



2020

HANDBOOK OF PEDIATRIC COVID-19 & STANDARD OPERATING PROCEDURES

THE CHILDREN'S HOSPITAL &
THE INSTITUTE OF CHILD HEALTH LAHORE

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Foreword

COVID-19 no doubt is the biggest health challenge faced by our generation of medical community worldwide. This has posed serious threats to the human health, welfare of the people and states, and the economic cycles everywhere around the globe. This has also stimulated and provided a challenge to the minds of people devoted to their profession and humanity. These challenges warrant a bigger, concerted, scientific and organized response from the professionals involved in the fight against the enemy.

Amidst the gloom and despair of death and helplessness ushered in by this unparalleled tragedy of modern days, the equally impressive resolve of the health care providers is the source of hope and pride for the common man.

The gloomy picture also has hidden in it the tremendous opportunities for good work, creating role models and leaving indelible prints in history. The initial brunt of the tragedy will no doubt be born by the health care providers. It is no secret that we cannot boast of the most ideal and sizeable health infrastructure; this makes it mandatory to use our meager resources effectively. The safety of our health care providers is of the utmost importance

This handbook prepared by the Children's Hospital Lahore under the dynamic leadership of Prof Masood Sadiq is a vivid example of the realization of this inherent responsibility of the profession.

I hope it will help the treating physicians everywhere and the principles outlined here will help the physicians in controlling the progression of the disease and saving lives. Such efforts have a worth much more than any worldly treasures. I congratulate the staff of Children's hospital and Institute of Child Health

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Preface

The medical profession has never confronted a situation like this in the recent history of mankind. COVID-19 pandemic, which started from Wuhan, China in December 2019, has become an international human crisis. More than 200 thousand people have died so far, all over the world and millions have been infected with this deadly virus.

The government of Pakistan reacted in time and has already taken necessary measures to prevent the spread of this virus to overcome this crisis. We need to interrupt the human-to-human transmission, as no definitive treatment is yet available. Serious consideration should be given regarding contact not only with other people but also in handling objects present at public places. Healthcare providers, who are our heroes, being the most vulnerable part of the society since they are in close contact with the patients being admitted in the hospital, need to be educated in this aspect.

Children are not the face of this pandemic but they risk being among its biggest victims by socioeconomic impacts and mitigation measures. Following guidelines have been prepared by a panel of senior experts of The Children's Hospital and Institute of Child Health, Lahore, especially for COVID-19 in children and SOPs for health care providers working at all levels, in general. The recommendations of Corona Expert Advisory Group (CEAG), government of Punjab, have also been incorporated. This is an evolving document and current guidelines are based on what is know today and updates will be incorporated regularly.

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Chapter 1

BACKGROUND

Introduction

Corona viruses are pathogens that infect both humans & animals. At the end of 2019, a novel corona virus was identified as the cause of pneumonia cases in Wuhan, Hubei province of China.¹⁻⁶ On January 30th 2020, the WHO declared the outbreak to be a public health emergency of International concern (PHEIC). In February 2020, the WHO designated the disease COVID-19, which stands for Corona virus disease 2019 and on March 11th it, was declared as pandemic.

Children of all ages appear to be susceptible to COVID-19 with no significant gender difference.¹ The disease however, is less prevalent and less severe in pediatric age group as compared to adults. The disease is even very rare in neonates, as only few cases have been reported in this age group.

1.1: Etiology: SARS-COV-2

The etiologic agent, which was initially given the name '2019 novel corona virus' (2019-nCoV) and later renamed on February 11, 2020 as 'severe acute respiratory syndrome corona virus 2(SARS-CoV2) are enveloped, positive single-stranded large RNA viruses that infect humans, but also a wide range of animals.^{5,6} Due to the presence of projections on their surface, which resembles solar corona, the virus was named as Corona virus (Latin corona=crown). The virus primarily infects adults, rarely children and very rarely neonates as only few cases have been reported in literature.¹⁻⁴

1.2: Epidemiology

Modes of Transmission:

According to the current evidence, COVID-19 virus is primarily transmitted between people through respiratory droplets and contact routes.^{7,8} Droplet transmission occurs when a person is in in close contact (within 1 m) with someone who has respiratory symptoms (e.g., coughing or sneezing) and may also occur through fomites in the immediate environment around the infected person. These droplets are too heavy to hang in the air. They quickly fall on floors or surfaces. Infection can also occur if a person touches an infected surface and then touches his or her eyes, nose, or mouth.

Airborne transmission (particles <5µm in diameter) may also be possible in specific circumstances in which procedures or treatments that generate aerosols are performed; i.e., endotracheal intubation, bronchoscopy, open suctioning/nebulization, tracheostomy, and cardiopulmonary resuscitation.⁹

There have been no reports of vertical transmission or feco-oral transmission of the COVID-19 virus to date.

Infectivity period:

The mean incubation period is 5 days (range: 2-14 days) with potential of asymptomatic transmission.¹⁰ The infectivity period is uncertain (10-20 days). The transmission is more likely during early stage of infection and viral shedding is variable depending upon the severity of infection (range 8 to 37 days). Viral RNA levels appear to be higher soon after onset of symptoms as compared to later part of the illness. Similarly, the detection of viral RNA does not necessarily indicate presence of infectious virus.

1.3: Pathogenesis:

The lungs are the organs most affected by COVID-19 because virus accesses the host cells via ACE 2 receptor, which is most abundant in type 2 alveolar cells. The virus uses special surface glycoprotein called a “spike” to connect to ACE 2 and enter the host cells. The virus smothers the host cells by reproducing COVID-19 virus within it. Cells in children's lungs express this receptor less than those in adult lungs. This may be one reason why the infection affects children less severely.

The main pathogenesis of COVID-19 infection as a respiratory system targeting virus was severe pneumonia, RNAemia, combined with the incidence of ground-glass opacities, and acute cardiac injury.¹¹ One proposed disease mechanism in severe cases is a 'cytokine storm.' Cytokines cause direct tissue damage, recruitment of neutrophils to tissues, and other pro-inflammatory effects and this damage can lead to Acute Respiratory Distress Syndrome. Significantly high blood levels of cytokines and chemokines were noted in patients with COVID-19 infection that included IL-6, IL-1 β , IL-1RA, IL-7, IL-8, IL-9, IL-10, basic FGF2, GCSF, GMCSF, IFN γ , IP-10, MCP1, MIP1 α , MIP1 β , PDGFB, TNF α , and VEGFA. Some of the severe cases have shown high levels of pro-inflammatory cytokines including IL-2, IL-7, IL-10, GCSF, IP10, MCP1, MIP1 α , and TNF α that are reasoned to promote disease severity.^{11,12}

1.4: Clinical Features:

The median age of all patients in the largest pediatric series (2143 patients) published so far was 7 years (Interquartile range: 2-13 years). Among those patients, 1213 cases (56.6 %) were boys and there was no statistically significant difference in the number of pediatric patients between boys and girls.¹

The main symptoms in children are fever, flu like illness (nasal obstruction, runny nose), dry cough, myalgia and fatigue. Some children only present with low to moderate grade fever in their entire course of disease, and some do not show fever at all.¹⁻⁴

Some children present with atypical symptoms, such as vomiting, diarrhea and other gastrointestinal discomfort, or only exhibited drowsiness and respiratory distress.¹

In severe cases, severe respiratory distress and/or hypoxemia may appear within one week after onset. Some of them rapidly deteriorate to acute respiratory distress syndrome (ARDS), septic shock, refractory metabolic acidosis, coagulation dysfunction, and multiple organ failure.

1.5: Clinical Classification, Complication & Differential Diagnosis

The severity of COVID-19 is defined based on the clinical features, laboratory testing and chest X-ray imaging:^{1,13}

Asymptomatic	Symptomatic			
	Mild	Moderate	Severe	Critical
Absence of any signs and symptom consistent with COVID-19	Non-specific symptoms like fever, cough, sore throat, runny nose, sneezing and myalgia Congestion of the pharynx and no auscultatory abnormalities	Pneumonia with fever and dry cough with fast breathing (according to age group) Radiological evidence of ppneumonia No hypoxemia	Severe respiratory distress O ₂ saturation <92% in room air Presence of any of the danger signs (convulsion, drowsiness, refusal to feed)	Signs of respiratory failure requiring mechanical ventilation ARDS Shock Multi organ failure

COVID-19 is less severe in pediatric age group except infant under one year of age and children with serious underlying conditions.^{1,14} In children 55% of all cases are asymptomatic or mild, 40% of cases are moderate, 5% of cases are severe and <1% have critical disease.¹⁴

Complications:

- * Respiratory: ARDS, respiratory failure
- * Thromboembolic: Pulmonary embolism, acute stroke
- * Cardiovascular: Cardiomyopathy
Arrhythmias, shock
- * Renal: Acute kidney injury
- * Neurological: GB Syndrome

Differential Diagnosis:

It is important to differentiate COVID-19 from other common illnesses with similar symptoms.

Symptoms	Coronavirus <small>Symptoms range from mild to severe</small>	Cold <small>Gradual onset of symptoms</small>	Flu <small>Abrupt onset of symptoms</small>	Seasonal Allergies <small>Symptoms may improve or worsen depending on environment</small>
Fever	Common	Rare	Common	Sometimes
Fatigue	Sometimes	Sometimes	Sometimes	Common
Cough	Common (usually dry)	Mild	Common (usually dry)	Common
Sneezing	No	Common	No	Common
Aches and pains	Sometimes	Common	Common	No
Runny or stuffy nose	Rare	Common	Sometimes	Common
sore throat	Sometimes	Common	Sometimes	No
Diarrhea	Rare	No	Sometimes in Children	No
Headaches	Sometimes	Rare	Common	Sometimes
Respiratory Distress	In moderate to severe cases	Rare	Rare	Sometimes

Chapter 2

CASE DEFINITION

2.1: Suspect Case

The possibility of COVID-19 should be considered primarily in children with fever, cough and/or respiratory distress and any one of the epidemiological history criteria.

- ∅ Travel or residence history in communities with documented COVID-19 positive cases within 14 days before the onset of illness.
- ∅ History of contact with COVID-19 infected persons (positive for nucleic acid detection) within 14 days before the onset of illness.
- ∅ History of contact with the patients presenting with fever or respiratory symptoms, who travel in other communities with documented COVID-19 positive cases within 14 days before the onset of illness.
- ∅ Clustering onset (2 or more cases of fever and/or respiratory symptoms within 2 weeks in small areas such as home, office, school class, etc.)

OR

A patient with severe acute respiratory illness requiring hospitalization in the absence of an alternative diagnosis that fully explains the clinical presentation and/or the patient has an underlying chronic medical condition*.

*(Cyanotic congenital heart disease, chronic lung disease, chronic kidney disease, chronic liver disease, on immunosuppressive treatment or an immune compromised state e.g., post-transplant)

While making a final diagnosis of a suspect case of COVID-19, it is very important that the clinician takes a good history and uses his/her clinical judgment, as in the presence of pandemics there is a high chance of false 'suspects'. Co-infections may be more common in children.

In adults with COVID-19, imaging features of pneumonia and CBC findings are also taken as clinical manifestation to suspect COVID-19, while in children these are of little help in diagnosis at initial stage of illness. Using such modalities will contaminate the imaging areas unnecessarily. Standard indications of a CBC and chest X-ray shall be followed as given in the management algorithm (Page: 17).

2.2: Probable Case

- A suspect case in whom COVID-19 PCR is negative but there is strong clinical suspicion, **OR**
- A suspect case in whom testing could not be performed for any reason.

2.3: Confirmed Case.

Suspected cases with one of the following etiology or serological evidence can be identified as confirmed cases

- o Real-time (RT)-PCR detection is positive for COVID-19 nucleic acid.
- o The viral gene identified by gene sequencing which is highly homologous with known COVID-19.
- o The COVID-19- specific IgM and IgG antibodies are tested positive. The titer of COVID-19 specific IgG antibody is 4 times higher in recovery period than that in acute phase.

2.4: Definition of Contact.

A contact is a person who experienced any one of the following exposures:

1. Face-to-face contact with a probable or confirmed case within 1 meter distance and for more than 15 minutes.
2. Direct physical contact with a probable or confirmed case.
3. Direct care for a patient with probable or confirmed COVID-19 disease without using proper personal protective equipment.
4. A person living in the same household with a COVID-19 case

2.5: Screening

The first screening of all patients shall be done at OPD and ER gates.

Healthcare providers deputed at the OPD and emergency gates shall:

- o Take temperature of every patient.
- o Ask relevant history of travel or contact
- o History of fever, persistent cough or breathing difficulty.

If history is positive, the patient is to be sent to fever clinic/ corona desk for further management (designated triage).

A. Out Door:

1. Separate room near entrance may be allocated where all patients with signs and symptoms of fever and respiratory infection shall be filtered.
2. Attending personnel shall be provided with adequate PPEs.
3. A proper mechanical distance between the attending physician and a suspected patient is to be assured.
4. A proper history & evaluation is to be done.
5. A patient, once suspected as having COVID-19, shall be shifted to the isolation room/ward. (See patient shifting policy)



B. Emergency Room

1. As in the present phase there is a suspicion of free viral circulation in the community, CMO, trauma doctors and nurses directly attending the patients shall be provided with N95 masks for safety.
2. There shall be a designated room/area within the emergency with provision of full PPEs to handle any COVID-19 suspect child presenting in a very sick condition and needing resuscitation. This room shall also serve the purpose for isolating any patient that is missed as “Corona suspect” during initial assessment and discovered later during further evaluation in the emergency. Once initial mandatory resuscitation is done, patient shall be shifted to corona isolation unit with all precautions.

C. Hospital Indoors:

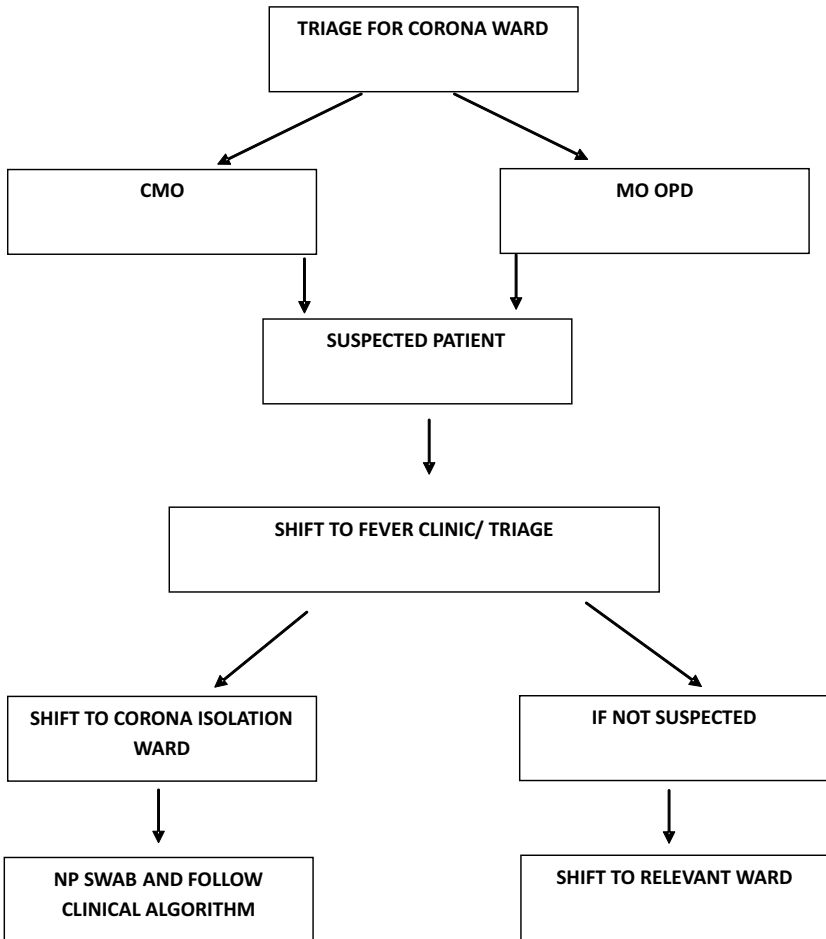
1. One patient one attendant policy shall be followed.
2. All health care professionals shall be provided with masks or PPE as per WHO/CEAG recommendation.

D. Patient Shifting Policy

1. The route of shifting a corona suspect/confirmed patient shall be isolated, pre-defined and away from the routine movement of other patients.
2. In case, the Corona isolation facility is distant from the presenting counters of the hospital OPD & emergency, an index patient should be shifted in an equipped ambulance with the driver wearing the protective gear.
3. The on-duty team in the Corona isolation ward shall be informed beforehand so that they are ready to receive the patient in full protective gear, and it is advisable that the previously taken patient history is re-evaluated. After shifting is complete, the emergency isolation room shall undergo disinfection.



Triage Algorithm



Chapter 3

DIAGNOSIS

3.1: Laboratory Confirmation¹⁵⁻¹⁸

Suspected cases should be immediately isolated and tested for COVID-19.

3.1.1: Real-Time Reverse Transcriptase (RT)-PCR

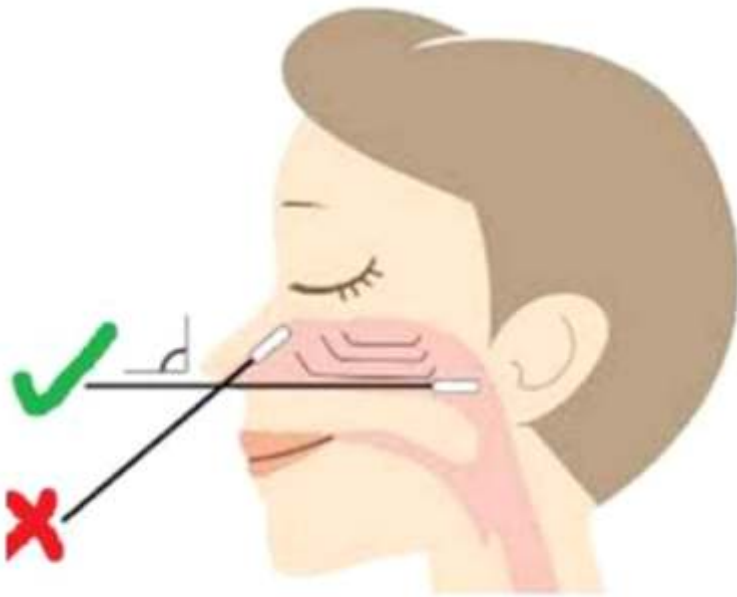
Sampling: By a trained health care staff with appropriate PPE and strict isolation precautions.

Specimen: Nasopharyngeal Swab- Insert a swab into nostril parallel to the palate. Swab should reach depth equal to distance from nostrils to outer opening of the ear. Leave swab in place for several seconds to absorb secretions. Slowly remove swab while rotating it.

Use only synthetic fiber swabs with plastic shafts. Place swabs immediately into sterile tubes containing 2-3 mL of viral transport media. If a delay in testing or shipping is expected, store specimens at -20°C (preferably at -70°C or below)

*A lower respiratory tract aspirate or Broncho alveolar lavage can also be collected in children receiving invasive mechanical ventilation.

Nasopharyngeal swab must be collected as shown in the diagram below:

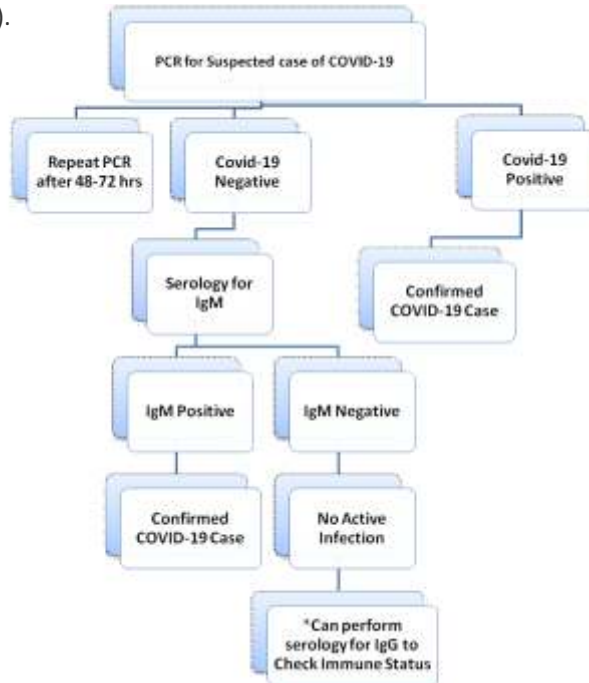


Although considered as “gold standard”, the sensitivity and specificity of PCR is not 100%. In a study of 107 specimens from 205 patients (age 5-67 years), detection results by (RT)–PCR for COVID-19, were as under;¹⁵

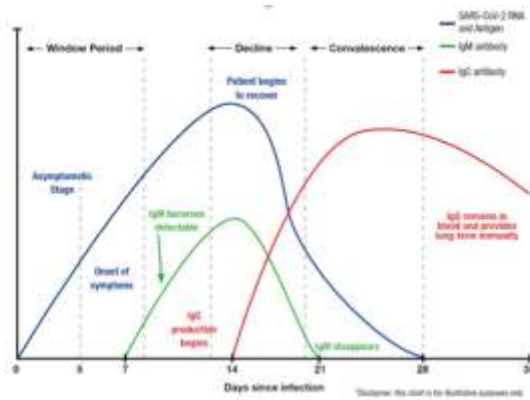
Corona testing Positivity rates-Journal of American Medical Association (JAMA)		
Sl No	Type of specimen	Positive %
1	Bronchoalveolar lavage fluid	93 %
2	Fibrobronchoscope brush biopsy	46 %
3	Sputum	72 %
4	Nasal swabs	63 %
5	Pharyngeal swabs	32 %
6	Feces	29 %
7	Blood	1 %
8	Urine	0 %

3.1.2: Serology

While IgM/IgG serological tests alone may not be enough to diagnose COVID-19, they can be a valuable diagnostic tool when combined with RT-PCR.¹⁵ If PCR test is negative and 5 days have passed after the onset of symptoms proceed with IgM serology (ELISA/RDT).



As shown in figure below, the serological tests are recommended, on patients at least 3 days after the onset of symptoms or 7-10 days after infection with the virus.^{17,18}



The table below shows the clinical interpretation of all possible scenarios that can be encountered when testing a patient with both RT-qPCR and an IgM/IgG serological test.^{17,18}

Test results			Clinical Significance
RT-qPCR	IgM	IgG	
+	-	-	Patient may be in the window Period of infection.
+	+	-	Patient may be in the early stage of infection.
+	+	+	Patient is in the active phase of infection.
+	-	+	Patient may be in the late or recurrent stage of infection.
-	+	-	Patient may be in the early stage of infection. RT-qPCR result may be false-negative.
-	-	+	Patient may have had a past infection, and has recovered.
-	+	+	Patient may be in the recovery stage of an infection, or the RT-qPCR result may be false-negative.

3.2: Laboratory Examination^{2,10}

CBC: In the early stages of the disease, peripheral WBC count is normal or decreased and the lymphocyte count is decreased. The platelet count may be low as well. In severe cases peripheral blood lymphocytes progressively decrease.

Acute Phase Reactants: Most patients have elevated CRP and ESR.

Serum Electrolytes and Renal Function Tests: These may be normal but are deranged in critical patients.

Liver Function Test: Elevated liver enzymes (ALT, AST) are observed in up to 1/3rd patients and need to be monitored.

In severe and critically ill patient, D-dimer and serum lactate increases & PT/APTT may be prolonged. Lactate dehydrogenase (LDH) may increase and is a predictive factor for early recognition of lung injury. Pro-calcitonin may be normal in initial stages but elevated in severe and critically ill patients and reflect bacterial co-infection.

Serum Ferritin elevation indicates cytokine storm syndrome or organ damage.

Arterial Blood gases in severe and critically ill patients.

3.3: Radiographic findings

Chest Radiographs: Chest X-ray may be normal in early or mild disease

As the disease progresses, multiple small patchy shadows and interstitial changes appear, which are more obvious in the periphery of the lung.

Consolidation and ground glass opacities with bilateral, peripheral and lower zone distribution can be there in moderate to severe disease.¹⁹

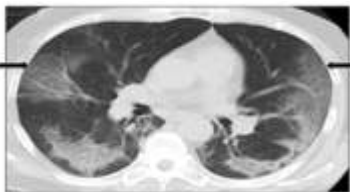
In severe cases, pulmonary consolidation may occur. Pleural effusion is rare.



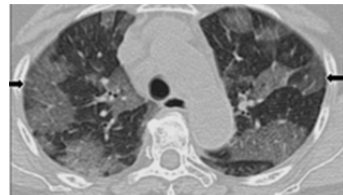
(Mild bilateral perihilar streakiness with no air space pacification)

Chest CT scan:

Finding on chest CT include ground glass opacity in 33%, local patchy shadowing in 19%, bilateral patchy shadowing in 12% and interstitial abnormalities in 01% of the patients.¹⁹ CT is very sensitive but not used for screening purposes.



Ground Glass Opacities

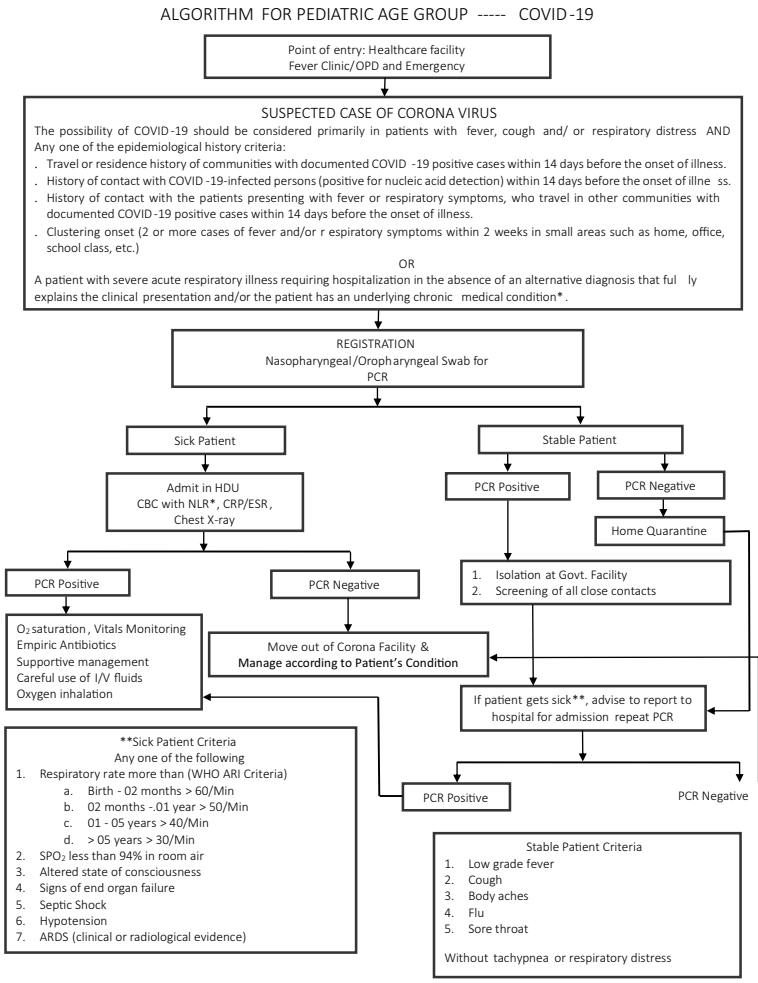


Chapter 4

PEDIATRIC PATIENT MANAGEMENT

4.1: Algorithm Pediatric Patient

The algorithm below shows a comprehensive scheme for the management of children presenting to a health care facility:



Go home therapy : Self isolation, Rest, Monitor temperature, Antipyretics, Oral Fluids, Hand Washing, No Steroids and No Ibuprofen

*NLR (Increased Neutrophil: Lymphocytic count ratio, 3.13 cutoff values)

**Cyanotic congenital heart disease, Chronic kidney disease, Chronic lung disease, Chronic liver disease, on immunosuppressive treatment or an immunocompromised state e.g., post -transplant)

4.2: Management as per severity:^{20,21}

Asymptomatic: No medications

- Monitoring for symptoms and disease progression
- Routine vitals including temperature, respiratory rate and heart rate

Mild disease: Oral medication

- Antipyretics: Paracetamol- SOS, Avoid NSAIDS
- Antihistamine-Cetirizine
- Normal saline nasal drops
- Oral hydration

Moderate disease: May need parenteral medication

- Antipyretics: Paracetamol- SOS, Avoid NSAIDS
- O₂ inhalation
- I/V fluids
- I/V antibiotics: for secondary bacterial infection
- (Ceftriaxone plus Co-Amoxiclav)
- Antibiotics may be stepped up if clinical condition warrants

Severe and Critical Disease:

General Management:

- Airway, breathing, circulation.
- Fluid and electrolytes balance should be maintained.
- Vital signs and oxygen saturation should be closely monitored.
- Effective oxygen therapy measures should be given in time, including nasal cannula, mask oxygen and high-flow nasal cannula oxygen therapy with target SpO₂ >94%.
- Empiric antibiotics: Since the clinical features of severe COVID-19 may be difficult to distinguish from bacterial pneumonia, so an empiric treatment for community acquired pneumonia (CAP) is rational when the diagnosis is uncertain.
 - Procalcitonin level may be used to differentiate between viral (<0.25 ng/ml) and bacterial pneumonia (>0.25 ng/ml)
 - First line Antibiotics: Inj. Ceftriaxone – 50-100 mg/kg/day, Inj. Co-Amoxiclav- 90mg/kg/day.
 - May escalate antibiotics if deteriorates or another organism suspected
- Inhaled medications:
 - Avoid nebulized medication to minimize the risk of aerosolization.

- o Inhaled medications shall be administered by MDI (Metered Dose Inhaler), where & when required.
- Corticosteroid should be avoided in common type of infection. However, its use may be considered in patients with rapidly deteriorating chest imaging, occurrence of ARDS, with obvious toxic symptoms, encephalitis or encephalopathy, hemophagocytic syndrome and other serious complications like septic shock.
- Inotropic support when indicated
- Mechanical ventilation (See section on Mechanical Ventilation)

Specific Therapy: Several treatments are being evaluated (primarily for adults) but their use for COVID-19 cases remains mainly investigational.

1. Antivirals:

Remdesivir

- ∅ A nucleotide analogue that inhibits viral RNA polymerase. It has activity against COVID-19 in vitro and related corona viruses both in vitro and animal studies.²²
- ∅ Compassionate use of remdesivir is available for children.²³
- ∅ **Dose:** 5mg/kg IV loading dose: 2.5 mg/kg OD for 2-9 days
- ∅ **Adverse effects:** Deranged liver enzyme, gastro paresis and rectal bleeding

2. Convalescent Plasma:

- ∅ Use of convalescent plasma has been described for patients with severe or life threatening COVID-19. The patients had decreased severity score, decreased NP viral load and improved oxygenation by 12 days after transfusion.²⁴
- ∅ FDA is also facilitating the evaluation of hyper immune globulin for patients with COVID-19.²⁵

3. Hydroxychloroquine/ Chloroquine:

- ∅ It prevents SARS-CoV-2 from binding to target cells.
- ∅ There is insufficient data for use of HCCQ/ Chloroquine in the treatment of COVID-19, so the patients should be referred to clinical trials whenever possible. When used toxicity (prolonged QTc) should be monitored closely.
- ∅ **Dose:** *Hydroxychloroquine:* 10 mg/kg max 600 mg BID Day 1, then 3 mg/kg/dose max 200 mg TID for 3 days.
- ∅ **Adverse effects:** Prolongation of QTc, retinopathy, serum glucose fluctuation



4. **IL-6 pathway inhibitors:**

Tocilizumab:

- ∅ It binds to IL-6 receptors and inhibits cytokine storm
- ∅ Indicated in patients with critical disease and high level of IL-6.²⁶
- ∅ **Dose:** 12mg/kg IV stat, max dose 400 mg, additional dose may be considered 12 hours after initial dose
- ∅ **Adverse effects:** Anemia, gastric perforation, hepatic injury

5. **Combined use of HCQ & Azithromycin:**

- ∅ Both HCQ and Azithromycin are associated with QTc prolongation and combined use may potentiate the adverse effect and should be avoided.

The optimal approach to treatment of COVID-19 is uncertain. No therapy has clearly proven to be effective. There are no well-controlled data supporting the use of any of these agents and their efficacy and safety for COVID-19 are largely unknown.

4.3: Warning signals for severe and critical disease:

- Increasing respiratory rate
- Poor mental responsiveness and drowsiness
- Rapid increase in D-dimers, procalcitonin and serum lactate levels
- Imaging showing bilateral or multi-lobe infiltration and pleural effusion; or pulmonary lesions progressing rapidly in a short time

4.4: Acute respiratory distress syndrome (ARDS):

Onset: 1 week after a known clinical insult or worsening respiratory symptoms.

Chest imaging (radiograph, CT scan, or lung ultrasound): bilateral opacities and bilateral ground glass appearance suggestive of ARDS.

Oxygenation impairment in children.³

Calculated by $\text{PaO}_2/\text{FiO}_2 \times 100$ (Normal > 350).

301 -350 - No ARDS

251 - 300 - Mild ARDS

150 – 250 - Moderate ARDS

< 150 - Severe ARDS

Management of critical COVID-19 ARDS:

- It is advisable to recognize severe hypoxemic respiratory failure early, and if hypoxemia persists despite high flow oxygen (via face mask with flow rate 10-15 L/min) then mechanical ventilation is indicated.²⁸
- In order to reduce the risk of aerosol generation and spread of infection, use of High Flow Nasal Oxygenation (HFNO) & Non-invasive ventilation (NIV) is not recommended where there is no facility of 'Negative Pressure Rooms'.

Mechanical Ventilation: ²⁹⁻³¹

- Should ideally be done in a negative pressure room (if possible)
- Remember that your personal protection is the priority. All team involved must use level III PPE and shall be experienced in donning and doffing of PPE.
- Pre oxygenate for 5 minutes with 100% O₂ to avoid manual ventilation
- Ensure filter between face mask and bag
- Intubate and confirm - avoid stethoscope - EtCO₂ (End tidal CO₂) and examination of chest are contradicting
- Start MV – use filter, inline suction, try not to disconnect from ventilator

Initial Ventilator settings:

Mode: Preferably PC-CMV or PC-SIMV

FiO₂: Start with 100 %, taper rapidly to 40% maintain saturation > 94%

Pressure Control (PC): Start with 20, titrate to maintain tidal volumes between 5-8 ml/kg. In severe ARDS maintain tidal volume between 3-6 ml/kg.

Respiratory Rate (RR): Age appropriate.

Peak end expiratory pressure (PEEP): Start with 5cmH₂O and can be increased to 10 to 15 cmH₂O

- Implement mechanical ventilation using lower tidal volumes (4–8 mL/kg predicted body weight) and lower inspiratory pressures (plateau pressure <30 cmH₂O)³²
- Tidal volumes should be adapted to disease severity: 3–6 ml/kg in the case of poor respiratory system compliance, and 5–8 ml/kg with better preserved compliance.
- Application of prone ventilation is strongly recommended for pediatric patients with severe ARDS

Monitoring: pH goal is normally 7.25-7.45;

- If pH >7.45, decrease respiratory rate
- If pH 7.15-7.30, then increase respiratory rate until pH >7.30
- If pH still <7.15, perform the following:
 1. Increase tidal volume by 1 ml/kg
 2. Deep sedation
 3. Continuous paralysis
 4. Prone ventilation

Optimization of oxygenation parameters

- 1) Minimize oxygen toxicity: (PEEP and FiO₂ drive oxygenation)
The goal is to deliver a partial pressure of oxygen to perfuse tissues
- 2) PEEP Optimization.
If FiO₂ requirement is >60 % increase PEEP

Refractory Hypoxemia: If patient is hypoxic (PaO₂<75) despite PEEP optimization and PaO₂ / FiO₂ ratio <150 then perform the following:



- Optimize volume status by diuresis
- Deep sedation
- Initiate continuous paralysis (atracurium)
- Initiate prone ventilation

Prone Ventilation:

- Severe ARDS (<36 hours from onset)
- Prone within 12 hours of $\text{FiO}_2 > 75\%$
- Prone >16 hours per 24 hrs. Supine >4 hours per 24 hours
- The only absolute contraindications are spinal cord injury, open chest or abdomen, and unstable airway.

Weaning from ventilator: Goal is to wean from ventilator, as soon as possible to prevent complications.

- All patients with improving or stable respiratory disease
 - $\text{FiO}_2 \leq 40\%$, PEEP ≤ 5 with $\text{SpO}_2 > 93\%$
 - Hemodynamically stable
 - Assess patient's readiness for weaning at least once daily
1. Consider temporary cessation of sedatives
 2. Patient should be on pressure support ventilation with minimum settings (e.g. PIP/PEEP <10/5).
 3. A daily spontaneous breathing trial (SBT) should be given, but may be discontinued if the patient develops:
 - Evidence of increased work of breathing with RR >30/min
 - Hypoxia ($\text{SpO}_2 < 92\%$)
 - Hemodynamic instability

Extubation: Consider extubation if patient meets the following criteria:

- Breathing spontaneously.
- Able to follow commands.
- Intact cough and able to protect airway.
- Requiring airway suctioning for secretion after 2 hours.
- $\text{FiO}_2 < 40\%$ at the time of extubation.
- Optimization of volume status prior to extubation.

Failure of weaning: Standard factors shall be looked for (respiratory, cardiac, neuromuscular, neuropsychological, and metabolic) and addressed appropriately.

Sedation & Analgesia: Dexmedetomidine (0.2 to 0.1 mcg/kg/hour) is preferred first line. Fentanyl (2-5 mcg/kg/hour) is preferred for short term or in severe renal dysfunction.



Morphine (20to 40 mcg/kg/hour): It is used as 2nd line but use should be cautious in renal dysfunction and hemodynamic instability.

Neuromuscular blockade: Always check for tube placement before giving neuromuscular blockade:

- 1) Atracurium (0.2 to 0.6 mg/kg)
- 2) Cis-atracurium (0.15 mg/kg)

ECMO Therapy should be considered when mechanical ventilation, blood purification, and other means are ineffective, and cardiopulmonary failure occurs which is difficult to correct.

4.5: Discharge Criteria

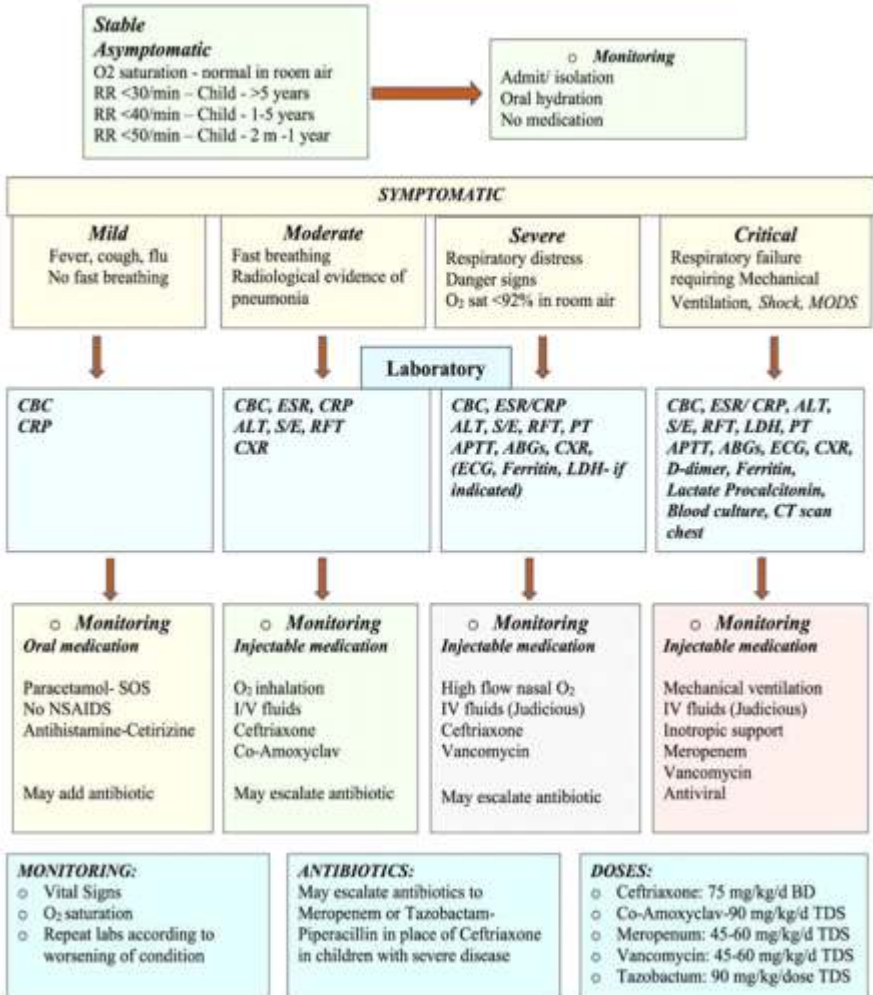
- ∅ Afebrile for >03 days without use of antipyretics
- ∅ Improved respiratory symptoms with improved radiological evidence of pneumonia.
- ∅ Two negative NPS for PCR in a row 24 hours apart.
- ∅ If 1st PCR is positive then:
 - Two negative NPS for PCR in a row, 24 hours apart.
 - 3rd test: after 24 hours of 2nd if it's negative.
 - To declare negative, two PCRs, 24 hours apart are required.
 - If necessary, home isolation for 14 days is suggested after discharge.
- ∅ In **symptomatic patients** repeat NPS should be taken at a minimum of 7 days after the 1st positive RT-PCR who clinically improve earlier.
- ∅ In **asymptomatic patients** it should be taken after 10 days of 1st positive RT-PCR.

Instructions at Discharge:

- Continue 14 days of isolation management & health monitoring.
- Wear mask and observe hand hygiene.
- Live in a single room with good ventilation.
- Reduce close contact with family members.
- Eat separately.
- Avoid outdoor activities.

Follow up visit: After 2-4 weeks.

Protocol for Children Admitted with COVID-19



Chapter 5

NEWBORN

5.1: Definitions

Suspected COVID-19 Neonate:³⁴

1. Neonate born to a mother with history of COVID-19, 14 days before delivery and 28 days after delivery. **OR**
2. Neonate with history of exposure to persons (mother, family members, visitors, attendant etc.) with confirmed or suspected COVID-19.

Probable COVID-19 neonate:

1. A suspected neonate for whom testing for the COVID-19 virus is inconclusive. **OR**
2. A suspected neonate for whom testing could not be performed for any reason.

Confirmed COVID-19 neonate:

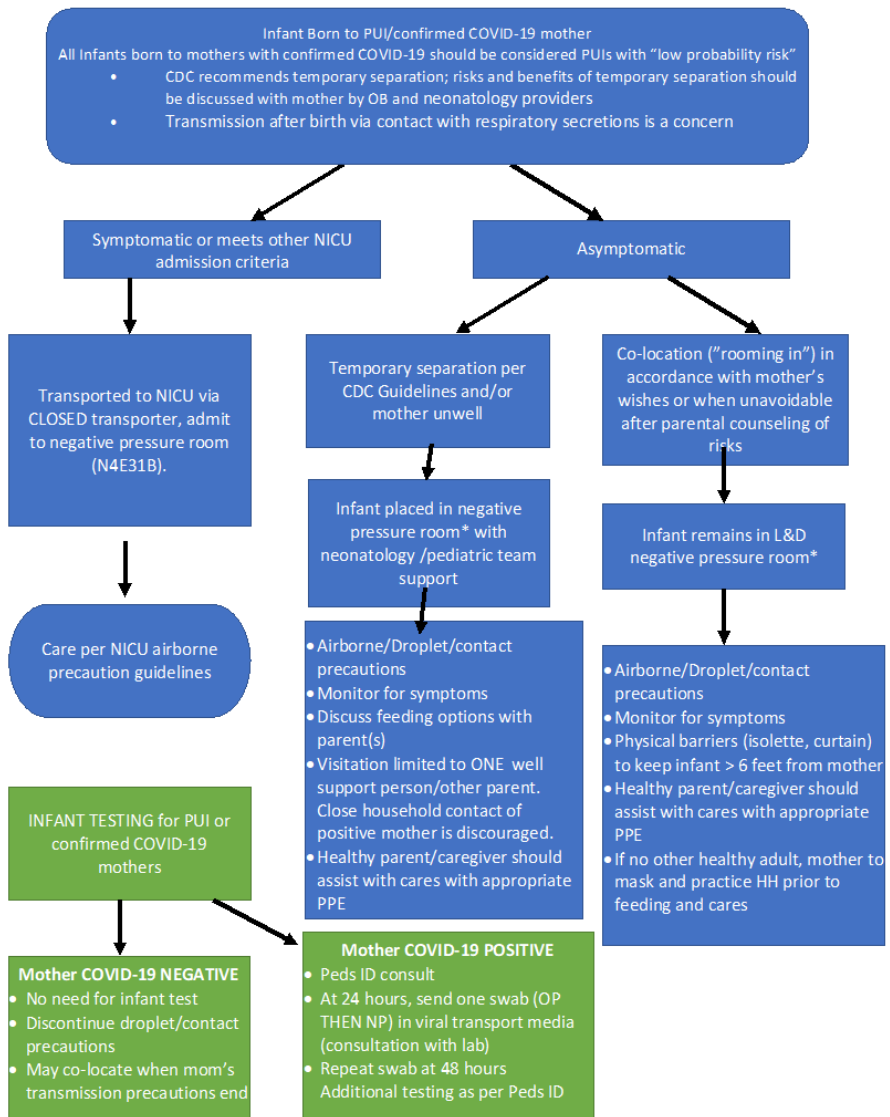
1. Respiratory tract or blood specimens tested by real-time fluorescence PCR (RT-PCR) is positive for COVID-19 nucleic acid.
2. Virus gene sequencing of the respiratory tract or blood specimens that is highly homologous to known COVID-19 specimens.

Suggestive clinical features in the neonate: Clinical findings, especially premature infants, are not specific. Therefore, it is necessary to closely monitor vital signs, respiratory symptoms and GI symptoms.

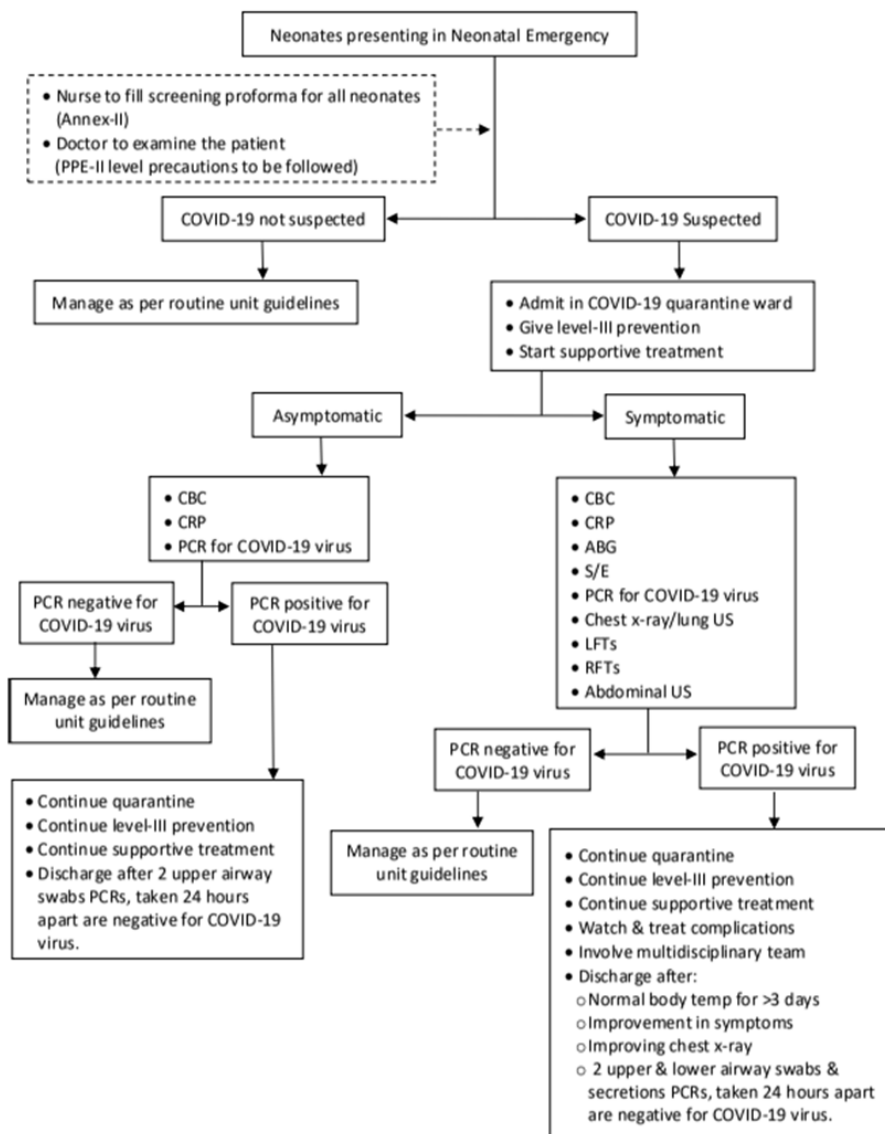
- Temperature instability (hyper or hypothermia)
- Tachypnea, grunting, nasal flaring
- Apnea
- Cough
- Tachycardia
- Poor feeding
- Lethargy
- GI symptoms like vomiting, diarrhea, abdominal distension

5.2: Neonatal Patient Management

NICU COVID ALGORITHM



MANAGEMENT APPROACH FOR COVID-19 IN NEONATES



5.3: Guidelines on feeding and care of neonate by mother having COVID-19:^{35,36}

- Currently, there is **no evidence for vertical transmission** of virus to neonates in women who develop COVID-19 in late pregnancy.^{35,36}
- In addition, evidence does not support presence of COVID-19 virus in breast milk of these mothers.
- However, postnatal transmission through infective air borne droplets poses a risk of transmission.
- Benefits of breast-feeding outweigh any potential risks of transmission of the virus through breast milk.
- The risks and benefits of breast feeding, including the risk of holding the baby by the mother and required infection prevention & control (IPC) measures should be discussed with her.
- Neonates born to mothers with suspected, probable or confirmed COVID-19 infection, can be fed according to standard infant feeding guidelines, while applying necessary precautions for IPC.
- The **mother should continue to breast feed** if she so desires, but taking due precautions of hand washing and use of mask around the baby.



Chapter 6

STANDARD OPERATING PROCEDURES

6.1: General Principles

The Govt. of Punjab SHCME nominated a “Corona Expert Advisory Group-CEAG” on 18th March 2020. The CEAG in its meeting held on 23rd March 2020, gave following recommendations:³⁷

- The **Hospital/Biomedical waste** will be strictly managed as per Hospital Waste Management Rules, 2014.
- All the international travelers (except from Africa) will be sent to quarantine facilities and will be retained there for 14 days.
- **Registration & Testing (PCR)** will be done for all suspected cases.
- **All hospitals equipped with HDUs** will receive suspected patients from the general public. These will be registered, screened and examined at Triage/ Filter Desks. If any patient falls within the Case Definition above, he/she will be admitted to the Isolation Room. Samples from all patients, thus admitted, shall be obtained in the prescribed manner by a trained official and sent to the Laboratory for PCR test.
- **Any patient who tests Positive for Covid-19**, he/she will be isolated in a Government facility for next 14 days; will be provided Quarantine Instructions, shifted to isolation ward/HDU as required in case of any medical complication and deterioration in clinical signs.
- Any person, who is contacted after being traced because he/she returned recently from any other country where Covid-19 has reported, showing signs and symptoms of corona disease, shall be shifted to nearby quarantine facility and tested for the disease.

Quarantine:

An area that separates and restricts the movement of people who were exposed to a contagious disease to see if they become sick. These people may have been exposed to a disease and do not know it, or they may have the disease but do not show symptoms.

Isolation:

An area used to separate sick people suffering from a contagious disease from people who are not sick.

6.2: SOP of a Model Quarantine Facility

- a. One room for one person. No common halls.
- b. Facility of distribution of meals to individual rooms by dedicated personnel observing all PPE.
- c. Appropriate facilities for hand washing/hand hygiene will be provided.
- a. **Registration and Screening** (as per case definition) will be done at these facilities.
- b. **Testing (PCR)** will be done for all symptomatic people at Quarantine. **Samples** will be collected, labeled and transported to designate laboratories by staff of Rescue 1122.
- c. Once the test comes **positive**, these cases will be shifted to COVID-19 ward/HDUs for further management.
- d. Dedicated ambulance of 1122 to be made available for the sole purpose of transportation of patients from quarantine to isolation at hospitals.
- e. Staff of the ambulance will observe all PPE.
- f. Waste generated at quarantine facilities will be segregated, collected, transported and disposed of as per Hospital Waste Management Rules 2014.
- g. Non-critical patient-care equipment (e.g. stethoscope, thermometer, blood pressure cuff and sphygmomanometer) to the individuals will be provided.
- h. Adequate equipment/items required for cleaning/disinfection will be provided for individual room.
- i. Thorough daily cleaning of each room will be ensured as per infection control SOP's.
- j. The room attendants will ensure use of proper PPE for contacting and attending the inmate.
- k. No visitors/family members from outside will be allowed inside this quarantine facility.
- l. Psychologist will be available for necessary counseling.
- m. All the Hospitals will establish a Triage/Filter Clinic for self-reporting patients. The Desks established will segregate/isolate the patients on the basis of symptoms, history of contact/travel and will be guided accordingly.
- n. The Committee further recommended establishing **Isolation Rooms, Isolation Wards and High Dependency Units** in the dedicated buildings/blocks of all public sector hospitals.

6.3: Isolation Rooms

1. All the conditions mentioned for Model Quarantine Facility will be applicable for Isolation rooms.
2. The guidelines for the use of PPE will be followed strictly.
3. All the patients with symptoms (as per Case Definition), and positive contact/travel history will be kept in the Isolation and will be managed symptomatically.
4. Samples for PCR testing will be obtained and sent at the Day 1 and the patient will be kept till the result of PCR.
5. In case of test positive the patient will either stay in room or be shifted to **Isolation Ward** as required.
6. In case of developing respiratory distress or any other life-threatening complication or on the basis of clinical assessment, the patient will be shifted to High Dependency Unit (HDU).
7. Hospital Administration will ensure the implementation of all hospital safety protocols for cross infection control and barrier the transmission for minimizing the risk.

6.4: Isolation Ward

1. This facility will be preferably located away or completely isolated from the main hospital building, having separate entry and exit and preferably near to the isolation rooms.
2. Only the (PCR) **Test Positive patients** will be shifted/ kept here.
3. Once the facility is occupied to 50% of the capacity, the patients will be shifted to dedicated facilities (as declared) by the department.
4. Stable patients, not requiring any supportive treatment would stay here.
5. In Case any patient gets unstable, develops shortness of breath or advised so by the clinical consultant will be shifted to HDU.

6.5: High Dependency Unit (HDU)

As per already given instructions by this Department, HDU will be equipped with all facilities for the management of unstable patients. HDU will be equipped with

- Ventilator
- Cardiac monitor
- Oxygen
- Resuscitation equipment
- Lifesaving drugs
- Disposables
- Portable X-rays & Ultrasound

Chapter 7

SURGICAL PROTOCOLS DURING CORONA PANDEMIC

In view of the Global Public Health Emergency, COVID-19 (Corona Virus Pandemic), the following guidelines for surgical patients has been prepared and will be kept under review on ongoing basis.³⁸⁻⁴²

7.1: Guidelines for the Surgical Patients in Wards:

- There will be strictly one patient on each bed.
- There will be one accompanied attendant only.
- Relevant history from attendant will be taken regarding fever, cough, respiratory distress, flu and any epidemiological criteria. If suspect; will be referred back with precaution to corona desk.
- Surgeries should be classified and **elective and semi-elective surgeries should be deferred** till pandemic is there.^{38,39}
- **Any suspected/confirmed case will not be scheduled** for elective surgery at any cost.
- Emergency and urgent cases will be given top priority during pandemic.^{38,39}
- There will be minimum number of the patient's attendants in the ward and attendants will be educated about cross infection.
- The stay of patients will be kept as short as possible.
- **Daily disinfection** of floor and hardware as per SOP of all OT's will be ensured with **minimum contact time of 10 minutes every time between the cases.**
- Separate spaces will be dedicated in wards, ICU and other areas for suspected cases/confirmed if needed **but preferably shifted to corona isolation room if available.**
- Single use or dedicated equipment (stethoscope, BP cuff and thermometer) will be used with proper care and after sterilization.
- If equipment needs to be shared it will be cleaned and disinfected/sterilized between usages for different patients.
- Healthcare worker who are transporting patients will perform strict hand hygiene and protective measures as recommended.

7.2: SOP'S for Operation Theatre

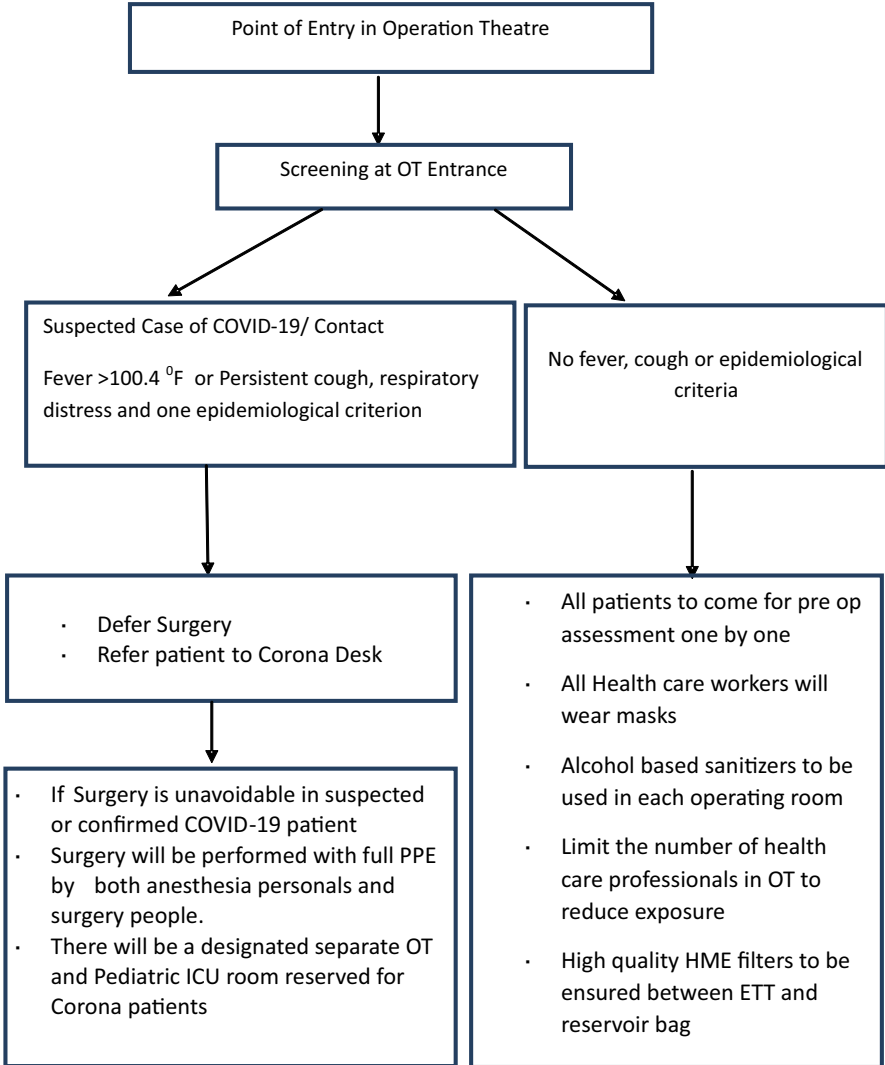
- Screening will be done at entrance of OT.
- If patient is having fever $>100.4^{\circ}\text{F}$, persistent cough or respiratory distress, flu and any epidemiological criteria, will not be scheduled for surgery and will be referred to Corona desk.

- All Health Care Workers will wear provided disposable surgical face mask and necessary equipment as per CEAG recommendation.
- Healthcare providers will wear a disposable surgical mask and use hand sanitizers all the time.
- Alcohol based sanitizers will be used in each operating room for personal hygiene.
- All OT tables and surfaces will be cleaned with alcohol-based liquids/ bleach (1:5 dilution) after each use and minimum contact time 10 minutes.
- Patients will be allowed to come one by one for pre-operative assessment.
- **Laparoscopic surgery, elective GIT endoscopy, bronchoscopy, and laryngoscopy** should be deferred during pandemic.
- **N-95/FFP2/KN95/FFP3 Masks and full PPE** as recommended by CEAG will be used for all known or suspected cases of COVID-19, if emergency surgery is indicated but elective surgery will be deferred.
- There will be **separate designated O.R and PICU room/area or in isolation room/isolation ward/HDU for confirmed or suspected COVID-19** cases.
- The number of staff members present in OT for intubation/extubation will be limited to reduce the risk of encounter with the patients having mark on thumb.
- High quality HME filter between ETT and the reservoir bag will be ensured.
- Theatre shoes will remain in theatre



ALGORITHM COVID-19

GUIDELINES FOR OPERATION THEATER



Intercollegiate General Surgery Guidance COVID-19

Intercollegiate General Surgery Guidance on COVID-19		
Emergency Surgery <ul style="list-style-type: none"> - Test all for COVID-19 - Treat all as +ve - CT thorax in last 24 hours - Add CT thorax if having CT abdo 	Planned Surgery <ul style="list-style-type: none"> - Risk assessment for COVID-19 - Greater risks of surgery - Consent - Risk-reducing strategies (e.g. stoma) 	PPE <ul style="list-style-type: none"> - PPE for all laparotomies - Unless COVID-19 negative (beware false negative) - Include eye protection - Practise donning & doffing
Theatre <ul style="list-style-type: none"> - Minimum staffing levels - All staff PPE including visors - Stop +ve pressure ventilation - Smoke extraction - Intubation / extubation in theatre 	Laparoscopy <ul style="list-style-type: none"> - Generally should not be used - Filters etc. difficult to implement - Appendicitis: open / conserv. - Cholecystitis: conserv. / cholecystostomy 	Endoscopy <ul style="list-style-type: none"> - Emergency only - Follow guidance from BSG - Upper GI endoscopy requires full PPE

Managing COVID-19 in Surgical Systems

- Prepare for a rapidly evolving situation: reevaluate frequently
- Educate all staff on PPE and COVID-19 management
- Develop a Dedicated COVID operating space
 - Specific room for all COVID operations
 - No unnecessary items inside
 - Minimize traffic in an out
 - Recover in OR until ready for isolation room
 - Keep transport pathways clear
 - Specific care pathways should be developed for each site
- Postpone elective operations immediately, save personnel & PPE
- Decrease Health Care Staff Exposure: limit to most experienced
- ORs may need to be converted to ICUs as landscape changed

Guidelines by @MaryEBrindle & @Atul_Gawande of @AniadnLabs
@CAHarrisMD

How do I manage surgery for COVID-19 PUI/confirmed patients?

- Develop a dedicated Covid-19 OR
- Intubate in a negative pressure room prior, extubate there too
- Minimize Airway Circuit disconnection
- Consider additional filters on anesthesia machines
- Employ an anteroom to don/doff PPE and staff a runner outside
- Empty OR of all non-essential materials
- Use separate OR case, airway, and medication carts
- N95 or PAPR for all aerosol generating procedures

#CoVisuals

7.3: Staff Safety Guidelines

- **Anesthesia personal/Aerosol dealing personnel** will take level III, protection during surgery by wearing N95/KN95/FFP2/FFP3 mask, full PPE, and protective shield during intubation.^{41,42}
- Everyone in Operation Theatre/wards/ICU will maintain strict hand hygiene.
- Staff will wear a three-ply surgical mask all the time in routine theatre.
- Staff will wear disposable gloves before touching a patient or patient's surrounding with use of hand sanitizer/disinfectant.

Minimum standard surgical dress during surgery

All operations including emergency or elective should be performed if needed. The surgery/anesthesia staff should wear disposable surgical gowns/or PPE (provided from hospital) disposable surgical cap, at least disposable three-ply surgical masks and protective shoe cover impermeable to water (polythene).

- If splash of any material is suspected during operation, goggles and protective shield should be worn.
- Staff will wash hands properly before leaving the operation theatre/wards/ICU.
- Staff will inform if anyone is having flu, fever or contact with a traveler from abroad to corona desk.

7.4: Hospital/Theatre waste

All the waste will be disposed of as per **waste management rules 2014**.⁴³



Chapter 8

SAFETY GUIDELINES REGARDING PPE

8.1: Safety levels for healthcare workers: ^{44,45}

Safety levels	Protective level	Protective equipment
Level-I	<ul style="list-style-type: none"> · General OPD · General emergency · Pre-examination Triage 	<ul style="list-style-type: none"> · Disposable Surgical mask · Surgical gowns/cap · Disposable Examination gloves · Sanitizer /soap with water
Level-II	<ul style="list-style-type: none"> · General triage by CMO · General ward · Short stay area · Regular labor room and operation theater 	<ul style="list-style-type: none"> · Disposable cap · Surgical gown · Disposable Surgical mask · Disposable latex gloves · Sanitizer /soap with water
Level-III	<ul style="list-style-type: none"> · Triage center for COVID -19 · Isolation ward/treatment area for COVID -19 · HDU/ICU for COVID -19 · Radiological imaging of suspected/confirmed cases of COVID -19 · Cleaning of surgical/interventional equipment · Sample collection and laboratory for COVID-19 · Labor room and theater if a suspected/confirmed case of COVID-19 is being managed/operated 	<p>Full Personal Protective Equipment</p> <ul style="list-style-type: none"> · Disposable cap · N-95/KN-95/FFP2/FFP3 preferably with respirator mask · Disposable latex long gloves · Tyvek suit · Goggles · Protective glass shield · Long shoes and shoe cover

Note:

1. All staff at healthcare facility must wear surgical mask and do proper hand wash with soap and water more than 20 second.
2. All staff working in outpatient department of infectious disease and respiratory disease and endoscopy department like gastrointestinal endoscopy, bronchoscopy, laryngoscopy etc. must wear medical protective mask (N-95/KN-95/FFP2/FFP3 mask).

1. Staff must wear a protective glass face shield/screen while taking respiratory sample from suspected/confirmed cases of COVID-19.
2. Life of medical protective masks like N-95 is 8 days if worn for 8 hours in a day with 2 hours interval, if does not get wet/soiled and used by the same person.
3. Surgical mask is disposable and may be used continuously for 6 hours if does not get wet/soiled.

HEALTH FACILITIES	TARGET PERSONNEL	ACTIVITY	TYPE OF PPE'S
PATIENT ROOM	Health care workers	Providing direct care to COVID-19 patients in Isolation or HDU	<ul style="list-style-type: none"> - Disposable cap - Disposable Latex Gloves - N95/KN95/FFP2 Mask - Tyvek suit - Eye Protection goggles or face shield
	Cleaners/Sweeper/Ward Boy	Cleaner entering the COVID-confirmed patient room	<ul style="list-style-type: none"> - Disposable cap & shoe cover - Disposable Gloves - N95/KN95/FFP2 Mask - Tyvek suit - Eye Protection goggles or face shield
		Cleaner not entering the room	<ul style="list-style-type: none"> - Gloves - N95/KN95/FFP2 mask & cap - Surgical Gown
	Attendant (mother/father)	Staying in the room with a COVID-19 child	<ul style="list-style-type: none"> - Gloves - N95 mask&disposablecap - Surgical Gown - Soap with water/ Sanitizer
TRIAGE	CMO/MO fever clinic	Preliminary screening not involving direct contact	<ul style="list-style-type: none"> - Maintain social distance of at least 1 m. - Disposable examination Gloves - N95/KN95/FFP2 mask & Cap - Surgical Gown - Soap with water/ Sanitizer
	Patients with respiratory symptoms	Any	<ul style="list-style-type: none"> - Maintain social distance of at least 1 m. - Provide medical mask to the patient - Soap with water/ Sanitizer
	Patients without respiratory symptoms	Any	<ul style="list-style-type: none"> - No PPE's required
LABORATORY	Lab Technician/designated health worker	Manipulation of respiratory samples	<ul style="list-style-type: none"> - N95/KN95/FFP2 Mask - Gown - Gloves - Eye protection by goggles
ADMINISTRATIVE AREAS	All Staff, Including healthcare workers	Administration tasks that do not involve contact with COVID-19 patients.	<ul style="list-style-type: none"> - Disposable surgical mask - Soap with water/ Hand Sanitizer



8.2:SOP's for Healthcare Workers at The Children's Hospital, Lahore.
8.2.1 Personal Protective Equipment (PPE)

COVID-19 Safe PPE



General contact with confirmed or suspected Covid-19 case

Aerosol Generating Procedures



Personal Protective Items:



Gown



Full Body Suit / Tyvek Suit



3 Layered Medical/Surgical Mask



N95 Mask



N95 Respirator



Goggles



Gloves



Shoe Covers

8.3: Hand Washing Techniques

RUB HANDS FOR HAND HYGIENE! WASH HANDS WHEN VISIBLY SOILED

⌚ Duration of the entire procedure: 20-30 seconds



Apply a palmful of the product in a cupped hand, covering all surfaces;



Rub hands palm to palm;



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



Palm to palm with fingers interlaced;



Backs of fingers to opposing palms with fingers interlocked;



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



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



Once dry, your hands are safe.

8.4: Donning and Doffing Method

A. Putting on PPE (Donning)

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



CSM00111

B: Safe Removal of PPE (Doffing)

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 an infectious* 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 an infectious* 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 an infectious* 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 an infectious* waste container



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

* An infectious waste container is used to dispose of PPE that is potentially contaminated with Ebola virus.



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



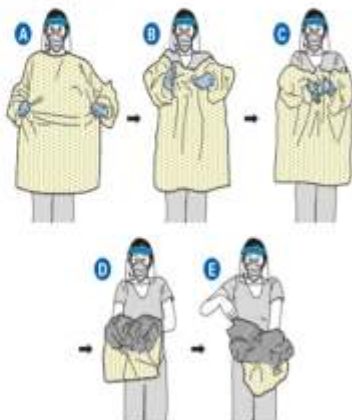
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HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 2

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **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. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into an infectious* waste container!



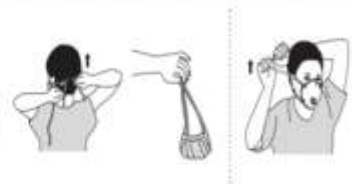
2. GOGGLES OR FACE SHIELD

- 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 and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in an infectious* waste container



3. 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 an infectious* waste container



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



* An infectious waste container is used to dispose of PPE that is potentially contaminated with Ebola virus.

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



Chapter 9

ESSENTIAL PRECAUTIONS FOR HEALTHCARE STAFF

9.1: Advice to Healthcare Personnel

1. **Stop** wearing wrist watches, rings, or bracelets.
2. **Stop** bringing computer, handbags and wallets to hospital. Just a credit card and some currency notes may be enough.
3. **Clean** your eyeglasses, business card, pen and mobile phones before starting work and before going home.
4. If possible, **use the spare rooms** in the hospital, and wear (Scrub) in the hospital, when you arrive at work, and replace it with your clothes before leaving.
5. Try to observe the recommended **social distancing** with each other during duty hours.
6. **Wear** your area-specific recommended safety gears strictly during working hours.
7. **Do** frequent hand washing and make use of **sanitizers**, before, during & after patient care.
8. **Wash** your hands to the elbows before leaving the hospital.
9. Frequently **clean** steering wheel, door handle of car/ bike.
10. **Leave** the driving license in the car.
11. At home, **leave mobile phone case/back cover** in car and just carry your cell phone without any covering to your house.
12. **Clean your car keys with antiseptic solution** on arriving at hospital and just before leaving.
13. **No phones, remote, I-pads** on beds at home and even duty rooms in hospital.
14. **Avoid putting mobile on the bed**, whether at home or shift room.
15. If work clothes are not available from the hospital, bring the work clothes with you in a clean bag.
16. **Leave** work shoes in the car or outside the home.
17. **Wash** your work clothes (with hot water if possible) and don't mix them with the other clothes
18. Take **shower** as soon as you arrive home, before meeting or touching any of your family members. Try to keep away from the elder/old family members staying with you.

19. **Nutrition:** Prefer protein rich diet, citrus fruits, dry fruits, and multivitamins to increase immunity.

9.2: Protocols for Protection at Returning Home

 <p>When you return home, try not to touch anything</p>	 <p>Take off your shoes</p>
 <p>Disinfect your pet's paws if you take him out for a walk</p>	 <p>Take off your outer clothing and put it in a laundry bag</p>
 <p>Leave bag, wallet, keys, etc. in a box at the entrance</p>	 <p>Shower or if you can't, wash all exposed areas well</p>
 <p>Wash your phone and glasses with soap and water or alcohol</p>	 <p>Clean the surfaces of what you have brought from the outside with bleach before storing</p>
 <p>Take off your gloves carefully, throw them away and wash your hands</p>	 <p>Remember that it is not possible to do a total disinfection, the objective is to reduce the risk</p>

Chapter 10

INFECTION CONTROL PROTOCOLS FOR COVID-19^{46,47}

Corona suspect or confirmed patients require isolation due to highly transmissible nature of Covid-19 virus. These guidelines are intended to apply to all medical staff (consultants, junior doctors, staff nurses, support staff) attending the patient within the Corona Unit.

10.1: General rules

These rules are to be followed by all the team members and include:

- Implementation of "**Standard Precautions**"
- Additional "**Transmission-Based Precautions**" are for patients known or suspected to be infected by epidemiologically important pathogens spread by airborne or droplet transmission or by contact with dry skin or contaminated surfaces.

10.2: Standard Precautions

Standard Precautions apply to all those Healthcare workers who contact with:

- Respiratory secretions
- Blood
- All body fluids, secretions, and excretions
- Non-intact skin and
- Mucous membranes

These Precautions include the following:

- o Health care providers must follow hand washing and antisepsis (hand hygiene) before donning PPE can be used before and after touching patient OR his/her surroundings OR any of the secretions or fluids.
- o Do not wear watches or jewelry.
- o Do not use nail polish.
- o **Healthcare worker** must wear personal protective equipment while entering Corona Ward as protocol provided.
- o **Sanitize hands** and change gloves between patients.
- o Healthcare Personal must handle patient care equipment properly.
- o Where possible, use disposable items.

Disinfection of the instrument will be done before using for next patient according to the protocol provided to Head Nurse.

- o **Soiled linen** will be packed in a double bag, in another yellow bag, sealed by sanitary staff and marked as highly infectious.
- o It will be handed over to waste management unit to transfer it to CSSD/ Incinerator.
- o They should prevent needle stick/sharp injuries.
- o Head nurse and support staff are responsible to keep Environment clean and spills-management as per IC protocols
- o Every member of the team is responsible for appropriately handling of waste.
- o **Treat every type of specimen as highly infectious** and every room should be provided with a pedal operated close bin to dispose it off in Yellow bags.
- o **Head Nurse will collaborate with waste management department** for the safe transportation of infectious waste to the incinerator where it will be immediately incinerated.
- o The **surfaces in patient care areas** including washrooms will be disinfected at the beginning of the shift by the ward boy on duty as guided by infection control team under the supervision of on Duty Head nurse.
- o **Contact time for disinfection:** It must be minimum **10 minutes**.
- o Head nurse will be responsible for maintaining the stock of disinfectants, sanitizers, liquid soap and PPE.
- o **Use of mobiles** must strictly be prohibited in patient care areas.
- o No Healthcare Personal should carry **bags laptops, tablets** in this area.
- o **Food** for the patient must be provided in disposable packs.
- o No food should be left open in the ward.
- o **When leaving**, wash your hands up to elbow thoroughly after doffing PPE and sanitize your belongings

10.3: Transmission-Based Precautions: (Aerosol & Contact)

The following precautions need to be taken:

- o Place patient in a single room.
- o The air should be discharged to the outdoors and specially be filtered before it is circulated in the room.
- o Keep doors closed.
- o Anyone who enters the room must wear a medical mask and if he is going to perform some respiratory procedure, he must wear N-95 respirator.
- o Limit the movement of the staff members.
- o Keep the minimum number of staff to avoid cross contamination.
- o A list of all disinfectant solutions approved for used with COVID-19 is available on the following link: <https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>⁴⁸

Chapter 11

GUIDELINES FOR IMAGING COVID-19 PATIENTS⁴⁹

11.1: General Precautions

- Limit attendants/visitors to the department
- Minimum staff and patients should only access scanning areas.
- Pregnant staff will not be assigned to work with known/suspected COVID-19 patients.

11.2: PPE and Isolation precautions

- Include protective gowns, gloves, and goggles (preferably).
- N95 mask is required to prevent aerosol transmission.

11.3 Patient transfers to and from the department

- Patients must not be shifted to department unless absolutely necessary.
- In event of transfer, radiology department must be pre-informed so that adequate arrangements can be made.

11.4: Patient must wear a surgical mask

- Healthcare staff needs to wear PPE during patient transfer.
- Patients with COVID-19 should be shifted directly to the scanners or procedure room and should ideally be scheduled at the end of the list if clinically possible.
- Patient transfer routes in and out of the department/scan rooms should be earmarked beforehand for ease of transfers.
- **Use of portable x-ray is highly recommended in emergency rooms /isolation rooms** rather than patient transfer to the radiology department.
- **Ultrasound facility** should be reserved for critically sick patient and decision to be made in consultation with Radiology team considering the risk vs. benefit outcome; keeping in mind the outcome in management of the patient.
- A **designated ultrasound machine** should be dedicated for COVID-19 patients.
- Departmental x-rays and ultrasounds to be discussed with consultant and performed on a separate ultrasound machine.

11.5: CT scanning

- CT scan facility should be reserved for critically sick patient and decision to be made in consultation with Radiology team considering the risk vs. benefit outcome; keeping in mind the outcome in management of the patient.
ideally a dedicated CT is required be designated for all patients with COVID-19, to prevent cross-contamination to other patients.

- Dedicated radiographers should be staffed in this scanner.
- Appropriate PPE and Decontamination kits/equipment must be available outside and inside the scanner suites.

11.6: Post exposure de-contamination

- **All sheets gowns** used must be discarded as per infection control policy.
- Preferably disposable sheets should be used.
- If disposable sheets not available then these sheets should be sent for sterilization in designated sealed waterproof or alginate bags.
- **Appropriate disinfectant solution spray** (which include quaternary ammonium, sodium hypochlorite, hydrogen peroxide and alcohol-based compounds) should be used to cover all contact surfaces of the scanners, work stations/desks, keyboards and monitors instrument trolleys.
- If a radiological instrument like X-ray or ultra sound machine is required for patient's investigation, it should be thoroughly disinfected (as per protocol provided) before leaving the ward to avoid transmission of virus.
- **Contact time of disinfection:** Appropriate concentration and contact times of the surface disinfectant should be used. Minimum recommended time is **10 minutes**.

All PPE must be discarded appropriately in designated bins and discarded as per infection control protocols.



Chapter 12

HOME QUARANTINE INSTRUCTIONS^{37,50}

12.1: In Suspected Cases

- **Restrict the mobility** to your room for 14 days and minimize contact with family members and other people.
- **Drink** plenty of water.
- **In case of fever:** Syrup Paracetamol 10–15 mg/kg/dose (6-8 Hourly, as per requirement)
- **After sneezing or coughing:** Wash your hands frequently with soap for at least 20 seconds.
- Keep wearing face mask all the time.
- Visit hospital in case of not feeling well.

12.2: Stay at Home guidance for households

Criteria and guidance applied as:

- **Day one** is the first day of symptoms.
- The **14-day period starts** from the day when the first person in the house became ill.
- If you live with others and you are the first in the household to have symptoms of corona virus, then you must stay at home for 7 days. If anyone else in the household starts displaying symptoms, they should stay at home for 7 days from when their symptoms appeared, regardless of what day they are on in the original 14-day isolation period.
- Household members, who remain well, stay in self-isolation for 14 days due to maximum incubation period, calculated from day 1 of first symptomatic person.

Household members do not need to restart the clock if other members become symptomatic during the 14 days self-isolation.



World Health Organization

Home care for people with suspected or confirmed COVID-19

Take care of yourself and your family

All members of the household

Wash hands with soap and water regularly, especially:

- after coughing or sneezing
- before, during and after you prepare food
- before eating
- after using the toilet
- before and after caring for the ill person
- when hands are visibly dirty



Avoid unnecessary exposure to the ill person and avoid sharing items, such as eating utensils, dishes, drinks and towels.



When coughing or sneezing, cover mouth and nose with flexed elbow or use a disposable tissue and discard immediately after use.



Monitor everyone's health for symptoms such as fever, cough and if difficult breathing appear, call your health care facility immediately.

EPI-WIN

www.who.int/covid-19

Chapter 13

GUIDELINES FOR HCW IN CORONA AREA

13.1: Guidelines for health care worker in corona ward

(Doctors, Nurses, support staff)^{46,51,52}

1. Doctor on duty should stay in ward and not allowed to go out during duty hours. Avoid the presence of unnecessary individuals in the room.
2. Duty nurse should continuously monitor the patient.
3. During the critical situation of patient, doctor on duty will immediately attend the patient in full PPE.
4. The duty doctor should take history, conduct examination and prescribe medicine for each new patient & inform consultant on call.
5. Doctor on duty should do NP Swab immediately after admission.
6. Ensure that health care workers refrain from touching their eyes, nose and mouth with potentially contaminated gloved or ungloved hands.
7. Consultant on call will do one round in 24 hours and on call senior registrar will be there for 24 hours with doctor on duty
8. All IV & oral medicines should be given on time by nurse on duty and she will do sampling if required.
9. On duty support staff should stay in corona ward for 24 hours

13.2: Preventive measure for patients and attendants of corona isolation ward.⁵¹

1. Patients must wear surgical mask.
2. Only one attendant (mother / father) will be allowed to stay with patient.
3. Attendant should wear N95 mask covering it with surgical mask.
4. During coughing and sneezing, patients should cover mouth with tissue paper or cough inside their elbow.
5. All waste of patients should be disposed of in labeled dustbins.
6. Patients in the ward should maintain social distancing.
7. If admitted patient is positive without symptoms, he / she should bring daily necessities (clothes, dry food, tissue papers, utensils etc.) with him / her.
8. Hospital administrative authority will provide daily food & water but if patient wishes to bring their food from home, they should follow hospital protocols.

9. During admission in ward, it is necessary to wash hands for 20 seconds frequently. Especially after changing cloths and nappies of sick children and after bedding and cleaning of room.
10. Duty staff nurses will administer IV + oral medication in every shift & if required, take sample also.
11. Consultant on call will do one round in 24 hours and on-call senior registrar will be there for 24 hours with doctor on duty.
12. Doctor, nurse and support staff will be in ward for 24 hours as per duty roster.

13.3: Discontinuation of isolation and Precautionary measures at discharge:⁴⁶

Isolation precautions can be discontinued once all the following conditions have been met

- Resolution of fever without the use of antipyretics.
- Improvement in respiratory symptoms (e.g., cough, shortness of breath).
- Two consecutive negative PCR tests collected 24 hours apart.
- Repeat PCR testing should be done 5 days after resolution of the symptoms.
- If the patient is still positive, a repeat sample should be obtained 5 days later.
- Patients, who are asymptomatic, should have repeat testing 7 days from the first test sent.
- When patient is to be discharged, he/she should first be given a bath with clothes changed.
- After being discharged the patient is to be sent home in the hospital's special ambulance.
- After reaching home, leave shoes outside for few hours and remove all clothes and wash them in hot water with Dettol and should take bath also.

13.4: Procedures for handling bodies of deceased suspected or confirmed COVID - 19 patients:^{46,52}

1. **Staff PPE:** The staff must make sure they are fully protected by wearing work clothes, disposable surgical caps, disposable gloves and thick rubber gloves with long sleeves, medical disposable protective clothing, medical protective masks (N95), protective face shields, work shoes or rubber boots, waterproof boot covers, waterproof aprons or waterproof isolation gowns, etc.
2. **Corpse care:** Fill all openings or wounds the patient may have, such as mouth, nose, ears, anus and tracheotomy openings, by using cotton balls or gauze dipped in 3000-5000 mg/L chlorine-containing disinfectant or 0.5%

3. **Wrapping:** Wrap the corpse with a double-layer cloth sheet soaked with disinfectant, and pack it into a double-layer, sealed, leak-proof corpse wrapping sheet/burial bags soaked with chlorine containing disinfectant.
4. The body shall be transferred by the staff in the isolation ward of the hospital via the contaminated area to the special elevator, out of the ward and then directly transported to a specified location by a special vehicle as soon as possible.
5. Perform **final disinfection of the ward and the elevator.**

13.5: Prevention of COVID-19 in school going children:^{51,53}

Currently there is no vaccine available to prevent corona virus disease 2019 (COVID-19). The best way to prevent COVID-19 is to avoid being exposed to this virus.

We can limit the transmission of virus by taking everyday preventive measures by:

1. Staying at home when sick. Do not send the sick child to school/anywhere outside home.
2. Care giver and a child should wear a face mask only if the child has symptoms particularly when you/your child are around other people (e.g., sharing a room or vehicle) and before you/your child enter a healthcare provider's office/facility
3. Covering mouth and nose with flexed elbow or tissue when coughing or sneezing. Dispose of used tissue instantly in closed bin.
4. Washing hands often with soap and water or a sanitizer whichever is available
5. Avoid touching your eyes, nose, and mouth with unwashed hands.
6. Cleaning frequently high-touched surfaces (tables, doorknobs, light switches, counter tops, handles, desks, phones, keyboards, toilets, faucets, sinks etc.) by detergents and disinfectants.
7. Avoid going to crowded places like shopping malls, restaurants, public parks etc.



BURIAL PROTOCOL ^{46,52}

Burial Protocol of Deceased died due to COVID-19 Infection Infection **Burial Protocols for Deceased body died due to COVID-19 Infected Infection**

Before starting any procedure, the family must be fully informed about the burial process. Formal agreement and consent from the family should be taken.

1. Prior to departure

Team should be comprised of:

- a. 4 members, wearing full PPE for field situation
- b. 1 sprayer, wearing full PPE for field situation
- c. 1 technical supervisor, not wearing PPE

Disinfectant preparation

Disinfectant solutions must be prepared for the same day:

- a. 0.05% chlorine solution for hand hygiene, disinfection of object and surfaces

Assemble necessary equipment

- b. Impermeable, vinyl, minimum thickness 400 microns with 4 handle and able to hold 100-125 kilos (200-250 lbs) body bag should be available
- c. For hand hygiene alcohol-based hand rub solution with supply of clean running water, soap and towels Or chlorine solution 0.05% should be available
- d. Personal Protective Equipment (PPE) including one pair of disposable gloves, one pair of heavy-duty gloves, disposable coverall suit (e.g. Tyvek suit) + impermeable plastic apron, goggles and mask for face protection and rubber boots or shoes with puncture-resistant soles and disposable overshoes should be available
- e. For disinfection, one hand sprayer, one back sprayer, Leak-proof and puncture resistant sharps container, two leak-proof infectious waste bags: one for disposable material (destruction) and one for reusable materials (disinfection) should be available
- f. Prior to departure the team leader must brief the burial team about how to conduct a burial according to particular religious and social beliefs.

2. Arrival:

- a. Greet the family and offer your condolences. The staff should not be wearing PPE upon arrival.
- b. Identify the family members who will be participating in the burial rituals.
- c. Verify that the grave is dug. If not then send selected people to dig the grave at the cemetery or at the area identified by the family
- d. A dry ablation can be performed by a Muslim member of the burial team on the deceased patient before or after being placed in the body bag. This process takes about 1-2 minutes.

Dry ablation

The hand of the Muslim Burial team member carrying out the dry ablation (in PPE), softly strikes their hands on clean sand or stone and then gently passes over the hands and then the face of the deceased. This symbolically represents the ablation.

- a. The deceased patient is shrouded by wrapping in a plain white cotton sheet before being placed in the body bag. The shroud should be knotted at both ends.
- b. If there are female members of the Burial team, they should shroud deceased female patient prior to placing in a body bag

3. Put on all Personal Protective Equipment (PPE)

- a. Locate the room for the body of the deceased patient; open the windows and doors for optimal light and ventilation
- b. Identify with the family, the rooms and annexes (bathroom, toilet) that were used by the deceased patient as they need to be cleaned and disinfected
- c. Put on all personal protective equipment (PPE) by burial management team in the presence of the family

4. Placement of the body in the body bag

- a. Enter into the house with at least 2 persons of the burial team.
- b. Laboratory-Epidemiology team collects a post-mortem sample for confirmation

- c. Place the body bag along the body and open it; at least two persons should take the body by arms and legs and place it in body bag and close it
- d. Disinfect the outer side of the body bag by spraying over the surface of the body bag with a suitable disinfectant (e.g., 0.5% chlorine solution)

5. Sanitize family's environment

- a. Clean with clean water and detergent and then disinfect with a suitable disinfectant (e.g., 0.5% chlorine solution) all rooms of the house that were possibly infected by the deceased patient. Special focus should be given to areas soiled by blood, nasal secretions, sputum, urine, stool and vomit.
- b. Clean with water and detergent all objects possibly infected by the deceased patient; then disinfect with a chlorine solution 0.5%.
- c. Collect any sharps that might have been used on the patient and dispose them in a leak-proof and puncture resistant container.

6. Remove PPE, manage waste and perform hand hygiene

- a. Disinfect boots without removing them
- b. Remove apron: Untie the apron, remove it and discard into infectious waste bag for disinfection. Wash outer gloves
- c. Remove outer gloves, Wash inner gloves
- d. Remove coverall: Take Hood off , Pull zip down ,Wash inner gloves ,Remove coverall suit, from inside, peeling it off , Dispose the coverall suit in the infectious waste bag for destruction , Wash inner gloves
- e. Remove goggles from behind; Place it in a waste bag for disinfection. Wash inner gloves
- f. Remove mask from behind Place it in waste bag for destruction Wash inner gloves
- g. Remove inner gloves: Grasp the outer edge of the 1st glove and peel it off. Hold the 1st glove in the gloved hand and drag a bare finger under the 2nd glove. Remove 2nd glove from the inside, creating a "bag" for both gloves and throw it in waste bag for disposal. Wash hands
- h. Recover the single-use PPE in an appropriate waste bag, prepared by the supervisor. The bag will be closed and disinfected and there after brought for incarnation at hospital.

7. Transport the body bag from the house to the cemetery

- a. Distribute disposable gloves to the family members who will carry the coffin
- b. The Body Bag is placed in rear of car usually the head towards the front.
- c. No family member should sit in the car cabin; only the burial management team, without PPE can sit in the car cabin
- d. The other participants of the funeral will follow on foot.

8. Placement of body bag into the grave

- a. Manually carry body bag to the grave by the carriers wearing disposable gloves.
- b. Place strings/ropes for lowering the body bag into the grave. The body bag is placed on the ropes. Slowly lower the body bag into the grave, either with ropes or with individuals wearing gloves who stepped into the graves
- c. Place the body bag into the grave

9. Burial at the cemetery: engaging community for prayers

- a. Family members and their assistants should be allowed to close the grave
- b. Special attention should be given to the first shovel of earth; in general, this is done carefully around the head area Family members should be allowed to close the grave
- c. Place identification on the grave i.e name of the deceased and the date
- d. Place disposable gloves in an infectious waste bag. The car used for the funerals needs to be cleaned and disinfected (especially the rear)
- e. Burial team to attend funeral and offer condolences
- f. All members involved in the funeral process should wash hands with disinfectant after the burial (using chlorine solution 0.05% or alcohol-based hand-rub).

10. Return to the Hospital

- a. Organize the incineration of the single-use equipment at the hospital.
- b. The reusable equipment is again disinfected and dried
- c. The post-mortem samples are sent to the laboratory team
- d. At the end of the working day, before going back home, each team member should take off rubber boots and disinfect them with 0.5% chlorine solution.
- e. Rubber boots should be kept at the hospital.
- f. Any problems detected should be reported

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