Management of Children with COVID 19 in Nepal

Nepal Paediatric Society (NEPAS) 2021

NEPAS Protocol for Management of children with COVID-19

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Background

Importance and scope of NEPAS Protocol for

Management of COVID 19

NEPAS stands for an organization working for the welfare of children in Nepal especially in the field of child health. We have contributed significantly in all the programs conducted by the government and other organizations in the field of child health like diarrheal diseases, respiratory diseases, newborn care, promotion of breast feeding, immunization, Integrated Management of Childhood Illness(IMCI), and Child Safe Guarding, etc.

It is imperative that NEPAS should have its own stand, policy and protocol on any important topic related to child health in Nepal. Right now a huge pandemic in the form of COVID19 is amidst us and creating havoc all over the world in a proportion never seen before. NEPAS should document what it did and what was the role it played in the various capacities possible and what it has done to manage the disease. So it is most appropriate that this initiative is being taken to come up with NEPAS Protocol on Management of COVID in Nepal. We hope to come up with a valuable document from the participation of all those who are in this committee and sharing our experiences.

We appreciate the initiative taken by Dr. K. P. Bista, the president and his team for to start this work.

Dr. Jyoti Ratna Dhakwa

Co-Ordinator

10 May 2021

Chapter I

Nepali Children and Nepal Pediatric Society (NEPAS) during COVID -19 Pandemic

Introduction

Nepal is a landlocked country with China in the northern side and India in the east, west and south. Nepal shares a 1,414 kilometers (879 mi) border with China's autonomous region of Tibet, in the Himalayas. China is Nepal's second-largest trading partner. Nepal has an 1,800-km open border with India in the east, west and south. Nepal lies in South Asia, one of the least developed and most densely populated world regions, that performs poorly in education as well as health care and sanitation metrics. As such, Nepal was considered one of the highest risk areas for the pandemic, and also one of the least prepared. However, WHO later re-classified Nepal to less at risk from its initial classification as "Very Vulnerable".

Background

The COVID-19 pandemic in Nepal is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2(SARS-CoV-2). As news of a new infectious disease in China broke, concerns were raised in Nepal over the high potential risk, the need to implement preventive measures and a severe lack of necessary medical equipment and infrastructure. The COVID crisis affecting the world today requires a level of response that goes beyond the capacity of any country. As the UN Secretary-General said: “More than ever before, we need solidarity, hope and the political will and cooperation to see this crisis through together”. The Government of Nepal is putting in place a series of measures to address the situation, and the international solidarity is required to ensure that the country is fully prepared to face the pandemic and address its impact in all sectors.

Public Health Emergency of International Concern (PHEIC) has been declared on 30 January 2020 and Pandemic on 11 March 2020. Illness caused by coronavirus was termed as COVID-19 by the WHO, which is derived from "coronavirus disease 2019".

Cases in Nepal

The first COVID-19 case in Nepal was confirmed on 23 January in a 32-year-old man who had returned from China on 9 January. The second case was confirmed on 23 March in a young woman who had recently flown to Kathmandu from France via Qatar. By 4 April, six additional cases had been recorded in people who had recently

returned home. The same day, the first case of local transmission was confirmed; a relative of one of the case confirmed that day also tested positive. The first COVID-19 death in Nepal was that of a 29-year-old postnatal woman from Sindhupalchowk on 14 May.

Till the date of 6th May 2021, Total positive cases with mortality of with low peak of 0-19 year .137may359610 3475.In Nepal, the significant number of patients are young adults. Many of them are migrant workers, who had recently returned from India and Gulf countries. There is also a significant number of children who have been infected by the virus in comparison to reported data from China, USA and other European countries.

At the time of this writing, number of COVID-19 cases has been confirmed in children with many deaths. It was however relieving to note that while there was a major surge of COVID-19 cases in children with increased diagnosis in adults, most pediatric facilities did not have to admit large number of children even during that period unlike adult services in the country.

Research in children with COVID

There are many researches being conducted in different parts of the country on epidemiological, clinical and laboratory, drug and treatment modality aspects of COVID-19 as available in the Nepal Health Research Council (NHRC) website. Nepal Pediatric Society (omit) has also taken a lead and is collecting some basic data on children in COVID-19. A manuscript has also been published about the early phase of the pandemic. (J Nepal Paediatr Soc. 2020; 40(3):202-9).

Responses on Pandemic

NEPAS has participated in different committees and task teams formed for preparedness and response to COVID-19 by the government. As a member of national immunization advisory committee, NEPAS has provided its expertise and advocated for roll out of COVID immunization in the country and has voiced for early initiation of childhood immunization as soon as childhood immunization is identified to be feasible.

Management of children

Pediatric COVID-19 patients were managed in most of the central hospitals and provincial hospitals. All COVID-19 children were admitted initially; only symptomatic children were admitted later after change in Government protocol. NEPAS members actively participated in patient management and also worked the management of quarantine centers. Different institutions had their own protocols which differed from one another. However, the experience gained by pediatricians

form different set up and managing different cases established a strong base for future management of such epidemics. During the later phase of the pandemic, pediatricians around the country have witnessed an increasing number of cases of MIS-C (omit) in different hospitals. Overall, the management of even sick cases have been rewarding in children.

NEPAS activities duringCOVID-19:

Since the beginning of the pandemic, NEPAS has encouraged its members to join the academic activities and interactive programs organized by International Pediatric Association and other sister societies in the region. The executive committee has participated in virtual forums organized by IPA, APPA and SAPA and presented the country's status and society responses to COVID-19.

NEPAS has tried to ensure that trustworthy and credible information is reaching to its members and as many people as possible and has circulated virtual events for this purpose to all its members. These have not only been limited to COVID-19 but also included other common ailments in children that have been sidelined by the COVID pandemic.

NEPAS has been providing evidence-based advice to government committees and task forces by participating, supporting real-time policy review, synthesizing and distilling the best available scientific evidence, and helping authorities to issue statements and recommendations.

NEPAS has actively engaged with the media to ensure that scientifically accurate information is available to all and has produced information materials for the public for improved understanding of COVID-19 in the public.

NEPAS has been organizing virtual meetings to share data and experiences amongst their members and with other academies in their region and gathering lessons learned.

NEPAS produced a position statement on Children's Health Promotion and Support during Health Emergencies; Special scenario: COVID-19 on May 2020 with special emphasis on regular resumption of childhood immunization.

NEPAS partnered with Pediatric Nurses Association of Nepal (PNAN) for preparing a guide for primary level health workers on COVID-19. {Child Care Management During COVID- 19 A Reference Guide for Health Care Practitioner: Publisher: Swatantrata Abhiyan Nepal (SAN), Pediatric Nurses association of Nepal (PNAN) & Nepal Pediatric Society (NEPAS).}

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Chapter II

Infection prevention and control (IPC) for COVID-19

Infection prevention and control (IPC), an essential part of health care infrastructure, is the practical discipline concerned with preventing healthcare-associated infection. IPC measures are of central importance to the safety of patients, health-care workers and environment, and to the management of communicable disease threats to the global and local community. Application of basic IPC precautions, such as Standard Precautions, is a cornerstone for providing safe health care. Measures like early identification, prompt isolation precautions, proper patient placement and adequate ventilation are essential to contain and mitigate the impact of respiratory pathogens that may constitute a major public health threat.[1]

The five IPC strategies required to prevent or limit transmission of COVID-19 in health care facilities include:[2]

1. Screening and triage for early recognition of patients with suspected COVID-19, and rapid implementation of source control measures
2. Applying standard precautions for all patients
3. Implementing additional precautions
4. Implementing administrative controls
5. Implementing environmental and engineering controls

1. Screening and triage for early recognition of patients with suspected COVID-19, and rapid implementation of source control measures[2]

It is critical to screen all persons at the first point of contact with the health-care facility and inpatients with suspected COVID-19 to allow for early recognition, and immediate isolation/separation.

To facilitate screening and triage, health-care facilities should:

• establish entrances and display information for patients with signs and symptoms of COVID-19 to report to designated area for screening;

• train staffs on the signs and symptoms of COVID-19 and the most recent case definitions;

• encourage health workers to be alert to potential COVID-19 infection in all patients;

• establish well-equipped screening and triage stations;

• ensure that screening personnel maintain a distance of at least 1 meter from patients, ideally with a separation created by a glass/plastic screen. If not possible, mask and eye protection should be worn;

• use a screening algorithm to promptly identify and direct patients with suspected COVID-19 to an isolation room or dedicated COVID-19 waiting area; all suspected COVID-19 patients should wear masks for source control purposes and be positioned at least 1 meter apart from each other in a designated, well-ventilated, waiting area.

For Isolation or designated waiting area:

• Health-care facilities without enough single isolation rooms in emergency departments should designate a separate, well-ventilated area (with benches/chairs placed at least 1 meter apart) where suspected COVID-19 patients can wait;

• the area should have dedicated toilets, hand hygiene stations, and trash bins with lid for disposal of paper tissues, and display graphic information on how to perform hand and respiratory hygiene.

To prevent transmission of COVID-19 in health-care facilities, it is necessary to promptly detect in-patients with suspected COVID-19, who were missed by screening and triage or became infected within the facility. Hence, health workers should be encouraged to look out for potential COVID-19 cases in wards, and establish reminder systems to consider COVID-19 in inpatients, especially in areas with community transmission.

2. Applying standard precautions for all patients

Standard precautions represent the basic level of infection control precautions that should be used at all times in the care of all patients. Standard precautions include, but are not limited to, hand and respiratory hygiene, the use of appropriate personal protective equipment (PPE) according to risk assessment, environmental cleaning, and safe waste management.

Hand hygiene is one the most effective measures to prevent the spread of COVID-19 and other pathogens. For optimal hand hygiene performance, following principles should be applied:[3,4]

- perform hand hygiene according to the WHO's My 5 Moments for Hand Hygiene (Figure 1) approach in the following five situations: before touching a patient, before any clean or aseptic procedure is performed, after exposure to body fluid, after touching a patient, and after touching a patient's surroundings;
- hand hygiene includes either cleansing hands with an alcohol-based hand rub (ABHR) containing at least 70% alcohol (20-30 seconds), or with soap, water and disposable towels (40-60 seconds);
- alcohol-based hand rub products are preferred if hands are not visibly soiled;
- wash hands with soap and water (Figure 2) when they are visibly soiled;

Figure 1: WHO's My 5 Moments for Hand Hygiene

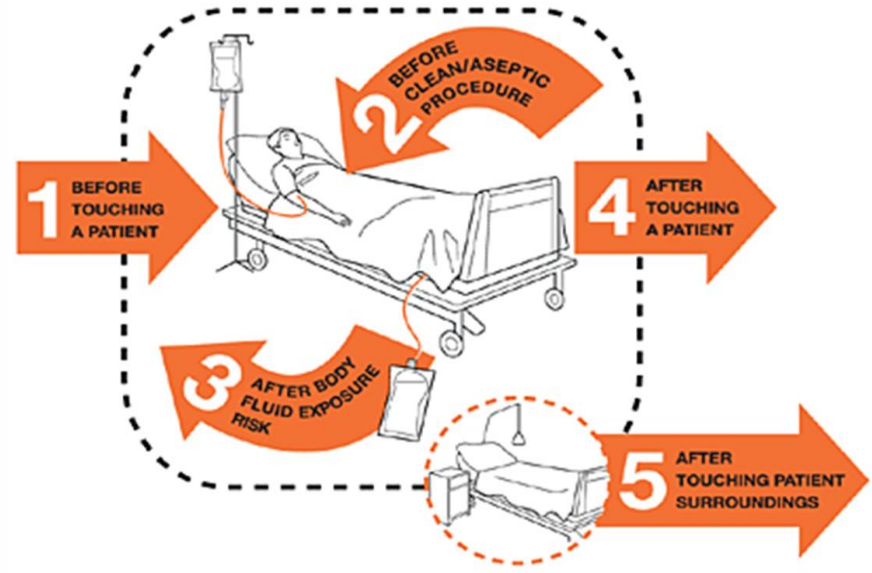
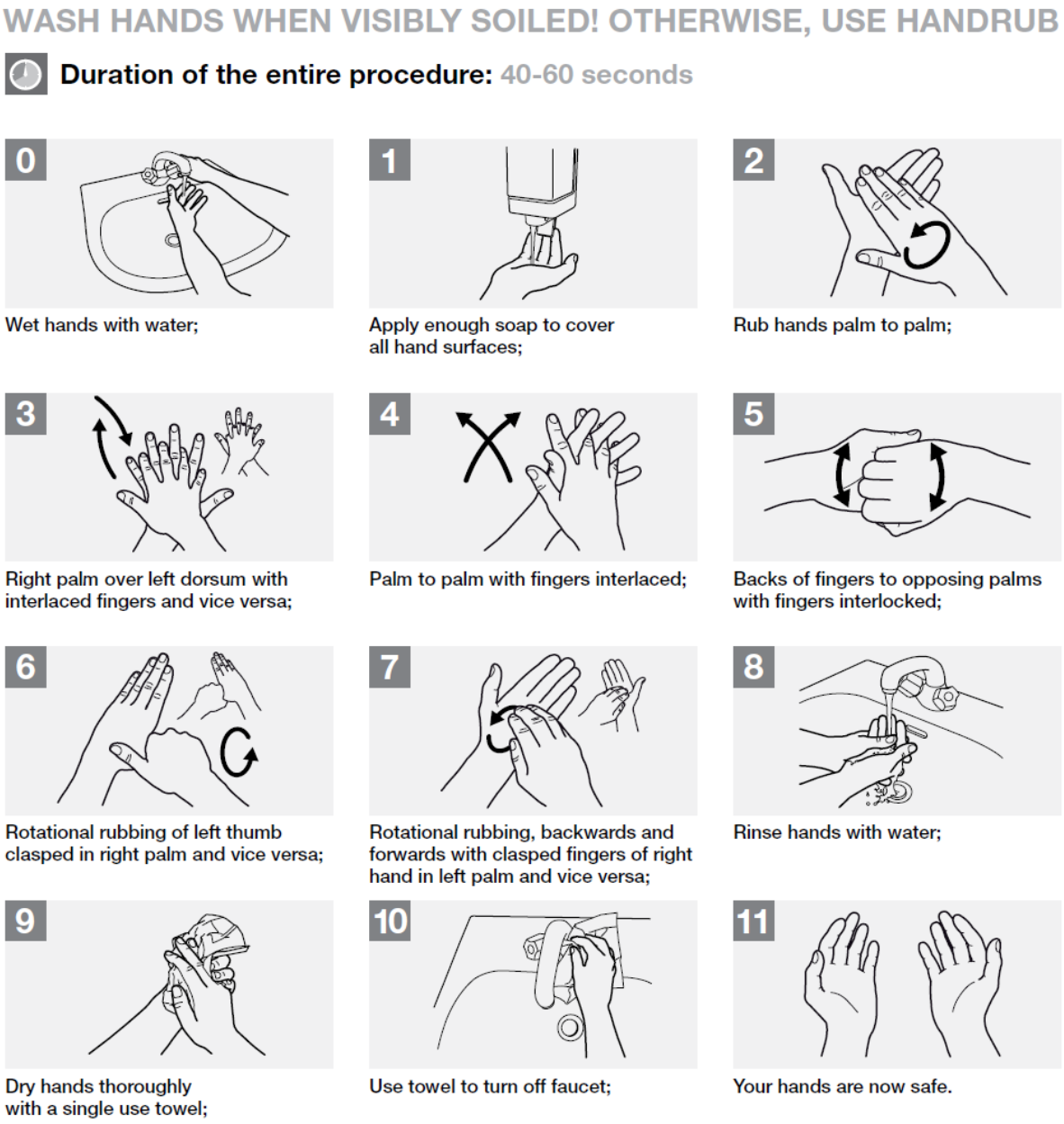


Figure 2. How to handwash?[4]



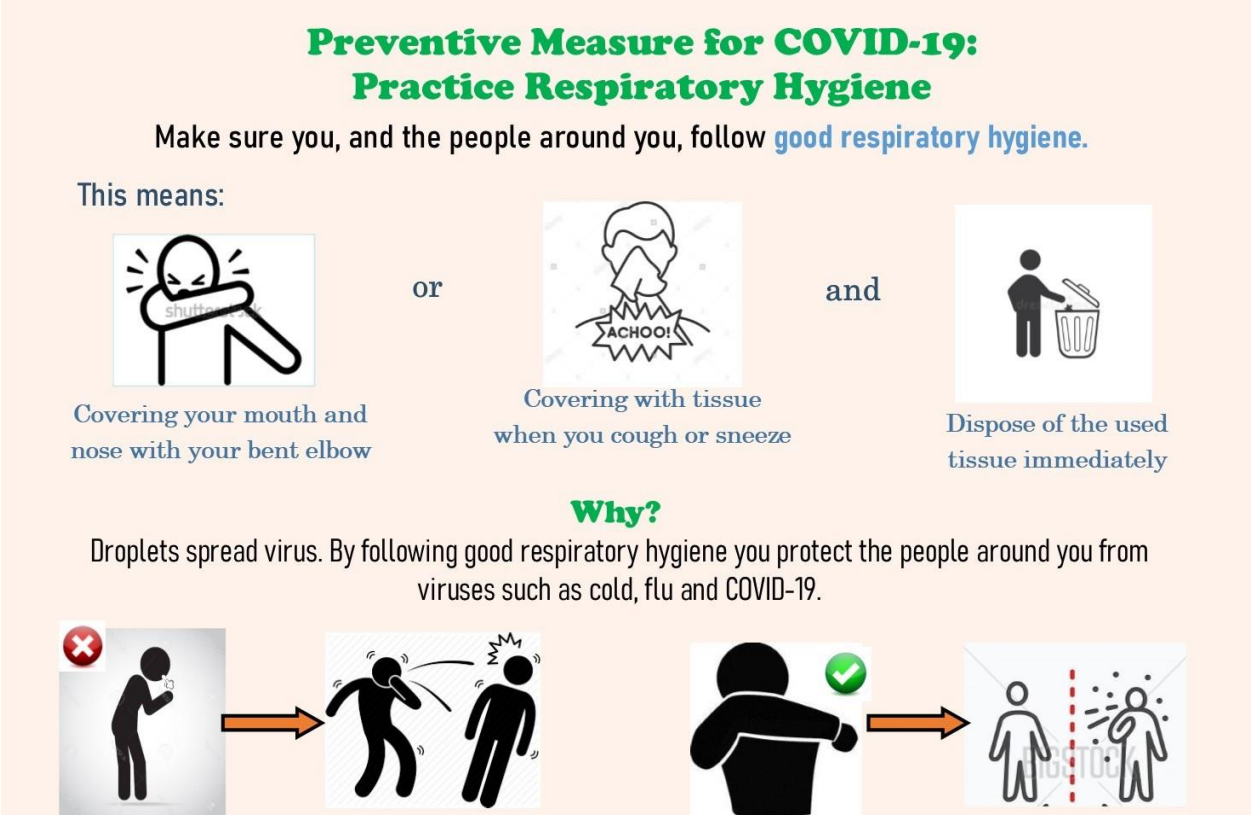
Respiratory hygiene (Figure 3) measures to be ensured are:[2]

- display graphic information on the need to cover nose and mouth with a tissue or bent elbow when coughing or sneezing;
- perform hand hygiene after contact with respiratory secretions or objects that may be potentially contaminated with respiratory secretions;
- give patients with suspected COVID-19 a medical mask to wear.

Children aged up to five years should not wear masks for source control. The rationale includes consideration of the fact that by the age of five years, children usually achieve

significant developmental milestones, including the manual dexterity and fine motor coordination movements needed to appropriately use a mask with minimal assistance[5].

Figure 3: Respiratory hygiene



Use of PPE:

The rational and correct use of PPE (Table 1) reduces exposure to pathogens. The effectiveness of PPE strongly depends on:

- staff training on putting on and removing PPE;[6]
- prompt access to sufficient supplies;[7]
- appropriate hand hygiene;[3,4]
- health worker compliance;[8]
- regular monitoring and feedback by IPC personnel.[1,3,8,9]

Steps to put on (don) and remove (doff) PPE is included in Figure 4 and 5

Table 1. Recommended type of personal protective equipment (PPE) to be used in the context of COVID-19 disease[7], according to the setting, personnel and type of activity[a]

Target personnel	Activity	Type of PPE or procedure
Healthcare facilities (Inpatient facilities):		
Patient room		
Healthcare workers (HCWs)	Providing direct care to COVID-19 patients	Medical mask, gown, gloves Eye protection (goggles or face shield)
	Aerosol- generating procedures	Respirator N95 or FFP2 standard, or equivalent. Gown, gloves, eye protection, apron
Cleaners	Entering the room of COVID-19 patients	Medical mask, gown, heavy duty gloves, eye protection (if risk of splash from organic material or chemicals), boots or closed work shoes
Visitors[b]	Entering the room of a COVID-19 patient	Medical mask, gown Gloves
Other areas of patient transit (e.g., wards, corridors)		
All staff, including HCWs	Any activity that does not involve contact with COVID-19 patients	No PPE required
Triage		
HCWs	Preliminary screening not involving direct contact[c]	No PPE required Maintain spatial distance of at least 1 m
Patients with respiratory symptoms	Any	Maintain spatial distance of at least 1 m. Provide medical mask if tolerated by patient
Patients without respiratory symptoms	Any	No PPE required
Laboratory		
Lab technician	Manipulation of respiratory samples	Medical mask, gown Gloves, eye protection (if risk of splash)
Administrative areas		
All staff, including HCWs	Tasks that do not involve contact with patients	No PPE required
Healthcare facilities (Outpatient facilities):		
Consultation room		
Healthcare workers	Examination of patients with respiratory symptoms	Medical mask, gown, gloves Eye protection
HCWs	Examination of patients without respiratory symptoms	PPE according to standard precautions and risk assessment
Patients with respiratory symptoms	Any	Provide medical mask if tolerated
Patients without respiratory symptoms	Any	No PPE required
Cleaners	After and between consultations with patients with respiratory	Medical mask, gown, heavy duty gloves, eye protection (if risk of splash from organic material or chemicals), boots or closed work

	symptoms	shoes
Waiting room		
Patients with respiratory symptoms	Any	Provide medical mask if tolerated; Immediately move the patient to an isolation room or separate area away from others; if not feasible, ensure spatial distance of at least 1 m from other patients
Patients without respiratory symptoms	Any	No PPE required
Administrative areas		
All staff, including HCWs	Administrative tasks	No PPE required
Triage		
HCWs	Preliminary screening not involving direct contact[c]	Maintain spatial distance of at least 1 m. No PPE required
Patients with respiratory symptoms	Any	Maintain spatial distance of at least 1 m. Provide medical mask if tolerated
Patients without respiratory symptoms	Any	No PPE required
Community:		
Home		
Patients with respiratory symptoms	Any	Maintain spatial distance of at least 1 m; Provide medical mask if tolerated, except when sleeping.
Caregiver	Entering patient's room, but not providing direct care or assistance	Medical mask
Caregiver	Providing direct care/when handling stool/urine/waste from COVID-19 patient being cared at home	Gloves Medical mask Apron (if risk of splash)
Healthcare workers	Providing direct care or assistance to a COVID-19 patient at home	Medical mask, gown Gloves Eye protection
Public areas (e.g., schools, shopping malls, train stations)		
Individuals without respiratory symptoms	Any	No PPE required
Points of entry:		
Administrative areas		
All staff	Any	No PPE required
Screening area		
Staff	First screening (temperature measurement) not involving direct contact[c].	Maintain spatial distance of at least 1 m. No PPE required
Staff	Second screening	Medical mask

	(interviewing passengers with fever for clinical symptoms suggestive of COVID-19 disease and travel history)	Gloves
Cleaners	Cleaning the area where passengers with fever are being screened	Medical mask, gown, heavy duty gloves, eye protection (risk of splash), boots or closed work shoes.
Temporary isolation area		
Staff	Entering isolation area, but not providing direct assistance	Maintain spatial distance of at least 1 m. Medical mask Gloves
Staff, healthcare workers	Assisting passenger being transported to a healthcare facility	Medical mask, gown Gloves Eye protection
Cleaners	Cleaning isolation area	Medical mask, gown, heavy duty gloves, eye protection (risk of splash), boots/closed work shoes
Ambulance or transfer vehicle		
Healthcare workers	Transporting suspected COVID-19 patients to the referral healthcare facility	Medical mask, gowns Gloves Eye protection
Driver	Involved only in driving the suspected patient and the compartment separated	No PPE required Maintain spatial distance of at least 1 m.
	Assisting with loading/unloading of suspected patient	Medical mask, gowns Gloves Eye protection
	No direct contact with patient but no separation between compartment	Medical mask
Patient with suspected COVID-19	Transport to the referral healthcare facility	Medical mask if tolerated
Cleaners	Cleaning after and between transport of patients with suspected COVID-19 disease to the referral healthcare facility	Medical mask, gown, heavy duty gloves, eye protection (if risk of splash), boots or closed work shoes.
Special considerations for rapid response teams assisting with public health investigations[d]		
Community, anywhere		
Rapid response team investigators	Interview suspected or confirmed COVID-19 patients or their contacts	No PPE if done remotely (e.g., by telephone or video conference). Remote interview is the preferred method
	In-person interview of suspected or confirmed COVID-19 patients	Medical mask; Maintain spatial distance of at least 1 m; Interview should be conducted outside the house or outdoors, and

	without direct contact	confirmed/suspected COVID-19 patients should wear a medical mask if tolerated.
	In-person interview with asymptomatic contacts of COVID-19 patients	Maintain spatial distance of at least 1 m; No PPE required; Interview should be performed outside the house or outdoors. If it is necessary to enter the household environment, use a thermal imaging camera to confirm that the individual does not have fever, maintain spatial distance of at least 1 m and do not touch anything in the household environment.

[a] In addition to using appropriate PPE, frequent hand hygiene & respiratory hygiene should always be performed. PPE should be discarded in an appropriate waste container after use, and hand hygiene performed before putting on (donning) and after taking off PPE (doffing).
[b] Number of visitors should be restricted. If visitors must enter a COVID-19 patient's room, they should be provided with clear instructions on: donning & doffing, perform hand hygiene before donning & doffing; supervised by a healthcare worker.
[c] This category includes the use of no-touch thermometers, thermal imaging cameras, and limited observation and questioning, all while maintaining a spatial distance of at least 1 m.
[d] All rapid response team members must be trained in performing hand hygiene, donning & doffing to avoid self-contamination.

Figure 4: Steps to put on PPE (donning)

Steps to put on personal protective equipment (PPE) including gown

1 Remove all personal items (jewelry, watches, cell phones, pens, etc.)

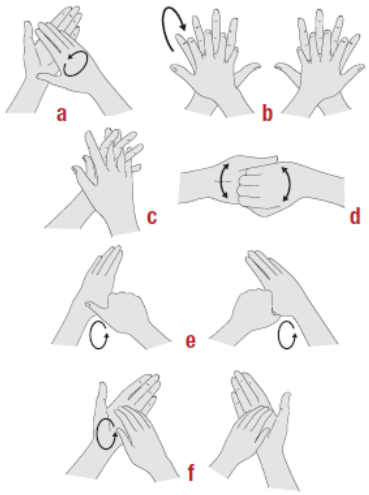
2 Put on scrub suit and rubber boots[1] in the changing room.

3 Move to the clean area at the entrance of the isolation unit.

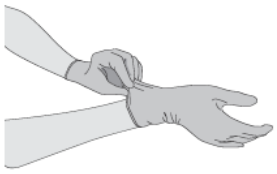
4 By visual inspection, ensure that all sizes of the PPE set are correct and the quality is appropriate.

5 Undertake the procedure of putting on PPE under the guidance and supervision of a trained observer (colleague).

6 Perform hand hygiene.



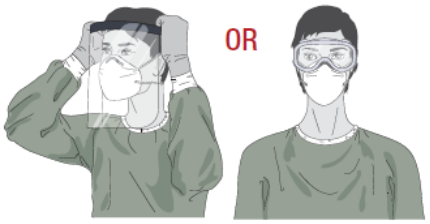
7 Put on gloves (examination, nitrile gloves).



8 Put on disposable gown made of fabric that is tested for resistance to penetration by blood or body fluids OR to blood-borne pathogens.

9 Put on face mask.

10 Put on face shield OR goggles.



11 Put on head and neck covering surgical bonnet covering neck and sides of the head (preferable with face shield) OR hood.

12 Put on disposable waterproof apron (if not available, use heavy duty, reusable waterproof apron).

13 Put on second pair of (preferably long cuff) gloves over the cuff.

[1] If boots are not available, use closed shoes (slip-ons without shoelaces and fully covering the dorsum of the foot and ankles) and shoe covers (nonslip and preferably impermeable)

World Health Organization

Figure 5: Steps to remove PPE (doffing)

Steps to take off personal protective equipment (PPE) including gown

1 Always remove PPE under the guidance and supervision of a trained observer (colleague). Ensure that infectious waste containers are available in the doffing area for safe disposal of PPE. Separate containers should be available for reusable items.

2 Perform hand hygiene on gloved hands.[1]

3 Remove apron leaning forward and taking care to avoid contaminating your hands. When removing disposable apron, tear it off at the neck and roll it down without touching the front area. Then untie the back and roll the apron forward.

4 Perform hand hygiene on gloved hands.

5 Remove outer pair of gloves and dispose of them safely.
Use the technique shown in Step 17

6 Perform hand hygiene on gloved hands.

7 Remove head and neck covering taking care to avoid contaminating your face by starting from the bottom of the hood in the back and rolling from back to front and from inside to outside, and dispose of it safely.

OR

8 Perform hand hygiene on gloved hands.

9 Remove the gown by untying the knot first, then pulling from back to front rolling it from inside to outside and dispose of it safely.

10 Perform hand hygiene on gloved hands.

11 Remove eye protection by pulling the string from behind the head and dispose of it safely.

OR

12 Perform hand hygiene on gloved hands.

13 Remove the mask from behind the head by first untying the bottom string above the head and leaving it hanging in front; and then the top string next from behind head and dispose of it safely.

14 Perform hand hygiene on gloved hands.

15 Remove rubber boots without touching them (or overshoes if wearing shoes). If the same boots are to be used outside of the high-risk zone, keep them on but clean and decontaminate appropriately before leaving the doffing area.[2]

16 Perform hand hygiene on gloved hands.

17 Remove gloves carefully with appropriate technique and dispose of them safely.

18 Perform hand hygiene.

1 While working in the patient care area, outer gloves should be changed between patients and prior to exiting (change after seeing the last patient)

2 Appropriate decontamination of boots includes stepping into a footbath with 0.5% chlorine solution (and removing dirt with toilet brush if heavily soiled with mud and/or organic materials) and then wiping all sides with 0.5% chlorine solution. At least once a day boots should be disinfected by soaking in a 0.5% chlorine solution for 30 min, then rinsed and dried

World Health Organization

Environmental cleaning

All surfaces in health-care facilities should be routinely cleaned and disinfected, especially high-touched surfaces, and whenever visibly soiled or if contaminated by body fluids.[10] In settings where suspected or confirmed COVID-19 patients are admitted, frequency depends on type of patient areas and surfaces (Table 2). [11]

To clean environmental, non-porous surfaces effectively:

- clean surfaces thoroughly with water and detergent;
- apply a disinfectant solution, either 0.1% (1000ppm) sodium hypochlorite or 70-90% ethanol. However, if there are large spills of blood or body fluids, a concentration of 0.5% (5000ppm) sodium hypochlorite should be used;
- contact time of a minimum of 1 minute is recommended for ethanol, chlorine-based products and hydrogen peroxide ≥0.5%;[12]
- after appropriate contact time, disinfectant residue may be rinsed off with clean water if required.[10]
- Medical devices and equipment, laundry, food service utensils and medical waste should be managed in accordance with safe routine procedures.[11-14]

Table 2.Health-care setting: Recommended frequency of cleaning of environmental surfaces, according to the patient areas with suspected or confirmed COVID-19 patients.[11]

Patient area	Frequency[a]	Additional guidance
Screening/triage area	At least twice daily	Focus on high-touch surfaces, then floors (last).
Inpatient rooms /cohort- occupied	At least twice daily, preferably three times daily, in particular for high-touch surfaces	Focus on high-touch surfaces, starting with shared/common surfaces, then move to each patient bed; use new cloth for each bed if possible; then floors (last).
Inpatient rooms-unoccupied (terminal cleaning)	Upon discharge/transfer	Low-touch surfaces, high-touch surfaces, floors (in that order); waste and linens removed, bed thoroughly cleaned and disinfected.
Outpatient / ambulatory care rooms	After each patient visit (in particular for high-touch surfaces) and at least once daily terminal clean	High-touch surfaces to be disinfected after each patient visit. Once daily low-touch surfaces, high-touch surfaces, floors (in that order); waste and linens removed, examination bed thoroughly cleaned and disinfected.
Hallways/corridors	At least twice daily[b]	High-touched surfaces including railings and equipment in hallways, then floors (last).
Patient bathrooms/ toilets	Private patient room toilet: at least twice daily Shared toilets: at least three times daily	High-touch surfaces, including door handles, light switches, counters, faucets, sink bowls, then toilets and finally floor (in that

		order). Avoid sharing toilets between staff and patients.

[a] Environmental surfaces should also be cleaned and disinfected whenever visibly soiled or if contaminated by body fluid (e.g., blood);
[b] Frequency can be once a day if hallways are not frequently used.

Waste management

Health-care waste produced during the care of patients with suspected or confirmed COVID-19 is considered to be infectious and should be collected safely in clearly marked lined containers and sharp safe boxes.[14]

To safely manage health-care waste, facilities should:

- assign responsibility and adequate human and material resources to segregate and dispose of waste;
- treat waste preferably on-site, and then safely dispose them. If waste is moved off-site, it is critical to understand where and how it will be treated and disposed;
- use appropriate PPE (boots, long-sleeved gown, heavy-duty gloves, mask, and goggles or a face shield) while managing infectious waste and perform hand hygiene after doffing;[3,6,7]
- prepare for increases in the volume of infectious waste during the COVID-19 outbreak, especially through the use of PPE.[14]

3. Implementing additional precautions

Transmission of the COVID-19 virus may occur by direct contact with infected people (respiratory droplets and contact routes) and indirect contact with surfaces in the immediate environment or with objects used on the infected person (e.g. stethoscope or thermometer).[15]Airborne transmission of the COVID-19 virus is possible under circumstances and settings where aerosol generating procedures (AGPs) are performed.[1] Apart from standard precautions, additional precautions that can be implemented for COVID-19 are:

A. Isolation and cohorting of patients with suspected or confirmed COVID-19 in single rooms or, if unavailable, cohorting them in the same room with the following principles:

- designate a team of health workers, where possible, for care of patients with suspected or confirmed COVID-19 to reduce the risk of transmission;
- restrict the number of health workers in contact with each COVID-19 patient;
- patients should be placed in well ventilated single rooms if feasible;[16]
- when single rooms are not available, suspected, probable or confirmed COVID-19 patients should be grouped together (cohorted) in adequately ventilated areas with beds placed at least 1 meter apart (e.g. suspected with suspected);
- avoid moving and transporting patients out of their room or area unless medically necessary. Use designated portable X-ray equipment and/or other designated diagnostic equipment.[17]
- If transport is required, use predetermined transport routes to minimize exposure for staff, other patients and visitors, and give the patient a medical mask to wear if tolerated;

- ensure that health workers who are transporting patients perform hand hygiene and wear appropriate PPE;[7]
- equipment should be either single-use and disposable or dedicated equipment (e.g. stethoscopes, blood pressure cuffs and thermometers). If equipment needs to be shared between patients, clean and disinfect after each use;[11]
- maintain a record of all staff entering the patient's room.

B. Contact and droplet precautions in addition to standard precautions should be followed , with the following principles:

- perform hand hygiene before donning and after doffing;
- use appropriate PPE;[7,18]
- health workers and caregivers working in clinical areas (in COVID-19 community transmission areas) should continuously wear a medical mask during all routine activities throughout the entire shift;[19]
- it is not necessary for health workers and caregivers to wear boots, coverall and apron during routine care;
- extended use of medical mask, gown and eye protection can be applied during the care of COVID-19 patients during PPE shortages.
- For a COVID-19 patient who is infected with a multi-drug resistant organism (e.g. Clostridioides difficile), a new set of gown and gloves are needed after caring for such patients;
- health workers should refrain from touching their eyes, nose or mouth with potentially contaminated gloved or bare hands;
- notify the area receiving the patient of any necessary precautions before the patient's arrival;
- frequently clean and disinfect surfaces with which the patient is in contact.[11]

For symptomatic COVID-19 patients, contact and droplet precautions can be discontinued 10 days after symptoms onset AND at least three consecutive days with neither fever nor respiratory symptoms. For asymptomatic patients, isolation and contact & droplet precautions can end 10 days after the initial positive RT-PCR test result.[20] Though some patients have been tested positive for COVID-19 based on molecular assays several days after resolution of symptoms, it is still unknown whether these patients continue to shed the virus, since only RNA viral fragments have been detected.[21]

C. Airborne precautions:

Some AGPs have been associated with an increased risk of transmission of coronaviruses (SARS-CoV-1, SARS-CoV-2 and MERS-CoV).[22-24] The current WHO list of these AGPs is: tracheal intubation, non-invasive ventilation (e.g. BiPAP, CPAP), tracheotomy, cardiopulmonary resuscitation, manual ventilation before intubation, bronchoscopy, sputum induction induced by using nebulized hypertonic saline, and autopsy procedures. It remains unclear whether aerosols generated by nebulizer therapy or high-flow oxygen delivery are infectious.[20]

Health workers performing AGPs among suspected or confirmed COVID-19 patients (intensive care units or semi-intensive care units) should:

- perform procedures in an adequately ventilated room;[1]

- use appropriate PPE: wear a particulate respirator at least as protective as a US National Institute for Occupational Safety and Health (NIOSH)-certified N95, European Union (EU) standard FFP2, or equivalent.[1,19]
- Although initial fit testing is needed prior to the use of a particulate respirator, many countries and health-care facilities do not have a respiratory fit testing programme. Therefore, it is critical that when health workers put on a disposable particulate respirator, they should always perform the required seal check to ensure there is no leakage.[25]
- Other PPE items include eye protection (i.e. goggles or a face shield), long-sleeved gown and gloves. If gowns are not fluid resistant, health workers performing AGPs should use a water proof apron if the procedure is expected to produce a large volume of fluid that might penetrate the gown;[1,7]
- in the intensive care units, where AGPs are frequently performed, the health worker may choose to wear a particulate respirator throughout his or her shift, in areas of community transmission;[19] keep the number of persons present in the room or unit to the absolute minimum required for the patient's care and support.

4. Implementing administrative controls:

Administrative controls and policies for the prevention and control of transmission of COVID-19 within the health-care facility include:[1]

- establishing sustainable IPC infrastructures and activities;
- educating patients' caregivers;
- developing policies for early recognition of patients with suspected COVID-19;
- ensuring access to laboratory testing for COVID-19 detection;
- preventing overcrowding, especially in the emergency department;
- providing dedicated waiting areas for symptomatic patients;
- planning for (e.g. repurposing of other wards) and isolating COVID-19 patients;
- ensuring adequate supplies of PPE; and
- ensuring adherence to IPC policies and procedures in all aspects of health care.

Administrative measures related to health workers and visitors include:

- provision of adequate training for health workers and ensuring an adequate patient-to-staff ratio;
- monitoring health workers' compliance with standard precautions and providing mechanisms for improvement as needed.
- Restriction of visitor access in order to protect visitors from getting infected and reduce visitors' potential to introduce the COVID-19 virus into the health-care facilities.
- Health-care facilities should:
  a. identify alternatives for direct interaction between patients, family members, other visitors and clinical staff, including making remote communications available (e.g. telephone, internet connection);
  b. restrict entry to visitors and only allow essential visitors like parents of paediatric patients and caregivers;
  c. encourage family members to assign a single caregiver to the patient. These caregivers should not be at high risk for severe COVID-19, such as older people or people with underlying medical conditions;

d. designate an entrance that visitors/caregivers can use to access the health-care facility;
e. restrict visitor's movement and maintain a record of all visitors allowed in the facility;
f. educate caregiver visitors on hand hygiene, respiratory etiquette, physical distancing and other standard precautions, & how to recognize signs and symptoms of COVID-19;
g. train and supervise caregiver visitors on the use of required PPE, droplet and contact precautions;[7]
h. caregiver visitors in areas with community transmission should wear a medical mask in clinical areas to prevent transmission;[19]
i. conduct active screening of all caregiver visitors before entering the facility in areas with widespread community transmission;
j. prohibit visitors' presence during AGPs;

5. Implementing environmental and engineering controls

Environmental and engineering controls, an integral part of IPC, aim to reduce the concentration of infectious respiratory aerosols (i.e. droplet nuclei) in the air and the contamination of surfaces and inanimate objects.[15]They include standards for adequate ventilation according to specific areas in health-care facilities, adapted structural design, spatial separation, as well as adequate environmental cleaning.

In health-care facilities, large quantities of fresh and clean outdoor air are required both for the benefit of the occupants and control of contaminants and odors by dilution and removal. There are three basic criteria for ventilation:[26]

• ventilation rate: the amount and quality of outdoor air provided into the space;
• airflow direction: the overall airflow direction in a building and between spaces should be from clean-to-less clean zones; and
• air distribution or airflow pattern: the supply of air that should be delivered to each part of the space to improve dilution and removal of airborne pollutants generated in the space.

When AGPs are not performed, adequate ventilation is considered to be 60 liters/second per patient (L/s/patient) for naturally-ventilated areas or 6 air changes per hour (ACH) (equivalent to 40 L/s/patient for a 4x2x3 m3 room) for mechanically-ventilated areas.[16,26] Ideally, AGPs should be performed in rooms equipped with negative pressure ventilation systems, according to airborne precautions.[1]

There are three methods that may be used to ventilate spaces within health-care facilities: natural, mechanical and hybrid (mixed-mode) ventilation. Any decision on which method to use should take into account climate, including prevalent wind direction, floor plan, need, availability of resources, and the cost of the ventilation system.[26]

Naturally ventilated areas: Health-care facilities using natural ventilation systems should ensure that contaminated air exhaust directly outdoor, away from air-intake vents, clinical areas, and people. Because natural ventilation provides fluctuating airflows, higher ventilation rate values than for mechanical ventilation are recommended. The recommended average natural ventilation rate is 160 L/s/patient.[16]

When natural ventilation alone cannot satisfy the recommended ventilation requirements, alternative ventilation systems, such as a hybrid (mixed-mode) should be considered.[26]

Mechanically ventilated areas: In health-care facilities where a mechanical ventilation system is available, negative pressure should be created to control the direction of airflow. The ventilation rate should be 6-12 ACH (e.g. equivalent to 40-80 L/s/patient for a 4x2x3 m3 room), ideally 12 ACH for new constructions, with a recommended negative pressure differential of ≥2.5Pa (0.01-inch water gauge) to ensure that air flows from the corridor into the patient room.[27,28] Airflow direction can be assessed by measuring the pressure difference between the rooms with a differential pressure gauge. If measuring the pressure difference is not feasible, the airflow direction from a clean to a less-clean area can be assessed using cold smoke (smoke test puffer).[29]

For health-care facilities without adequate natural or mechanical ventilation, the following approaches can be considered in consultation with an environmental engineer:[26,28]

- Installation of exhaust fans: so that the air is released directly outdoors. The number and technical specification of exhaust fans will depend on the size of the room and the desired ventilation rate. Positioning of the exhaust fan should be done so that it is not close to the ventilation air intake. A reliable electricity supply is required for the exhaust fan.
- Installation of whirlybirds (e.g. whirligigs, wind turbines): these devices do not require an electrical supply and provide a roof-exhaust system increasing the airflow in a building.
- Installation of high-efficiency particulate air (HEPA) filters: when appropriately selected, deployed and maintained, single-space air cleaners with HEPA filters (either ceiling mounted or portable) can be effective in reducing/lowering concentrations of infectious aerosols in a single space.[30-32] However, evidence on the effectiveness of HEPA filters in preventing health-care transmission of coronaviruses is currently limited. To be effective, recirculation of all or nearly all of the room air through the HEPA filter should be achieved, and the unit should be designed to achieve the equivalent of ≥2 ACH.[33]

Poorly designed or maintained ventilation systems can increase the risk of health-care-associated infections transmitted by airborne pathogens due to incorrect airflow and poor maintenance of the system. Rigorous standards for installation and maintenance of ventilation systems are essential to ensure that they are effective and contribute to a safe environment within the health-care facility.

Ultraviolet germicidal irradiation (UVGI) has been proposed as a supplemental air-cleaning measure, however, currently there is limited evidence of its effectiveness in preventing respiratory pathogen transmission in health-care facilities.[1] In addition, there are concerns about potential adverse effects because UVGI may be absorbed by the outer surfaces of the eyes and skin, leading to keratoconjunctivitis and dermatosis.[34,35]

Both spatial separation (of at least 1 meter between patients) and adequate ventilation can help to reduce the spread of many pathogens in health-care facility.[18,36] Use of physical barriers such as glass or plastic windows can also reduce health workers' exposure to the COVID-19 virus. This approach can be implemented in areas where

patients first present, such as screening and triage areas, registration desk at the emergency department, or at the pharmacy window where medication is collected.

Collecting and handling laboratory specimens from patients with suspected COVID-19:

All specimens collected for laboratory investigations should be regarded as potentially infectious. Health workers who collect, handle or transport any clinical specimens should adhere to the following measures and biosafety practices to minimize the possibility of exposure to pathogens:[37]

- Ensure that health workers who collect specimens, including nasopharyngeal and oropharyngeal swabs, use appropriate PPE (i.e. eye protection, a medical mask, a long-sleeved gown and gloves). If the specimen is collected with an AGP (e.g. sputum induction), personnel conducting the procedure should wear a particulate respirator at least as protective as a NIOSH-certified N95, an EU standard FFP2, or equivalent;
- ensure that all personnel who transport specimens are trained in safe handling practices and spill decontamination procedures;[10,11]
- place specimens for transport in leak-proof specimen bags (i.e. secondary containers) that have a separate sealable pocket for the specimen (i.e. a plastic biohazard specimen bag), with the patient's label on the specimen container (i.e. the primary container), and a clearly written laboratory request form;
- ensure that laboratories adhere to appropriate biosafety practices and transport requirements based on WHO's interim Laboratory biosafety guidance related to COVID-19;[37]
- deliver all specimens by hand whenever possible. Do not use pneumatic-tube systems to transport specimens;
- document clearly patient's full name, date of birth and clinical diagnosis of the suspected case of COVID-19 on the laboratory request form. Notify the relevant laboratory as soon as possible that the specimen is being transported.

Considerations for surgical procedures:

In the context of the COVID-19 pandemic, every surgical procedure may entail risk for both health workers and patients.[38] Any decision on whether to operate on a patient should not be based on the patient's COVID-19 status, but on need (e.g. trauma or emergency), the risks and benefits of surgery (e.g. life-threating outcomes or patient harm if surgery is delayed), and patient clinical conditions. Recent data point to a high proportion of post-operative pulmonary complications associated with increased mortality in patients with COVID-19.[39]

General considerations to be followed before performing a surgical procedure are:

- consider whether non-surgical interventions or treatments could be an alternative;
- postpone elective surgery in areas with community transmission to minimize the risk to patient and medical staff, and also to increase capacity in terms of patient beds, beds in intensive care units, and ventilators during the outbreak;
- if the surgical procedure cannot be postponed (e.g. urgent), a careful risk assessment should be done to screen patients for COVID-19 symptoms, signs and exposure history;[40]
- patients with signs and symptoms of COVID-19 should be tested for the virus using molecular assay on upper respiratory specimens, if available.[37] However, urgent

surgery should not be delayed if this test is not available and IPC precautions should be strictly followed;[38]

- if the urgency of the surgical procedure does not allow sufficient time for testing or if testing is unavailable, patients with signs of COVID-19 should undergo Chest-X-ray, chest computerized tomography (CT) or chest ultrasound, if available, as an early diagnostic tool and as a baseline to monitor patient;[41,42]
- avoid AGPs if possible;

For surgical procedures in suspected or confirmed COVID-19 patients:

- When surgical procedures in COVID-19 patients cannot be postponed, surgical staff in the operating room should use contact and droplet precautions that include sterile medical mask, eye protection (i.e. face shield or goggles), gloves and gown (apron may be required if gowns are not fluid resistant and when the surgical procedure is expected to generate high volume of fluid);
- A particulate respirator (i.e. N95, FFP2 or equivalent) should be used instead of a medical mask, if there is potential for an anticipated or unanticipated AGP or if the procedure involves anatomic regions where viral loads of the virus may be higher (e.g. nose, oropharynx, respiratory tract).[43,44] Because the risk of AGPs during surgical procedures may be difficult to anticipate, health workers may use particulate respirators when performing surgical procedures on suspected or confirmed COVID-19 patients, if available. Respirators with exhalation valves should not be used during surgical procedures as unfiltered exhaled breath will compromise the sterile field;
- COVID-19 patients should wear a medical mask while being transported to the operating room, if tolerated;
- transport staff should use contact and droplet precautions when transporting suspected or confirmed COVID-19 patients to the operating room;
- ideally, a negative pressure room should be used for anaesthesia and intubation, if available, and health workers should wear a particulate respirator in addition to eye protection, gown and gloves. However, if a negative pressure room is not available, intubation should occur in the operating room where the surgical procedure will be performed, and a particulate respirator should be worn by health workers in the room;[43]
- one or more operating rooms for surgical procedures of COVID-19 patients could be identified. These rooms should ideally be in the far corner of the surgery floor to avoid areas with a high flux of staff, and can also be used for surgical procedures of other patients, if it cannot be dedicated to COVID-19 patients, after terminal cleaning;[38,42]
- surgical staff in the room should be limited to essential personnel;
- operating rooms that were built to applicable design code should already have a high ventilation rate (15-20 ACH) and their doors should always remain closed during procedures;[27,28]
- terminal cleaning should be performed after each surgical procedure, in accordance with cleaning and disinfection recommendations for COVID-19;[10,11]
- all surgical instruments should undergo standard transport, cleaning and sterilization procedures. Medical masks, eye protection, gloves and gowns should be worn by personnel responsible for cleaning these instruments prior to sterilization.[7,42]

For surgical procedures in patients whose COVID-19 status is unknown:

- In areas with community transmission, transport staff should wear a medical mask while transporting patients to the operating room;[19]
- contact and droplet precaution should be applied by surgical staff. In health-care facilities located in areas with community transmission that do not have COVID-19 test capacity or where testing could not be done due to the urgency of the procedure, a particulate respirator can be worn instead of a medical mask if there is potential for anticipated or unanticipated AGPs or if the procedure involves anatomic regions where viral loads of the COVID-19 virus may be high (e.g. nose, oropharynx, respiratory tract);[44]
- terminal cleaning of operating room should be performed using standard hospital cleaning practices.[10,11]

IPC measures recommended for outpatient care are:

- Apply the basic principles of IPC and standard precautions in all health-care facilities, including outpatient settings and primary care.[45]
- consider alternatives to face-to-face outpatient visits using telemedicine (e.g. telephone consultations or cell phone videoconference) to provide clinical support without direct contact with the patient;[46]
- screening, early recognition and isolation of patients with suspected COVID-19;
- emphasis on hand hygiene, respiratory hygiene and medical masks to be used by patients with respiratory symptoms;
- appropriate use of contact and droplet precautions when performing clinical exam on patients with suspected COVID-19;
- when symptomatic patients are required to wait, ensure they have a separate waiting area where patients can sit at least 1-meter apart and provide them with masks;

Dead body management:

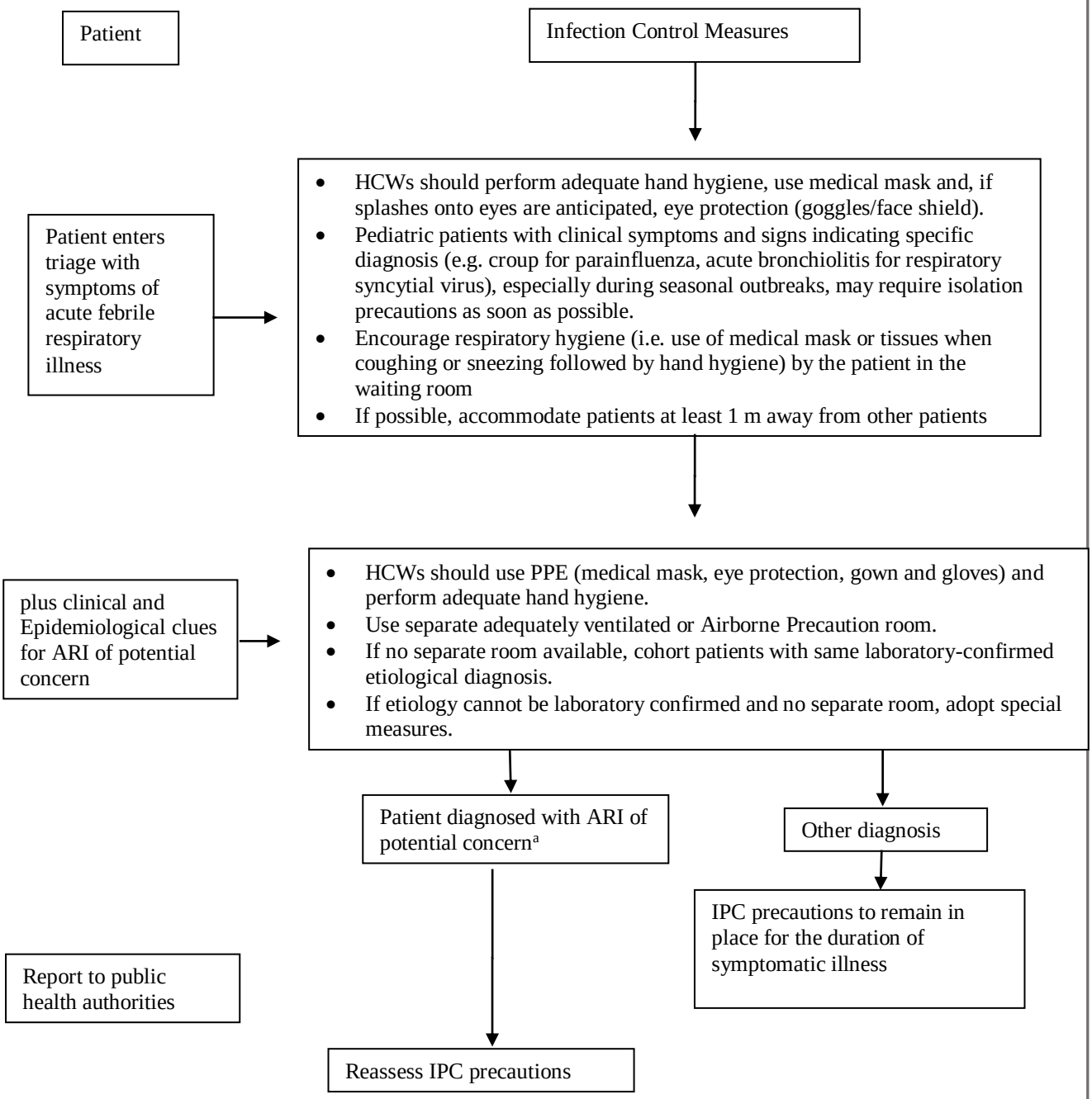
Health workers should do a preliminary evaluation and risk assessment before undertaking any activity related to the management of suspected or confirmed COVID-19 fatality and follow WHO's IPC guidance for safe management of dead bodies in the context of COVID-19.[47]

Health workers should:

- perform hand hygiene before and after handling the body;
- use appropriate PPE based on the level of interaction with the body and risk assessment (e.g. use of eye protection and medical masks in addition to gloves and fluid-resistant gown or apron, if there is a risk of body fluids splashes while handling the body);[7]
- ensure that any body fluids leaking from orifices are contained and cover body in cloth to transfer to mortuary area;
- do not engage in any other activity during body handling or preparation;
- disinfect any non-disposable equipment used during handling of the body as per WHO guidance;[11]
- correctly remove and dispose of PPE when finished
- Body bags are not necessary for COVID-19, although they may be used for other reasons such as excessive body fluid leakage or absence of refrigerated morgue, especially in countries with a warm climate. If more than 24 hours has passed since

the person died, or if burial/cremation is not foreseen within the next 24-48 hours, a second body bag may be used.

Figure 6. Decision-tree for infection prevention and control measures for patients known or suspected to have an acute respiratory infection[48]



[a]ARIs of potential concern include SARS, new influenza virus causing human infection (e.g. human cases of avian influenza), and novel organism-causing ARIs that can cause outbreaks with high morbidity and mortality. Clinical and epidemiological clues include severe disease in a previously healthy host, exposure to household member or

close contact with severe ARI, cluster of cases, travel, exposure to ill animals or laboratory.
[b]Airborne Precaution rooms include both mechanically and naturally ventilated rooms with ≥ 12 air changes per hour (ACH) and controlled direction of airflow.
[c]The term "special measures" means allowing patients with epidemiological and clinical information suggestive of a similar diagnosis to share a room, but with a spatial separation of at least 1 m.
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CHAPTER III

1. When to suspect COVID-19 infection in children?

Children of any age can get infected with COVID. Most of the children get infected from household exposure from an infected adult. Rarely, health care associated infection is also present. Together with the opening of schools, transmission from other school children should be strongly considered. The symptoms in children are similar to that in adults. However, the disease is milder in children.

Symptoms include fever (46%), cough (37%), shortness of breath (7-16%), myalgia (10-30%), rhinorrhea (7%), sore throat(13-30%), headache (15-42%), nausea/vomiting (10%), abdominal pain (7%), diarrhea(14%), loss of smell or taste (1-10%). Sometimes gastrointestinal symptoms may occur without respiratory symptoms. Other rare manifestations may include conjunctivitis, heart failure or arrhythmia. Cutaneous findings may include maculopapular rashes, urticaria or vesicles.

In infants under one year, non-specific symptoms like poor feeding, lethargy, fever may be present. Respiratory symptoms may be present, but less common, and include fast and noisy breathing or a bronchiolitis like picture. Additionally, diarrhea, vomiting could be a manifestation of COVID in infants.

2. Diagnosis of suspected children with COVID 19 symptoms

Indications for testing:

1. A patient with acute respiratory illness (fever and cough or fever and shortness of breath) AND new loss of smell OR taste.

2. A patient with acute respiratory illness (fever and cough or fever and shortness of breath) AND any two of these (chills, muscle pain, diarrhea, sore throat).

3. A patient with acute respiratory illness (fever and cough or fever and shortness of breath) in the absence of an alternative diagnosis that fully explains the clinical presentation.

4. For children less than 18 years, Fever (>3 days) AND two of the following: (i) rash, non-purulent conjunctivitis or muco-cutaneous inflammation; (ii) hypotension or shock; (iii) new cardiac abnormalities; (iv) new bleeding disorder; and (v) diarrhoea, vomiting or abdominal pain.

5. A patient with acute respiratory illness (fever and cough or fever and shortness of breath) with underlying chronic conditions, immunocompromised conditions.

6. Presentation with severe illness (Eg, new requirement for supplemental oxygen or increased requirement from baseline, new or increased need for ventilation [invasive or noninvasive] or clinical manifestations of multisystem inflammatory syndrome in children.

7. **Patients who were in close contact with a person with confirmed or probable SARS-CoV-2 infection, and developed ANY of the symptoms described above**

Close contact is defined as a history of contact within a distance of less than 6 feet for a cumulative durationof at least 15 minutes over a 24-hour period from a person with laboratory-confirmed or probable SARS-CoV-2 infection starting from 2 days before illness onset (or, for asymptomatic patients, 2 days prior to test specimen collection) until the time the patient is isolated.

Testing for active SARS-CoV-2 infection is not necessary if there is exposure to a close contact of an individual with laboratory-confirmed SARS-CoV-2 infection and not the infected person himself/herself, unless the close contact is symptomatic or other criteria are met.

8. Patients who require screening, i.e. prior to a medical procedure such as elective surgery or as a school or workplace requirement.

9. Infant born to a mother with suspected or confirmed COVID-19.

10. If the treating clinician suspects COVID-19.

2A. Testing Modalities

a. Nucleic Acid Amplification Tests (NAATs):

The detection of SARS-CoV-2 RNA is done by nucleic acid amplification tests (NAATs). The most commonly performed NAAT is **Reverse-Transcription Polymerase Chain Reaction (RT-PCR) from Upper Respiratory Tract (URT).** Some of the most frequently tested gene targets for the detection of SARS-CoV-2 include the *E*, *S*, and *N* genes and the open reading frame ORF1a/1b.

Sites for sample collection: The various possible sites for sample collection are:

- ✓ Nasopharyngeal swab specimen by Health care worker
- ✓ Nasal swab specimen from both anterior nares, by Health care worker or by patient on-site or at home
- ✓ Nasal or nasopharyngeal wash/aspirate, by Health care worker
- ✓ Oropharyngeal swab specimen, by Health care worker

Nasopharyngeal, mid-turbinate, or nasal specimens are preferred to oropharyngeal specimen (or saliva) because of limited data suggesting lower sensitivity with oropharyngeal specimens and lack of data on accuracy of saliva specimens.

Lower Respiratory Tract specimens may have higher viral loads and be more likely to yield positive tests than Upper Respiratory Tract specimens (BAL, sputum). In those patients with lower respiratory tract infection, and the initial upper respiratory tract specimen turns out to be negative, despite strong clinical suspicion, specimens from the lower respiratory tract (expectorated sputum, tracheal aspirate or bronchoalveolar lavage from intubated patients) can be an option.

The sensitivity of NAAT with self-collected nasal or nasal mid-turbinate specimens may be similar to that with nasopharyngeal specimens collected by a health care provider.

Positive PCR test confirms the diagnosis of COVID-19. Patients with COVID-19 can have detectable SARS-CoV-2 RNA in upper respiratory tract specimens for weeks after the onset of symptoms. Viral detection in the Upper Tract specimen doesn't necessarily indicate ongoing infectiousness. Most of the time a single negative PCR test rules out COVID-19. However false negative may be present. In presence of strong clinical suspicion but negative initial PCR test, a repeat test is warranted to rule out COVID. The repeat testing should be performed after 24-48 hour of the first test. It should not be repeated within the 24 hour of the first test.

NAATs are highly specific but with sensitivity reported as low as **60-70% and as high as 95-97% .** However, false negatives can come depending on the day when testing is done. False negative rate is 100% on the first day after exposure. On the day of symptom onset (~4 days after exposure) the false negative rate remains at 38%, and it reaches its nadir of 20% three days after symptoms begin (8 days post exposure). From this point on, the false negative rate starts to climb again reaching 66% on day 21 after exposure. Reported false-positive rates range from less than 5 to 40 percent. Sensitivity depends on type and quality of the specimen, duration of illness, and the specific assay.

b. Antigen Testing for SARS-CoV-2

Antigen tests detect the presence of a specific viral antigen, which implies current viral infection. Antigen tests are performed on nasopharyngeal or nasal swab specimens placed directly into the assay's extraction buffer or reagent. The currently authorized antigen tests are not restricted to use on persons of a certain age. Antigen tests can be used as a point of care test and are inexpensive as compared to NAATs. The results can be obtained in 15 minutes. However, the sensitivity of antigen tests is lesser than NAATs.

Possible indications of Antigen testing:

1. **As a Point of care test:** results are obtained within 15 minutes

2. Whenever cost is an issue.

Salient Features of NAATs and antigen tests (*Adapted from the CDC guideline*)

Features	**Nucleic Acid Amplification Tests (Eg. RT-PCR)**	**Antigen tests**
Intended use	Detect Current Infection	Detect Current Infection
Analyte detected	Viral Ribonucleic Acid (RNA)	Viral Antigen
Specimen Type (s)	Nasal, Nasopharyngeal, sputum, saliva.	Nasal, Nasopharyngeal,
Sensitivity	Varies by test, but generally high	Moderate
Specificity	High	High
Test complexity	Varies by test	Relatively easy to use
Authorized for use at the point of care	Most are not, some are.	Most are, some are not.
Turnaround time	Ranges from 15 minutes to >2 day.	Ranges from 15 minutes to >2 day.
Cost	Moderate	Low

c. **Antibody testing**

It is useful for diagnosis of prior infection (or infection of at least 3 to 4 weeks' duration). Antibody testing should not be used as the sole basis for diagnosis of acute infection. The specimen used is blood. The Sensitivity and specificity are highly variable. Detectable antibodies generally take several days to weeks to develop; IgG usually develops by 14 days after onset of symptoms. Cross-reactivity with other coronaviruses has been reported. Time to perform the test ranges from 15 minutes to 2 hours. It remains uncertain whether a positive antibody test indicates immunity against future infection.

Possible Indications of Antibody testing

1. Patients who present late in their illnesses (2 weeks approximately) when used in conjunction with viral detection tests.

2. For suspected post-infectious syndrome (e.g., Multisystem Inflammatory Syndrome in Children; MIS-C). (*For details, please refer to the chapter on Multisystem Inflammatory Syndrome in Children; MIS-C).*

3. For surveillance and epidemiologic studies.

Antibody tests help determine whether the individual being tested was previously infected—even if that person never showed symptoms.

d. Testing for other pathogens

If influenza and RSV are circulating in the community, test for these viruses, if facility available, should also be done, as the symptoms overlap. However, detection of another viral (or bacterial) pathogen does not necessarily rule out SARS-CoV-2 in locations where there is widespread transmission. Coinfection with SARS-CoV-2 and other respiratory viruses, including influenza, has been described, but the reported frequency is variable.

3. Clinical Spectrum of COVID-19

Asymptomatic infection: Absence of clinical sign and symptoms of the disease and normal chest X-ray or CT scan associated with a positive test for SARS-CoV-2.

Mild infection: Upper airway symptoms such as fever, fatigue, myalgia, cough, sore throat, runny nose and sneezing. Pulmonary clinical examination is normal. Oxygen saturation is normal. Some cases may have fever and others may experience gastrointestinal symptoms such as nausea, vomiting, abdominal pain and diarrhea. There is no new or increased supplemental oxygen requirement.

Moderate Infection: There are clinicalsigns of pneumonia, persistent fever, initially dry cough which becomes productive, may have wheezing or crackles on pulmonary auscultation but shows no respiratory distress. Oxygen saturation is ≥ 94%. Some individuals may not have symptoms or clinical signs but chest CT scan reveals typical pulmonary lesions. No new or increased supplemental oxygen requirement.

Severe Infection – Initial respiratory symptoms may be associated with gastrointestinal symptoms such as diarrhea. The clinical deterioration usually occurs in a week with the development of dyspnea and hypoxia (blood oxygen saturation SaO2 <94%). Age-specific tachypnea definitions are respiratory rate ≥ 60/min in children < 2 months of age, ≥50/min in children 2–11 months of age, ≥40/min in children 1–5 years of age. There is new requirement for supplemental oxygen or increased requirement from baseline without new or increased need for ventilatory support (noninvasive or invasive).

Critical Infection – Patients can quickly deteriorate to acute respiratory distress syndrome or respiratory failure and may present as shock, encephalopathy, myocardial injury or heart failure, coagulopathy, acute kidney injury and multiple organ dysfunction or rapidly worsening clinical trajectory. There is new or increased need for noninvasive or invasive mechanical ventilation.

Acute respiratory distress syndrome (ARDS)

Worsening respiratory symptoms 1 week after disease onset due to SARS-CoV-2 with new opacities on chest imaging not explained by cardiac failure or volume overload and with a partial pressure of oxygen (PaO_2) to fraction of inspired oxygen (FiO_2) ratio ≤ 300 mmHg, or an $SpO_2/FiO_2 < 264$ during noninvasive ventilation, or an oxygenation index > 4, or an oxygen saturation index (OSI) > 5 during invasive mechanical ventilation are concerning for ARDS.

Why is COVID-19 infection less frequent and less severe in children than adults?

- Children are well cared at home with limited outdoor activity, hence less exposure.
- Possible age-related differences in the expression of angiotensin-converting enzyme 2 (ACE2) receptors.
- Lower immune dysregulation in children than adults.
- Developing immune system in children responds differently to the viral antigen.
- Frequent intercurrent viral infections and vaccination could enhance the immunity and hence protect.

Indication for Hospital admission/ referral to tertiary centers:

1. Children with COVID-19 and severe or critical lower respiratory tract disease

2. Children with suspected or confirmed MIS-C.

3. Children with mild to moderate COVID-19 may require hospital admission if they are at risk for severe disease due to underlying conditions (Eg, immune compromised).

4. INVESTIGATIONS TO BE SENT IN COVID-19 PATIENTS

4A. Laboratory studies

There is no pathognomic laboratory pattern of COVID-19 in children. However the following investigations need to be sent (*depending on the availability and laboratory resources)

a. Complete Blood Count: Expected finding: normal neutrophil count in majority; Lymphopenia

b. Serum electrolytes (sodium, potassium, calcium)

c. serum Urea, creatinine.

d. Liver Function tests: Increased liver enzymes

e. CRP level (may get elevated)

f. ESR (may get elevated)

g. Lactate Dehydrogenase (may get elevated)*

h. Serum Procalcitonin level (may get elevated)*

i. Serum d-Dimer*

j. serum ferritin*

k. Arterial blood gas (to be done in moderate to severe cases)*

l. Blood culture and sensitivity (to rule out bacterial sepsis/coinfection)

4B. Imaging studies

- **Chest x ray:** bilaterally distributed peripheral, lower zone and subpleural ground-glass opacities and consolidation.
- **Computed tomography (CT) scan of chestCT chest :**similar to adults

✓ Ground-glass opacities/nodules

✓ Consolidation with a surrounding halo sign

✓ Bilateral or local patchy shadowing

✓ Interstitial abnormalities

Radiographic findings are most extensive about 10-12 days after symptom onset.Radiographic findings may be present before symptoms.

Imaging Recommendations

✓ Imaging is not indicated in children with mild clinical features unless they are at risk for disease progression.

✓ Imaging is done in patients with worsening respiratory status.

✓ In a resource-constrained environment, imaging is indicated for medical triage of patients with suspected COVID-19 who present with moderate-severe clinical features and a high pretest probability of disease

Chest CT scan may be warranted if the results could affect clinical management. A series of chest radiographs may be useful to assess therapeutic response. The use of CT as a primary screening tool is discouraged. Up to 18% demonstrate normal chest radiographs or CT when mild or early in the disease course, but this decreases to 3% in severe disease.

4C Role of Ultrasound chest

- Lung ultrasound may be useful in the evaluation of critically ill COVID-19 patients.
- Findings like multiple B-lines (thickened subpleural interlobular septa), subpleuralconsolidations, alveolarconsolidation, etc may be seen.

5. Inpatient management of children with COVID-19

5A. Supportive care for all patients

- Admission to COVID treatment units.
- **Respiratory support**, including supplemental oxygen and ventilatory support (noninvasive or invasive). Details of respiratory support provided subsequently.

- **Fluid and electrolyte support.**
- **Empiric antibiotics:** Although the patient may be suspected to have COVID-19, administer appropriate empiric antimicrobials within 1 hour of identification of sepsis. Empiric antibiotic treatment should be based on the clinical diagnosis (community-acquired pneumonia, health care-associated pneumonia [if infection was acquired in health care setting] or sepsis), local epidemiology and susceptibility data, and national treatment guidelines. Empiric therapy should be de-escalated on the basis of microbiology results and clinical judgment. Continue with antibiotics if bacterial coinfection is proven, though bacterial coinfections appear to be infrequent.
    - **Child**: Ampicillin 50mg/kg or Benzylpenicillin 50,000U/kg IM or IV every 6 hours for 5 days PLUS Gentamycin 7.5 mg/kg IM or IV once daily for at least 5 days.
    - If bacterial pneumonia or sepsis is suspected use Ceftriaxone or Amoxicillin-Clavulanic Acid. Add Azithromycin for atypical coverage of pneumonia substitute with Doxycycline if allergic to macrolides.
- **Adequate rest and sufficient calorie.**
- **Fever: Paracetamol is the preferred** antipyretic agent
- Monitoring for cytokine release syndrome by monitoring blood pressure, oxygen saturation.
- Baseline CRP, D-dimer, ferritin, LDH, and IL-6 (if available) to be obtained.
- Monitor CRP, D-dimer, ferritin, and LDH two or three times per week or if there is concern for worsening disease.

- Care during aerosol generating events &procedures in the intensive care unit.

1. Aerosol generating events
    a. Inadequate seal during Non-invasive ventilation (NIV)NIV &High Flow Nasal Canula (HFNC)HFNC
    b. Nebulization
    c. Endotracheal Suction
    d. CPR prior to intubation
    e. Extubation
    f. Coughing/sneezing
2. Procedures vulnerable to aerosol generation (omit)
    a. Inadequate seal during laryngoscopy
    b. Front of neck access
    c. Intubation
    d. Bronchosocpy

5B. Antiviral therapy for select patients: Use of antiviral therapy is individualized.

- **Potential indications of antiviral therapy are:**

✓ Severe disease

✓ Rate of clinical deterioration, and underlying conditions that may increase the risk for progression.

REMDESIVIR:

- Remdesivir is the one of the most widely used antiviral drug used in COVID-19 infection. Studies of the effectiveness and safety of antiviral therapy have predominantly been performed in adults with severe lower respiratory tract disease. Data suggests Remdesivir reduces time to recovery. However, WHO doesn't recommend Remdesivir for management of COVID-19 infection. Dose of Remdesivir:

- Adults and children aged 12 years and older who weigh at least 40 kg. An emergency use authorization (EUA) remains in place to treat

- Pediatric patients weighing 3.5 kg to less than 40 kg or children younger than 12 years who weigh at least 3.5 kg.

Dose of Remdesivir:

Dosage (weight 3.5-40 kg)

- Requiring mechanical ventilation
  - Day 1 loading dose: **5 mg/kg IV** infused over 30-120 min, THEN
  - Days 2-10 maintenance dose: **2.5 mg/kg IV** qDay
- Not requiring mechanical ventilation
  - Day 1 loading dose: **5 mg/kg IV** infused over 30-120 min, THEN
  - Days 2-5 maintenance dose: **2.5 mg/kg IV** qDay
  - If clinical improvement not demonstrated, treatment may be extended for up to 5 additional days (ie, up to 10 days total)

Dosage (weight 40 kg or more)

- Requiring mechanical ventilation
  - Day 1 loading dose: **200 mg IV** infused over 30-120 min, THEN
  - Days 2-10 maintenance dose: **100 mg IV** qDay
- Not requiring mechanical ventilation
  - Day 1 loading dose: **200 mg IV** infused over 30-120 min, THEN
  - Days 2-5 maintenance dose: **100 mg IV** qDay
  - If clinical improvement not demonstrated, treatment may be extended for up to 5 additional days (ie, up to 10 days total)

Side effects of Remdesivir

- Nausea
- vomiting
- Hypersensitivity reactions
- Transaminase elevation
- Infusion related hypotension
- Avoid if : CrCl<30ml/min, AST>5times normal Or AST elevation with deranged conjugated bilirubin, ALP or INR

5C. <u>Corticosteroids:</u>

Low dose steroids are used for immune-mediated complications of COVID-19. They are not to be used routinely in all patients. Steroids are not to be used in patients who do not require respiratory intervention.

Indications for using glucocorticoids:

1. Children with severe or critical COVID-19 who require mechanical ventilation or those who require supplemental oxygen and have risk factors for disease progression or those who develop septic shock.

2. Steroids should be continued in children with an underlying condition requiring chronic steroid treatment

3. Steroids to be given when an additional diagnosis is made where steroid therapy is appropriate.

Which steroid to be used?

Dexamethasone is the most preferred agent. Dexamethasone 0.15 mg/kg orally, IV, or nasogastrically (NG) once daily (maximum dose 6 mg).

Other options

Prednisolone 1 mg/kg orally or NG once daily (maximum dose 40 mg) OR **Methylprednisolone** 0.8 mg/kg IV once daily (maximum dose 32 mg) OR **Hydrocortisone** For neonates (<1 month of age): 0.5 mg/kg IV every 12 hours for 7 days followed by 0.5 mg/kg IV once daily for 3 days; For children ≥1 month: 1.3 mg/kg IV every 8 hours (maximum dose 50 mg; maximum total daily dose 150 mg)

Duration of steroid therapy:

The duration of therapy is **up to 10 days or until discharge**, whichever is shorter.

5D. Low Molecular Weight Heparin:

LMW heparin is known to reduce the risk of Venous Thromboembolism (VTE) and may have anti-inflammatory properties.

In adults, venous thromboembolism (VTE) prophylaxis is appropriate in all hospitalized medical, surgical, and obstetric patients with COVID-19, unless there is a contraindication to anticoagulation. (Eg, active bleeding or serious bleeding in the prior 24 to 48 hours) or to the use of heparin (Eg, history of heparin-induced thrombocytopenia [HIT], in which case an alternative agent such as fondaparinux may be used). Unlike adults, the decision to start venous thromboembolism (VTE) prophylaxis in children is individualized.

Indications for starting prophylactic Low Molecular Weight Heparin in children:

1. Children with Multisystem Inflammatory Syndrome (MIS-C)

2. Severe or critically ill children with predisposition to venous thromboembolism

Risk factors for thrombosis to consider:

- Personal history of thrombophilia or VTE
- First-degree relative with VTE
- Presence of central venous line
- Congenital Heart Disease, Nephrotic syndrome, Diabetes Mellitus
- Postpubertal age
- Prematurity
- Antiphospholipid syndrome
- Decreased mobility from baseline
- Burns
- Active malignancy
- Indications of venous stasis or cardiac low flow state
- Active systemic infection
- Flare of inflammatory disease
- Obesity
- Severe dehydration
- Recent surgery or trauma

An assessment of bleeding risks (intracranial hemorrhage, active bleeding, coagulopathy, neurosurgical procedure within 24 hour, etc.) versusbenefit should be completed on each pediatric patient. Alternative methods of prophylaxis, such as early ambulation or mechanical prophylaxis should be considered in contraindicated patients and all COVID-19 pediatric patients, if applicable.

Dose and route of prophylactic Enoxaparin:

0.5 mg/kg (maximum dose 40 mg) given twice a day subcutaneously. Alternate administration between the left and right anterolateral and left and right posterolateral abdominal wall. To avoid bruising, the injection site should not be rubbed.

Monitoring of patients on Enoxaparin

If facilities available, obtain anti factor Xa levels 4 hour after subcutaneous dose after the third consecutive dose to obtain a level of 0.20-0.49 anti-Xa U/mL.

When should full dose anticoagulation be used?

- Documented or strongly suspected venous thromboembolism (VTE)

- Clotting of vascular access devices.
- Patients receiving anticoagulation therapy prior to admission.

For such children injection enoxaparin is given at the dose of **1 mg/kg subcutaneously** every 12 hourly with an anti-Xa factor target of 0.5–1 IU/ml

How to monitor for thromboembolism in children with COVID-19?

- Obtain a complete blood count (CBC) with platelet count, fibrinogen, prothrombin time, D-dimer on admission, and serially for monitoring.
- Baseline or surveillance imaging (Ultasound Doppler, CTangiography, etc.) not to be routinely done in the absence of clinical symptoms of venous thromboembolism.
- Imaging may not be needed prior to initiation of therapeutic anticoagulation if a thromboembolic event or pulmonary embolus is strongly suspected.

Indications for Tissue Plasminogen Activator (tPA), alteplase

- Limb-threatening DVT
- Massive Pulmonary Embolism (PE)
- Acute stroke
- Acute myocardial infarction

Individuals who suffered from venous thromboembolism require three months of anticoagulation after they get discharged.

5E. <u>Treatment of bleeding</u>

Bleeding does not appear to be a major manifestation of COVID-19. However, patients may have bleeding for other reasons, including trauma and/or treatment with anticoagulation. The approach to bleeding involve anticoagulant reversal and/or discontinuation, transfusions for thrombocytopenia or hypofibrinogenemia, or specific therapies such as factor replacement.

<u>5F.Oxygenation and respiratory support</u>

Indications for supplemental oxygen:

a.Children with Oxygen Saturation less than 94% in room air.

b. Obstructed or absent breathing

c. Severe respiratory distress

d. Central cyanosis

e. Shock

f. Coma or convulsions

These children should receive airway management and oxygen therapy during resuscitation to target SpO2 ≥ 94%; Use of nasal prongs or nasal cannula is preferred in young children, as these may be better tolerated.

Management of hypoxia and ARDS:

Non Invasive Ventilation (NIV):

Patients with respiratory distress should be treated when oxygen saturation is <94%.The use of High Flow Nasal cannula or Noninvasive Positive Pressure ventilation (NIPPV) should be done to provide respiratory support and prevent the need for invasive mechanical ventilation. These devices decrease the need for intubation, especially in younger children. These noninvasive devices are potentially aerosol generating, hence health care workers should follow (omit)airborne precautions. The use of HFNC and NIV should be limited to children with mild respiratory distress preferably in negative pressure rooms and with adequate personnel protective equipments (PPEs). However, there should be low thresholds for intubation and invasive mechanical ventilation in the event of clinical deterioration while on any respiratory support.

Heated Humidified High Flow Nasal Cannula (HHHFNC/HFNC)

Indications for HFNC:

HFNC therapy can be useful in special situations for hypoxia.In children with COVID-19 who persist to have increased work of breathing and hypoxemia on supplemental oxygen should receive HFNC if available.

Settings for HFNC:

A flow rate of HFNC is:

- ≤12kg: 2:/kg/minute
- >12kg: 2L/kg/minute for first 12 kg + 0.5L/kg/minute for each kg thereafter (max flow 50L/min)

Airborne precautions to be followed and adequate PPE to be used.

If available, child to be managed in negative pressure rooms.

In infants, while HFNC is being given they can be placed in an oxygen hood to minimize environment contamination.

Utmost care to be given while on HFNC to avoid sepsis.

How to monitor?

HFNC should be tried for a maximum of 1-2 hours.

Signs of improvement are decrease in heart rate and respiratory rate by 10-20%, decrease in FiO2 requirement to less than 50% and improvement in oxygen saturations.

What if no improvement on HFNC?

Patients with progressive respiratory distress, or where HFNC is unavailable, can be escalated to NIV, bubble continuous positive airway pressure (bCPAP)bCPAP, or bilevel positive airway pressure (BiPAP). Patients with worsening hypercapnia, acidemia, respiratory fatigue, hemodynamic instability or those with altered mental status should be considered for early invasive mechanical ventilation.

Non Invasive Ventilation

Indications of NIV:

Routine use of NIV is not recommended in COVID-19. It should be used only in selected patients with hypoxemic respiratory failure (**mild cases of ARDS without hemodynamic instability).**

Setting for NIV

Ideally, negative pressure single rooms are preferable for patients on NIV; in lack of such rooms keeping a distance of at least two meters between two beds should be considered. Conventional ventilators with NIV option having double lumen tubing is a safer option than NIV ventilator with single lumen tubing requiring exhalation port to washout the CO2. Antiviral/Antibacterial filters should be attached to the exhalation limb of the circuit to reduce environmental contamination.

Different interfaces used in NIV:

Preferred interfaces are helmet (hood), total face mask and oro-nasal non-vented masks.

How to monitor patient on NIV?

PaO2/FiO2is a sensitive and accurate indicator of oxygenation function on NIV and can be used to define the severity of ARDS once the patient has been on a PEEP of 5 cm for a minimum of 30 minutes. **Invasive ventilation must be considered if PaO2/FiO2 ratio is below 300.** In the absence of an ability to do an arterial blood gas, the SpO2/FiO2 can also be used to identify oxygenation failure as long as the FiO2 has been titrated to get saturations between 92%- 97%. The most recent World Health Organization (WHO)interim guidance on management of the novel-CoV has also recommended the **use of NIV for mild cases of ARDS without hemodynamic instability**.

Risks associated with NIV:

All patients receiving NIV need a clear plan for treatment failure as patients has high percentage of failure with NIV in case of rapidly progressing disease, like COVID-19. Risks of NIV include delayed intubation, large tidal volumes and injurious trans-pulmonary pressures thus further aggravating the lung injury. Although NIV might reduce intubation and mortality in mild ARDS, it is associated with higher mortality in moderate-to-severe ARDS from multiple causes.

Bubble CPAP:

In resource limited settings, bubble CPAP should be considered for respiratory support in children with hypoxemia, severe pneumonia and/or ARDS. This can be considered where both non-invasive and invasive mechanical ventilation are not available. Bubble nasal CPAP (commercial or indigenous) may be used for newborns and children with severe hypoxemia as these are readily available alternative in resource-limited settings. For minimization of environmental contamination, the infant could be placed in an oxygen hood to reduce droplets. These patients should be on continuous monitoring and in case the patient acutely deteriorates or does not improve after a short trial (about 2 hours), patient needs to be intubated.

Endotracheal Intubation and mechanical ventilation

Patients with known contraindications for NIV like moderate/severe ARDS with PaO2/FiO2 ratio below 200, hemodynamic instability, multi-organ failure, or abnormal mental status should receive invasive ventilation from the very beginning.

Patients not improving or worsening (persistent hypoxia, altered mentation, increased respiratory work) should be intubated. The endotracheal intubation must be done by the most skilled person of the team and cuffed endotracheal tube must be used. Bag and mask ventilation prior to intubation might pose risk for aerosol generation, hence Rapid Sequence Intubation(RSI) using muscle relaxant must be done as much as possible. Pre-oxygenation with 100% oxygen (unless contraindicated, e.g. cyanotic heart lesion patients) is recommended to minimize hypoxia with RSI. Video laryngoscopy, if available, can be used to increase the distance between the patient and provider. Once the patient is intubated, the endotracheal tube cuff must be inflated immediately to prevent aerosolization. Full PPE must be donned during endotracheal intubation. Extubation is also an aerosol-generating procedure; therefore, PPE must be worn.

COVID- 19 with ARDS (CARDS)

COVID-19 causes unique lung injury. It is a systemic disease that primarily injures the vascular endothelium. It may be helpful to categorize patients as

having either type L or H phenotype. Different ventilatory approaches are needed, depending on the underlying physiology.

Type L CARDS:

This is the initial stage of CARDS characterized by good lung compliance despite very poor oxygenation. The Minute ventilation is typically high. On CT scan, infiltrates are few and there is ground-glass pattern which suggests interstitial rather than alveolar edema. Clinically many patients are not overtly dyspneic. These patients can be assigned, in a simplified model, to "type L," characterized by low lung elastance (high compliance), lower lung weight as estimated by CT scan, and low response to PEEP. If this stage is properly treated, many patients do not deteriorate, and if not, they progress to the H type.

Ventilator strategy in Type L CARDS:

Use **lower PEEP (<10 cm H20). Use more liberal tidal volume (7-9 ml/kg as needed).** Lower tidal volume is unnecessary. Higher PEEP is ineffective, creates dead space, and adversely redirects blood flow (redirects blood flow away from overstretched open airspaces, accentuating stresses on highly permeable microvessels and compromising CO_2 exchange)

Type H CARDS:

This spectrum resembles the typical ARDS pattern characterized by extensive CT consolidations, atelectasis and edema, high lung elastance (low compliance), higher lung weight, and high PEEP response. Clinically, such patients are overtly dyspneic.

Ventilator strategy in Type H CARDS:

In this advanced state, it is advisable to apply a more conventional lung-protective strategy: **higher PEEP (≤15 cm H_2O), lower tidal volume (6 mL/kg), and prone positioning** while minimizing oxygen consumption.

Individualized titration of PEEP is recommended and the patient's hemodynamics must be monitored closely with increasing PEEP.

Prone positioning

Prone positioning 12-16 hours per day in mechanically ventilated patients with ARDS improves oxygenation and corrects ventilation perfusion mismatch. However, this should be done by teams that routinely practice prone positioning for other cases of ARDS.

High-frequency oscillatory ventilation (HFOV) can be considered for refractory respiratory failure, but no clear data exist to support its use in COVID-19 patients. Hence, conventional mechanical ventilation using individualized PEEP is advised; patients with preserved compliance (Type L CARDS) may not require high PEEP whereas those with low lung compliance (Type H CARDS) will benefit from more PEEP.

Also, a conservative fluid strategy should be used in patients with ARDS if the patient's hemodynamics allow fluid restriction. If available, extracorporeal membrane oxygenation (ECMO) may be considered in patients with continued severe hypoxemia despite maximal support.

5G. Management of shock

Give Intravenous fluid bolus **10–20 ml/kg per bolus up to 40–60 ml/kg**, over the first hour of resuscitation. The initial fluid of choice should be **crystalloids.** In children with COVID-19 and shock, age-appropriate mean arterial pressure (MAP) should be targeted. In settings where accurate MAPs cannot be easily obtained, systolic blood pressure is an acceptable option. The use of advanced hemodynamic variables, like cardiac index, systemic vascular resistance, and central venous oxygen saturation, whenever available should be used to guide resuscitation. Blood lactate levels can also be used to help guide resuscitation.

For inotropic support, **epinephrine or norepinephrine** should be chosen as the first-line vasoactive infusion guided by clinical preferences, individual patient physiology, and local system factors. Both have inotropic and vasopressor effects and are effective in treating children with fluid refractory shock. **Epinephrine should be considered as the first-line agent in patients with myocardial dysfunction and norepinephrine for patients with low systemic vascular resistance**. Diluted solution can be initiated through a peripheral intravenous catheter if central venous access is not

available. Vasopressin should be considered in children who need high doses of catecholamines. Inodilators such as milrinone, dobutamine or levosimendan could be used when there are signs of tissue hypoperfusion and cardiac dysfunction, despite high doses of catecholamines. For those with refractory shock, use of glucocorticoids should be considered.

Myocardial injury and increased cardiac biomarkers are associated with worse outcomes. Cardiac injury can be detected by elevated cardiac biomarkers, such as troponin, creatine kinase (CK), and its isoenzyme MB, electrocardiogram (EKG) and echocardiographic abnormalities.

5H.Other therapies

1. Hydroxychloroquine and chloroquine

- Hydroxychloroquine and chloroquine should not be used in the treatment of COVID-19 other than in the context of clinical trial.

2. Azithromycin and hydroxychloroquine

- Azithromycin in combination with hydroxychloroquine for treating COVID-19 **NOT to be used.**
- Most studies did not show clinical benefit.
- Furthermore, both azithromycin and hydroxychloroquine are associated with QTc prolongation, and combined use may potentiate this adverse effect.

3. Lopinavir-ritonavir

- Invitro activity of lopinavir-ritonavir has been demonstrated against the SARS-CoV and some activity against MERS-CoV in animal studies. However, lopinavir-ritonavir appears to have **minimal to no role in the treatment of SARS-CoV-2 outside of a clinical trial.**

4. Should children already taking Angiotensin Converting Enzyme Inhibitors (ACE inhibitors)/Angiotensin Receptor Blockers (ARBs) be continued if they get COVID 19?

Detrimental Effect of ACEI and ARBs

SARS-CoV-2 is known to utilize angiotensin-converting enzyme 2 (ACE2) receptors for entry into target cells. The speculated mechanism for detrimental effect of ACEIs and ARBs is related to ACE2. Any agent that increases expression of ACE2 could potentially increase susceptibility to severe COVID-19 by improving viral cellular entry;**ACEI and ARBs increase expression of ACE2 receptors and hence help in entry of the virus into cells.**

Protective role of ACEIs and ARBs

ACE2 converts angiotensin II to angiotensin-(1–7), which has **potentially beneficial vasodilatory and anti-inflammatory properties**; upregulating ACE2 (with ACE inhibitors or ARBs) could enhance this process. So, ACEIs and ARBs may protect against lung injury. It is therefore uncertain whether an increased expression of ACE2 receptors would worsen or mitigate the effects of SARS-CoV-2 in human lungs

Whether to continue or stop ACEIs and ARBs

Patients receiving ACEIs or ARBs **should continue treatment** if there is no other reason for discontinuation (Eg, hypotension, AKI). However, ACE inhibitors or ARBs is **not to be used as potential COVID-19 treatment**.

5. Should children already taking statins be continued if they get COVID- 19?

Statins are known inhibitors of the MYD88 pathway, which results in marked inflammation. Most evidence indicates that liver injury from statins is uncommon. Whether statins could impact the natural history of SARS-CoV-2 infection is not clear. **Therefore,Statins should be continued in hospitalized patients already taking statins.**

6. What is the effect of NSAIDs on COVID:

The Mechanism of action- of NSAIDs : inhibiting the COX enzymes, COX-1 and COX-2, and thereby inhibiting the synthesis of PGs and thromboxane A2 (TXA2). Local inflammation involves production of PGs by COX2 and the recruitment and activation of effector cells, such as PMNs. This causes pain and fever in infection. Alternatively, COX2 also helps in resolution of inflammation, thereby preventing self-inflicted damage from the immune response. COX-2 is believed to be upregulated in activated human B lymphocytes and required for optimal antibody synthesis. **??Inhibition of COX2 is associated with reduction in PMN recruitment in the lungs during the acute stage.**

Hence COX2 has dual role, amplifying the initial acute phase, and then promoting resolution of inflammation

NSAIDs during SARS-CoV-2 infection could improve or complicate the course of the disease, given the **biphasic immune response to SARS COV-2** (the *first immune defense-based protective phase and the second inflammation-driven damaging phase*). An in vitro study designed to determine whether nonselective NSAIDs **affect antibody synthesis** found that ibuprofen, Aminosalicylic acid(ASA), naproxen and acetaminophen inhibited antibody production at pharmacological doses; with **ibuprofen having the greatest effect**.

Possible benefit of NSAIDs:

The **NSAIDs indomethacin and naproxen** have both been found to have **antiviral properties**. Indomethacin in vitro and animal models have potent antiviral activity against SARS-CoV. Naproxen also has antiviral activity against influenza A and B. Naproxen could be "a probable agent for control of widespread novel coronavirus infection".

Uncertainty about NSAID use??

Paracetamol : preferred antipyretic agent

If NSAIDs are needed: use the lowest effective dose. There is **no need to discontinue NSAIDs** in patients who are on them chronically for other conditions, unless there are other reasons to stop them (eg, renal injury, gastrointestinal bleeding). **NSAIDs NOT TO BE avoided when clinically indicated.**

7. Patients already on long term immunosuppressant

For these patients, **benefits and risks of reducing immunosuppressive therapy should be weighed**. Although the relationship between immune compromise and severe COVID-19 disease has not been well established in children, management of viral infections in immunocompromised hosts typically includes reduction of baseline immunosuppression, if reduction is possible

8. Avoiding nebulized medications

Inhaled medications should be administered by Metered Dose Inhaler (MDI), whenever possible, rather than through a nebulizer, to avoid aerosolization. If a nebulizer must be used, appropriate infection control precautions should be taken.

9. Adequate vitamin D intake

Vitamin D supplementation may be necessary to meet the recommended intake, particularly for children with limited exposure to sunlight (Eg, those remaining inside while self-isolating). However, the role of vitamin D in the treatment and prevention

of COVID-19 is uncertain and **doses exceeding the upper level intake are not recommended**. Whether vitamin D deficiency increases the risk of severe SARS-CoV-2 infection in children is uncertain.

10. Role of Vitamin A

Vitamin A deficiency may be associated with impairment of humoral and cell-mediated immunity, and even mild vitamin A deficiency may lead to increased morbidity from measles and other viral respiratory infections. There **are no available data on the use of vitamin A for the treatment of COVID-19.**

11. Convalescent plasma:

The **role of convalescent plasma in treating children with severe and critical COVID is unclear**. Trial data are emerging. The proposed mechanism of action is via neutralizing antibodies binding to virus, rendering it inert. Donors should meet the following criteria: *(a) initially proven positive for SARS-CoV-2 by a laboratory test; and either: at least 14 days from symptom resolution with a repeat documented negative test for SARS-CoV-2, or at least 28 days from symptom resolution without a documented repeat test results at the time of plasma collection.*

Inclusion criteria for Convalescent plasma infusion:

- Severe COVID-19 disease, OR
- Moderate disease with a risk of progression to severe or life threatening disease

Convalescent plasma NOT to be used in:

Those with volume overload and history of anaphylaxis should not undergo convalescent plasma therapy.

Dose of Convalescent plasma

An **ABO compatible** product is to be identified. The dose administered will be **10mL/kg/dose (up to 2 units per dose) times two doses per patient for a total dose of 20 mL/kg.**

12. Other investigational antivirals: Nitazoxanide,Ivermectin, Lopinavir/ritonavir, Favipiravir, Bemcentinib, Bemcentinib

13. Immunomodulators and Other Investigational Therapies

- **Interleukin inhibitors:** They may prevent severe damage to lung tissue caused by cytokine release (“cytokine storm” with release of IL-6, IL-1, IL-12, and IL-18, TNFα)

- ✓ ***Interleukin-6 inhibitors-****sarilumab,tocilizumab*
- ✓ ***Interleukin-1 inhibitors-*** Anakinra

Investigational Antibody Therapies

- Anti-SARS-CoV-2 polyclonal hyperimmune globulin
- Monoclonal antibodies
- VIR-7831 & VIR-7832
- Polyclonal hyperimmune immunoglobulin

6. Duration of isolation:

- The Shedding of SARS-CoV-2 RNA in upper respiratory tract specimens declines after onset of symptoms. At 10 days after illness onset, recovery of replication-competent virus in viral culture is decreased and approaches zero. Although persons may produce PCR-positive specimens for up to 6 weeks (Xiao, 2020), it remains unknown whether these PCR-positive samples represent the presence of infectious virus.
- For persons recovered from COVID-19 illness, isolation be maintained for **at least 10 days *after illness onset* and at least 3 days (72 hours) *after recovery*.** Illness onset is defined as the date symptoms begin. Recovery is defined as resolution of fever without the use of fever-reducing medications with progressive improvement or resolution of other symptoms. Loss of taste and smell may persist for weeks or months after recovery and need not delay the end of isolation.

When to discharge?

- At least **ONE** negative rRT-PCR results from nasopharyngeal swab AND
  1. Resolution of fever, without use of antipyretic medication (at least 24 hour fever free period).
  2. Improvement in illness signs and symptoms.
  3. Does not require in-patient care for other reasons.

However, decision to discharge should be on a case-by-case basis.

CHAPTER IV

Neonates and COVID-19

PREVENTION OF TRANSMISSION FROM INFECTED MOTHER TO NEWBORN

1. Testing in neonates

- Obtain either a single swab of the nasopharynx; *or* a single swab of the throat followed by the nasopharynx; *or* two separate swabs from each of these sites, and submit for a single test.
- Testing should be done first at approximately 24 hours of age and again at approximately 48 hours of age. If it is planned that a healthy newborn will be discharged prior to 48 hours of age, clinicians may choose to order a single test at 24-48 hours of age. **For the sake of convenience, a single test at 48 hours of life is sufficient. (done at BPKIHS)**
- For infants who require ongoing hospital care, caregivers should continue to use appropriate PPE until discharge, or until the infant has two consecutive negative tests collected ≥24 hours apart.

2. Mother-baby contact

There have been debate regarding whether to separate the mother from the baby. The World Health Organization **(WHO)** opines that mothers who have suspected, probable, or confirmed COVID-19 virus infection **should be enabled to remain together and practice skin-to-skin contact**. The **CDC** advises determining whether to separate a mother with known or suspected COVID-19 and her infant on a **case-by-case basis**, using shared decision making between the mother and the clinical team.

The newborn's risk for acquiring SARS-CoV-2 from themother is low, and data suggest no difference in risk of neonatal SARS-CoV-2 infection whether the neonate is cared for in a separate room or remains in the mother's room. Rooming-in helps establish breastfeeding, facilitates bonding and parental education, and promotes family-centered care. We recommend to **discuss the issue of separation with the mother and family, explain them the risk of transmission if not separated, and the harms of separation on the mother baby pair. The decision whether to separate the baby from the mother should come after the discussion with the mother and the family.** If another healthy family member is providing infant care, they should use appropriate

personal protective equipment (mask, hand hygiene). However, if separation is not done, use of measures like Physical barriers (Eg, a **curtain between the mother and newborn**), and keeping the newborn in a temperature controlled isolette **≥6 feet** away from the mother should be done. **Face mask and hand hygiene by the mother** or caretaker, when in close contact, particularly when feeding, should be strictly carried out. If another healthy adult is in the room, they can care for the newborn.

Conditions in which mother baby separation MAY be required:

a. Mothers who are too sick to take care of their babies or those who need higher level of care.

b. On a case by case basis, for newborns who are at higher risk of disease progression (preterm, infants with underlying medical morbidity, critically ill neonates, etc.).

Separation of mother baby pair NOT useful when:

a. If the neonate tests positive for SARS-CoV-2.

b. If the mother and newborn will not be able to maintain separation after discharge until they meet criteria for discontinuation of quarantine.

Does discharge prior to usual practice with the intent to reduce risk of COVID-19 infection provide any advantage to the newborn or family?

The answer is **NO.**

When should mother-newborn infection precautions be discontinued?

- When at least 10 days have passed since symptoms first appeared (up to 20 days if they have more severe to critical illness or are severely immunocompromised).
- When at least 24 hours have passed since their last fever without the use of antipyretics.
- When Symptoms have improved.
- For asymptomatic mothers, after at least 10 days of positive test.

3. Breastfeeding and formula feeding:

The risk of SARS-CoV-2 transmission from ingestion of breast milk is minimal. In a study by the WHO, breast milk samples from 43 mothers were negative for SARS-CoV-2 by RT-PCR and samples from three mothers tested positive, but specific testing for viable and infective virus was not performed.
As considering the mother-infant benefits of breastfeeding, less chances of transmission of virus through breast milk, the American academy of Pediatrics (AAP) recommends breastfeeding to be continued, however mothers should perform hand hygiene before, and wear a mask during, breastfeeding.

Scenarios for breastfeeding:

Scenario 1:

Breastfeeding mother has suspected or confirmed COVID-19, but breastfed child does not have COVID-19: Such infant should be quarantined for the duration of the lactating parent's recommended period of home isolation and during their own quarantine thereafter. The mother who is feeding must follow precautions including hand hygiene, wearing mask if placed within 6 feet of the child, clean and sanitize breast pumps (in case expressed milk is being used).

Scenario 2:

Breastfed child has suspected or confirmed COVID-19, but breastfeeding mother does not have COVID-19: Motherswho are breastfeeding their children with suspected or confirmed COVID-19 should be considered as a close contact (omit), and should be quarantined for the duration of the breastfeeding child's recommended period of home isolation and during their own quarantine thereafter. Because of the danger of suffocation, masks should NOT be put on children younger than 2 years. To minimize possible exposure, breastfeeding people may choose to take precautions as recommended above for those with suspected or confirmed COVID-19 while feeding at the breast, expressing milk, or feeding from a bottle. This includes wearing a mask during any close contact (i.e., less than 6 feet) with the child and cleaning their hands frequently (i.e., before and after touching their child).

Scenario 3:

Both the breastfeeding mother and breastfed child have suspected or confirmed COVID-19: Both the breastfeeding mother and breastfed child with suspected or confirmed COVID-19 should follow information on home isolation. No special precautions (e.g., wearing a mask) are recommended for breastfeeding, expressing milk, or feeding from a bottle during the period of home isolation.

Scenario 4:

Breastfeeding mother has been in close contact with someone who has COVID-19, but breastfed child has not been in close contact with anyone who has COVID-19: The breastfeeding mother should quarantine herself (omit)during her quarantine after the last contact with the person who has COVID-19. The breastfed child should be monitored for signs or symptoms of COVID-19 but does not require quarantine unless the breastfeeding mother develops COVID-19 symptoms or receives a positive viral test result. During the breastfeeding mother's period of quarantine, she should follow precautions for feeding at the breast, expressing milk, and feeding from a bottle as if she has suspected or confirmed COVID-19.

Scenario5:

Breastfed child has been in close contact with someone other than the breastfeeding mother who has COVID-19 (e.g., another caregiver, childcare provider), but breastfeeding mother has not been in close contact with anyone who has COVID-19: The breastfed child should be quarantined after his/her last contact with the person who has COVID-19. The breastfeeding mother should be monitored for signs or symptoms of COVID-19 but does not require quarantine unless the breastfeeding child develops COVID-19 symptoms or receives a positive viral test result. Because of the danger of suffocation, masks should NOT be put on children younger than 2 years. To minimize possible exposure, breastfeeding mother may choose to take precautions as recommended above for those with suspected or confirmed COVID-19 while feeding at the breast, expressing milk, or feeding from a bottle.

Scenario 6:

Both the breastfeeding mother and breastfed child have been in close contact with someone who has COVID-19: The breastfeeding mother and breastfed child should both quarantine after their last contact with the person who has COVID-19. If either

or both member(s) (omit) develops symptoms or receives a positive viral test result, that person(s) should follow information on home isolation. If only one member of the dyad develops symptoms or receives a positive viral test result, the uninfected member of the dyad should be quarantined for the duration of the recommended period of home isolation and during their own quarantine thereafter. During the quarantine period, the breastfeeding person should follow precautions for feeding at the breast, expressing milk, and feeding from a bottle as if they have suspected or confirmed COVID-19. If the breastfeeding mother develops symptoms of COVID-19 or receives a positive viral test result, she should continue these precautions, extending the time frame for taking such precautions to the end of her recommended period of home isolation. If the breastfeeding child develops symptoms of COVID-19 or receives a positive viral test result, breastfeeding mother may choose to take precautions as recommended above for those with suspected or confirmed COVID-19 while feeding at the breast, expressing milk, or feeding from a bottle. This includes wearing a mask during any close contact (i.e., less than 6 feet) with the child and cleaning hands frequently (i.e., before and after touching their child).

Feeding pumped breast milk

If mother and baby separation has been implemented, ideally, the infant is fed expressed breast milk by another healthy caregiver until the mother has recovered or has been proven uninfected, provided that the other caregiver is healthy and follows hygiene precautions

Before pumping, ideally with a dedicated breast pump, mothers should wear a mask and thoroughly clean their hands and breasts with soap and water and clean pump parts, bottles, and artificial nipples

Formula feeding

Ideally, women who choose to formula feed should have another healthy caregiver feed the infant. If this is not possible or desired, such women must also take appropriate infection control precautions, as described above, to prevent transmission through close contact when feeding.

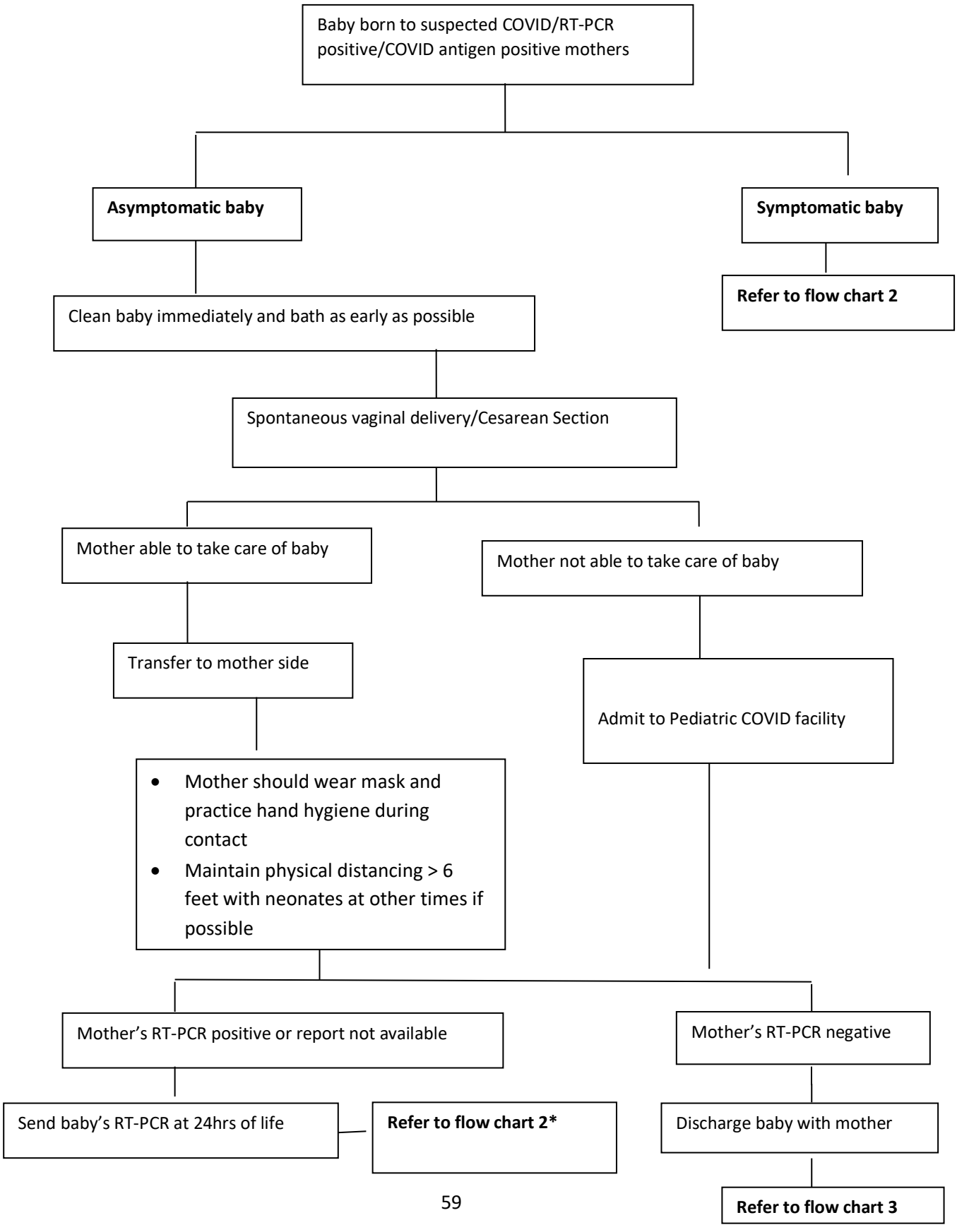
Antiviral drug safety in lactating mothers

For mothers who are receiving remdesivir, their infants are not likely to absorb clinically important amounts of the drug from breast milk.

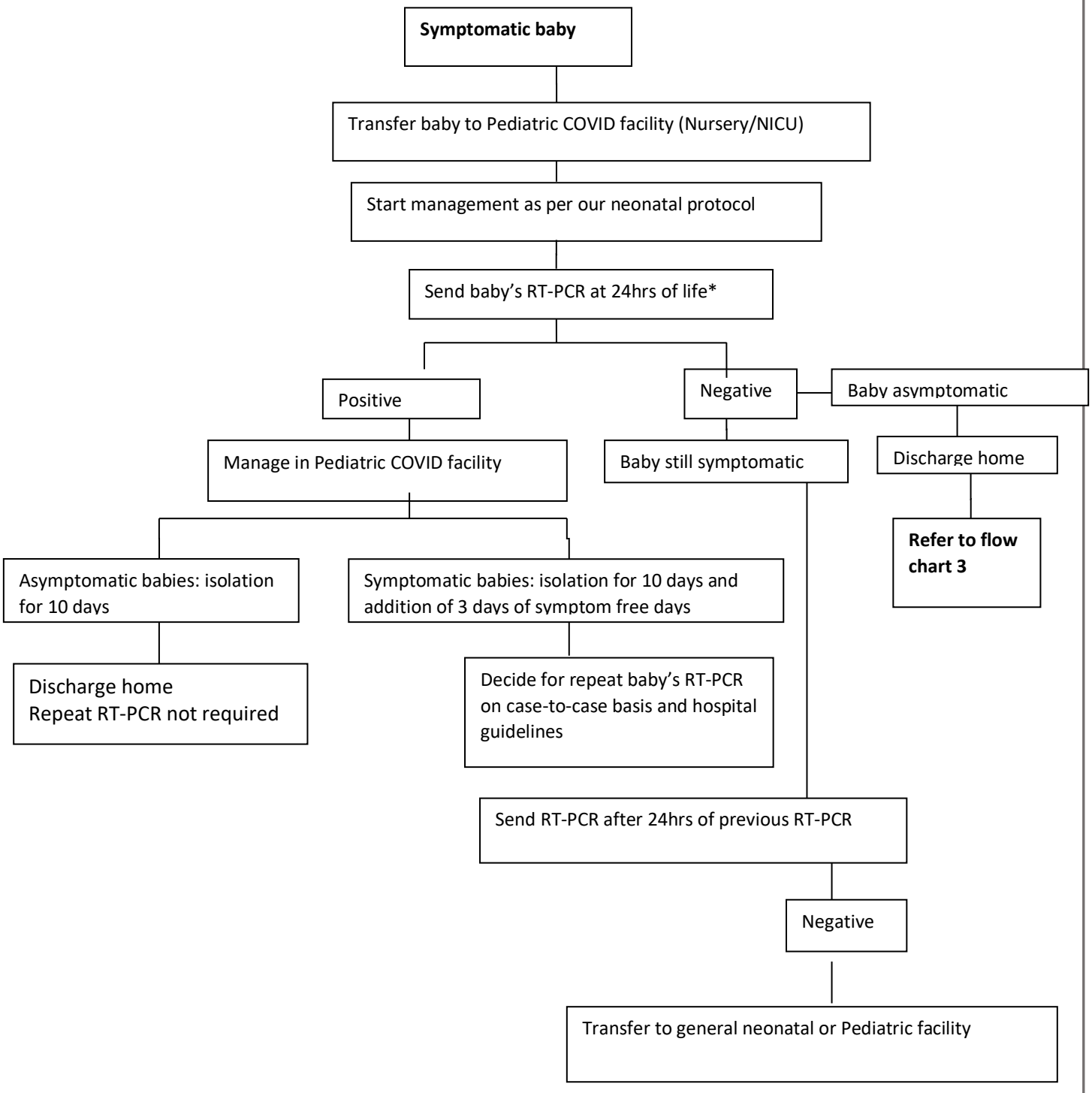
SARS-CoV-2 vaccines safety in lactating mothers

Breastfeeding is not exclusion to receiving the first vaccines to become clinically available. However, lactating women were not included in vaccine trials. If any vaccine crosses into breast milk and is then ingested by the infant, it is likely to be inactivated by the infant's digestive system, but maternal COVID-19 antibodies induced by maternal vaccination can pass into breast milk and may have protective effects.

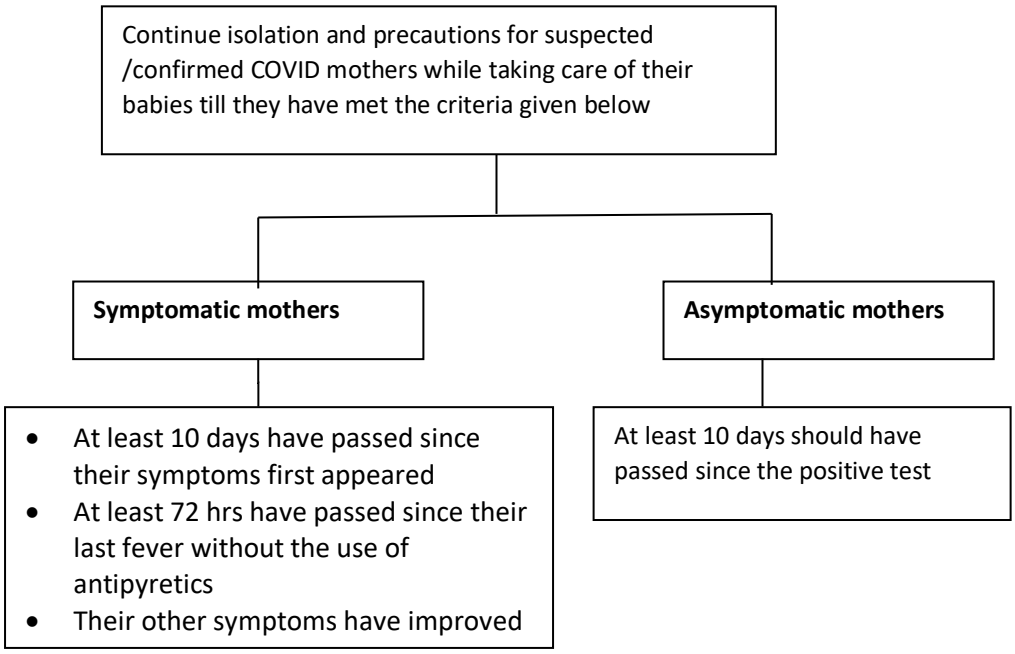
Flow chart 1: Approach to baby born to suspected/RT-PCR positive/COVID antigen positive mothers



Flow chart 2: Approach to symptomatic baby born to suspected/RT-PCR positive/COVID antigen positive mothers



Flow chart 3: Discontinuing isolation and precautions guidelines for suspected or confirmed COVID mothers



Note: COVID antigen positive test is managed as confirmed COVID for both neonates and mothers as per our guidelines.

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CHAPTER V

Miscellaneous

1. Outpatient management of Children with COVID 19

The parents should be counselled regarding isolation, monitoring for clinical deterioration, and supportive care. They must be informed about the chances of clinical deterioration, which may occur suddenly after one week of symptoms. The symptoms of clinical deterioration include: Severe respiratory distress, difficulty breathing (for infants: grunting, central cyanosis, inability to breastfeed), chest pain or pressure, blue lips or face, findings associated with shock (eg, cold, clammy, mottled skin; new confusion; difficulty arousing; substantially reduced urine output), etc. Use of telephone and digital media like video call can be used for the purpose of counselling and monitoring.

Duration of home isolation:

At 10 days after illness onset, recovery of replication-competent virus in viral culture is decreased and approaches zero. Although persons may produce PCR-positive specimens for up to 6 weeks, it remains unknown whether these PCR-positive samples represent the presence of infectious virus. After clinical recovery, many patients do not continue to shed SARS-CoV-2 viral RNA. These data have been generated from adults. Data from children and infants are not presently available.

For persons recovered from COVID-19 illness, the CDC recommends that isolation be maintained for **at least 10 days *after illness onset* and at least 3 days (72 hours) *after recovery.*** Illness onset is defined as the date symptoms begin. Recovery is defined as resolution of fever without the use of fever-reducing medications with progressive improvement or resolution of other symptoms.

Avoidance of unproven interventions

- Hydroxychloroquine and other investigational agents should be used only under the supervision of a health care provider.
- Eg, chloroquine phosphate, which is used in home aquariums; ivermectin intended for animals may lead to severe toxicity, including death

2. Key points in neonatal resuscitation

The following points must be noted:

- Use of appropriate PPE by the care givers is a must.
- Initial steps are unlikely to be aerosol generating; they include drying, tactile stimulation, placement into a plastic bag or wrap, assessment of heart rate, and placement of pulse oximetry and ECG leads.
- Suction should not be performed unless indicated.
- Endotracheal medications to be avoided.
- Intravenous epinephrine via a low-lying umbilical venous catheter is preferred.
- Closed incubators to be used.

3. Key points in Pediatric Advanced Life Support (PALS) : *(Adapted from American Heart association journal circulation, consensus report ; interim guidance on BLS and ALS in adults, children and neonates with suspected or confirmed COVID 19 infection).*

- Use of appropriate PPE by the care givers is a must.
- Limiting the number of personnel involved.
- Consider using mechanical devices for CPR for adults and adolescents who meet height and weight criteria.
- Communicate COVID- 19 status to any new providers.
- Prioritize oxygenation and ventilation strategies with lower aerosolization risks
  - ✓ Use a HEPA filter, if available, for all ventilation.
  - ✓ Intubate early with a cuffed tube, if possible, and connect to mechanical ventilation, when able.
  - ✓ Engage the intubator with highest chance of first pass success
  - ✓ Pause chest compression to intubate
  - ✓ Consider use of video laryngoscopy, if available.
  - ✓ Before intubation, use a bag mask device (or T piece in neonates) with a HEPA filter and tight seal.
  - ✓ For adults, consider passive oxygenation with non-re-breathing face mask as alternative to bag mask device for short duration.
  - ✓ If intubation is delayed, consider supraglottic airway.
  - ✓ Minimize close circuit disconnections

  Consider resuscitation appropriateness

1. Address goals of care

2. Adopt policies to guide determination, taking into account patient risk factors for survival.

4. PREVENTION OF TRANSMISSION

- **Hygiene and social distancing**

✓ Having the child (and other sick family members) wear a mask if leaving the home cannot be avoided.

✓ As much as possible, keeping ill family members ≥6 feet away from other people, especially family members who are ≥65 years of age or have serious medical conditions.

✓ If such separation is not possible, have the ill family member wear a face mask when they are in the same room or vehicle as other people.

✓ Keeping ill family members separated from pets in the household.

✓ Having family members who have fever or cough sleep in separate rooms and use separate bathrooms.

✓ Avoiding sharing items (eg, pillows, blankets, utensils, cups).

✓ **After hospital discharge** —

✓ After hospital discharge a mother with symptomatic COVID-19 infection should maintain a distance of **at least six feet** from the newborn and use a face mask and hand hygiene for newborn care until at least 3 days (72 hours) have passed since recovery and at least 10 days have passed since symptoms first appeared.

✓ For mothers with laboratory-confirmed COVID-19 who have never been symptomatic, transmission precautions can be discontinued when at least 10 days have passed since the date of their first positive COVID-19 diagnostic test.

Should routine health supervision appointments rescheduled?

- The CDC and AAP encourage prioritization of newborn care and vaccination of children through 24 months of age.
- **Routine immunization activities should not be deferred.**
- Scheduling home visits, telemedicine.
- **Use of cloth face coverings** — Individuals **≥2 years** of age must wear a cloth face covering (eg, homemade masks or bandanas) when they are in public settings where social distancing may be difficult to achieve (eg, grocery stores, clinician offices), especially in areas with substantial community transmission.

- **Cloth masks are not recommended for children <2 years of age, because of concerns about suffocation**

Hand sanitizer safety

- Alcohol-based hand sanitizer is safe for use in children; there is no cause for concern if children eat or lick their hands after the hand sanitizer has fully dried. However, because ingestion of even a small amount of liquid hand sanitizer can cause **alcohol poisoning** in children (including hypoglycemia), children **younger than six years** should be supervised when using alcohol-based hand sanitizers, and alcohol-based hand sanitizers should be kept out of the reach and sight of children

Postexposure prophylaxis like HCQ not be attempted outside of a clinical trial.

TRANSPORT OF COVID- 19 CASES

Transportation of COVID 19 cases, particularly children, is a challenging task and requires planning and coordination. The necessary transport equipments need to be ready beforehand. The following equipments need to be made ready before the transfer:

- Portable ventilator connected to oxygen cylinder
- Extra oxygen cylinder
- Portable monitor with defibrillator
- Disposable or sterilizable bag-valve-mask with oxygen tubing
- Intubation and emergency medication Kit
- Infusion pumps- with extended tubing
- Transparent drape to cover the patient (such that enables easy access to the airway)
- Transparent protective covers for equipment
- Closed suction system
- Source of heat (portable heater)

Coordination

The following things need to be discussed and finalized among the receiving department or hospital, transport team and the security before transfer:

- The condition of the patient, test results, COVID-19status of the caregivers (in case of young children).
- The time at which the patient will be moved and approximate time of arrival at the receiving department/hospital.
- The route taken for the transfer. Special precautions must be taken to bypass hassle and crowded areas like the emergency department.
- The number of personnel involved in the transfer must be minimized, without compromising the safety of the patient.
- In case of neonates and infants, mother or caregiver must accompany the patient. However, the transport team must first screen the caregiver for

COVID-19 status. If the caregiver is COVID positive, or there is a strong suspicion based on history, then other caregiver must accompany. In case there is no other caregiver, s/he must wear a surgical mask and follow safety precautions.

- Wrap transport equipment in the transparent covers.
- Ensure functionality of wrapped transport equipment after attaching to the patient.
- Clearly label an emergency IV access.

During the transport process:

- Donning of appropriate PPE by the transport team outside the patient room before transport.
- Strictly following contact/ droplet precautions throughout transport.
- Intubated patients—cover intubated patient with a plastic transparent drape and for non-intubated patients above 2 years of age should don a surgical face mask.

After arrival:

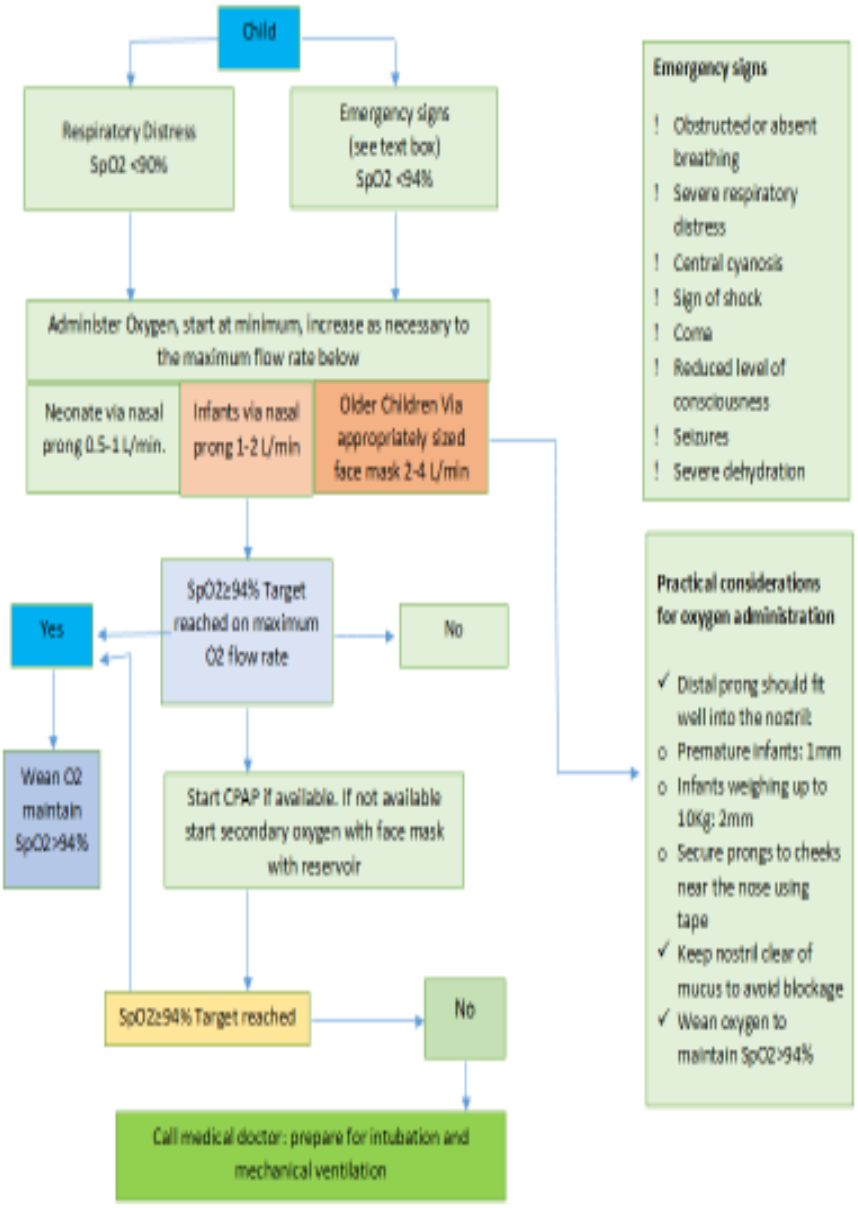
- The patient should be handed over to the designated person of the respective COVID ward.
- All the protective equipments covering should be removed.
- Doffing of the PPE in the designated area of the receiving hospital/department.
- Don new PPE for the return journey.
- Complete patient handover outside the patient's room.
- Return the equipment by the same ambulance.
- Return all the transport equipment to the area of initiation of transport for decontamination.

Decontamination of the equipments and vehicles after the transport. *(Follow infection prevention chapter for details of decontamination)*

Precautions to be taken during attending deliveries for a mother who is a suspected or proven case of COVID- 19

The attending medico should wear appropriate PPE including gown, gloves, N95 respirator mask and eye protection goggles or face shield. The mother should wear a surgical mask, and whenever feasible, there should be a distance of at least 6 feet between the mothers bed and resuscitation table. If intubation of the mother is necessary for general anesthesia, the transport members should leave the operating room during the intubation procedure, if possible. Use of an approved bacterial/viral HEPA filter in line with the bag is recommended, whenever feasible.

Once the neonate is placed in the transport isolate, every effort should be made to keep the portals closed and access limited to emergencies.



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Chapter VI

Multi-system Inflammatory Syndrome in Children (MIS-C)

Background

Multisystem Inflammatory Syndrome in Children (MIS-C) also known as pediatric hyper-inflammatory syndrome or pediatric hyper-inflammatory shock is a condition which is characterized by fever, inflammation and multi-organ dysfunction which manifests several weeks after the infection of SARS-CoV-2.[1] This condition should be differentiated from other pediatric inflammatory conditions like Kawasaki disease, bacterial sepsis, staphylococcal and streptococcal toxic shock syndromes, and macrophage activation syndromes as these conditions have features similar to that of MIS-C.[2] The main objective of this document is to develop the guidelines for the evaluation and management of MIS-C based on recent evidences and current resources available in our country. This guideline includes case definition criteria and approach to the evaluation and management of MIS-C in Nepal.

When to suspect MIS-C?

- Any children who fulfil the case definition criteria given by CDC[3] or WHO[4] should be evaluated for MIS-C

WHO case definition[4]

All 6 criteria must be met:

1. Age 0 to 19 years
2. Fever for ≥3 days
3. Clinical signs of multisystem involvement (at least 2 of the following):
    - Rash, bilateral non-purulent conjunctivitis, or mucocutaneous inflammation signs (oral, hands, or feet)
    - Hypotension or shock
    - Cardiac dysfunction, pericarditis, valvulitis, or coronary abnormalities (including echocardiographic findings or elevated troponin/BNP)
    - Evidence of coagulopathy (prolonged PT or aPTT; elevated D-dimer)
    - Acute gastrointestinal symptoms (diarrhea, vomiting, or abdominal pain)
4. Elevated markers of inflammation (e.g., ESR, CRP, or procalcitonin)
5. No other obvious microbial cause of inflammation, including bacterial sepsis and staphylococcal/streptococcal toxic shock syndromes
6. Evidence of SARS-CoV-2 infection
    - Any of the following:
        - Positive SARS-CoV-2 RT-PCR
        - Positive serology
        - Positive antigen test
        - Contact with an individual with COVID-19

Diagnostic evaluation of MIS-C:

- A child suspected for MIS-C still should also be evaluated for other common clinical disease conditions like infectious and non-infectious causes that justifies the patient's clinical manifestation.
- Refer to Table 1 for clinical manifestations and details of investigations that can be done for MIS-C
- Refer to Table 2 for distinctions between MIS-C and Kawasaki disease
- Refer to flow diagram 1 for the evaluation and management of MIS-C

Table 1. Clinical manifestations of MIS-C

Symptoms	**Signs**
• Fever • Gastrointestinal: abdominal pain, vomiting, diarrhea • Rash • Conjunctivitis • Mucous membrane involvement • Neurological: headache, lethargy, confusion • Respiratory: tachypnea, labored breathing • Sore throat • Myalgias • Swollen hands/feet • Lymphadenopathy	• Shock • Features of Kawasaki disease • Myocardial dysfunction (by echocardiogram or elevated troponin/BNP) • Arrhythmia • Acute respiratory failure requiring noninvasive or invasive ventilation • Acute kidney injury • Serositis (small pleural, pericardial, and ascitic effusions) • Hepatitis or hepatomegaly • Encephalopathy, seizures, coma, or meningo-encephalitis
Laboratory investigations Abnormal blood cell counts • Lymphocytopenia • Neutrophilia • Mild anemia • Thrombocytopenia • Elevated inflammatory markers • C-reactive protein • Erythrocyte sedimentation rate • D-dimer (if available) • Fibrinogen (if available) • Ferritin • Procalcitonin (if available) Elevated cardiac markers • Troponin • BNP (if available) • Hypoalbuminemia • Mildly elevated liver enzymes • Elevated lactate dehydrogenase • Hypertriglyceridemia	**Radiology** Echocardiogram • Depressed LV function • Coronary artery dilation/aneurysm • Other findings can include mitral regurgitation and pericardial effusion Chest radiograph • Normal in many patients • Abnormal findings: small pleural effusions, patchy consolidations, focal consolidation and atelectasis Chest CT • Findings generally similar to those on chest radiograph • A few patients had nodular ground-glass opacification Abdominal imaging (ultrasound and/or

	CT) • Ascites • bowel and mesenteric inflammation • terminal ileitis • mesenteric adenopathy/adenitis • pericholecystic edema

Table 2. Distinction features between MIS-C and Kawasaki disease (KD)[5-7]

	MIS-C	**KD**
Age	older children & adolescents	infants & young children
Ethnicity	common in black and Hispanic children	common in East Asian children
Gastrointestinal symptoms	very common	less prominent
Myocardial dysfunction/shock	more common	less common
Inflammatory markers	markedly elevated	elevated
Coronary artery involvement	risk present	risk present

Indications for Hospital admission

- All children with signs and symptoms of MIS-C should be admitted to the hospital.

Indications for admission to the ward

- Features of Kawasaki disease (KD)
- Severe abdominal pain or vomiting, especially if unable to tolerate oral feeds
- Clinical or laboratory evidence of dehydration

Indications for PICU Admission

Admission to a PICU is appropriate for children with

- Hemodynamic instability (shock, arrhythmia)
- Significant respiratory compromise
- Abnormal vital signs (tachycardia, tachypnea)
- Shock
- Respiratory distress
- Evidence of cardiac involvement (elevated troponin or brain natriuretic peptide, depressed ventricular function or coronary artery abnormality on echocardiogram, abnormal echocardiogram)

- Neurologic changes (e.g., depressed mental status, abnormal neurologic examination, seizures)
- Laboratory evidence of acute kidney injury, acute hepatic injury, or coagulopathy

  Underlying medical condition that may place the child at increased risk for complications (e.g. immunodeficiency, cardiac or pulmonary conditions)

Approach to a child with suspected MIS-C

All the patients with history of fever, two organ system involvement, predominantly gastrointestinal and cardiac and having epidemiological link to SARS-CoV-2 should be considered as patient under investigation for MIS-C and evaluated as shown below.[8] Refer to Flow diagram 1 for diagnostic evaluation of MIS-C.

First line investigations[1,9]:

- It includes complete blood cell count with differential, complete metabolic panel, erythrocyte sedimentation rate [ESR], C-reactive protein [CRP],urine analysis, chest X-ray and testing for SARS–CoV-2 by polymerase chain reaction [PCR] or serology). The complete metabolic panel (CMP) includes measurement of sodium, potassium, blood urea nitrogen, creatinine, glucose, calcium, albumin, total protein, aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, and bilirubin.
- In addition, these patients must also be evaluated for the possible etiologies that could explain their clinical presentation like bacterial infection/sepsis, Rickettsia infection, toxic shock syndrome, Kawasaki disease etc.

Second line investigations[1,9]:

- It includes D-dimer, ferritin, fibrinogen, LDH, PT/INR, aPTT, troponin, triglyceride, ECG, echocardiography, BNP, procalcitonin if available.
- It is carried out in children who have elevated ESR and/or CRP and at least 1 other suggestive laboratory feature: lymphopenia, neutrophilia, thrombocytopenia, hyponatremia, or hypoalbuminemia, or presented in shock/cardiac dysfunction.

Definition of organ system involvement[5,10]

Gastrointestinal: nausea/vomiting. Diarrhea, abdominal pain, appendicitis, pancreatitis, hepatitis, gallbladder hydrops or edema

Cardiovascular: hypotension or shock, cardiac dysrhythmia or arrythmia, ejection fraction <55%, pulmonary edema due to left heart failure, coronary artery z score ≥2.5, pericarditis or pericardial effusion or valvulitis, B-type natriuretic peptide (BNP) >400 pg/mL, elevated troponin, receipt of vasopressor or vasoactive support, receipt of cardiopulmonary resuscitation (CPR)

Hematologic: Total white blood cell <4,000, anemia for age, platelet count <150,000 /μL, deep vein thrombosis, pulmonary embolism, hemolysis, bleeding or prolonged PT/aPTT, ischemia of an extremity

Mucocutaneous: bilateral conjunctival injection, oral mucosal changes, rash or skin ulcers, 'COVID' toes, swollen red cracked lips, erythema of palms or soles, edema of hands or feet, periungual (nails) desquamation

Respiratory: receipt of mechanical ventilation or any type of supplemental oxygen (or· increased support for patients receiving respiratory support at baseline), severe bronchospasm requiring continuous bronchodilators or pulmonary infiltrates on chest radiograph, lower respiratory infection, pleural effusion, pneumothorax or other signs of barotrauma, pulmonary hemorrhage, chest-tube or drainage required

Musculoskeletal 23% (more frequent in teens): arthritis or arthralgia, myositis or myalgia

Renal: acute kidney injury with or without dialysis

Neurologic: stroke or acute intracranial hemorrhage, seizures, encephalitis, aseptic meningitis, or demyelinating disorder, altered mental status, suspected meningitis with negative culture

Management of MIS-C

The management of MIS-C patients requires a multidisciplinary approach ideally in centers offering pediatric intensive care units (PICU). Many therapeutic agents used for treating MIS-C are unavailable or unaffordable in most of the Lower middle income countries (LMICs) and the choices for immunomodulation are limited[11].The ongoing international study comparing the best available treatment depending on clinician preference and drug availability, might provide information on the treatment options available in LMICs[12].The existing therapy may be changed after the results of existing trials are published.

Treatment protocols can be grouped under 4 major categories[13]

1. Supportive care
2. Antibiotics: Ceftriaxone, Clindamycin, +/-Vancomycin/Cloxacillin
3. Anti-inflammatory: Intravenous immunoglobulin (IVIG), Aspirin, Methylprednisolone, Anakinra and others
4. Anti-coagulant: Enoxaparin

1. **Supportive care**

Primary Assessment Pentagon (ABCDE)[14]**:**

The ABCDE approach consists of stabilization of airway, breathing, circulation and neurological status. If the patient is in shock, vasoplegic or cardiogenic, manage with fluids, Vasopressors or inotropes as per the protocol.

2. **Antibiotics**

Empirical first dose of broad-spectrum antibiotics of ceftriaxone, clindamycin and vancomycin/cloxacillin preferably within the first hour of presentation after blood culture is obtained.

3. **Anti-Inflammatory /Immunomodulatory treatment**[1,15,16]

- Patients without organ dysfunction may only require close monitoring and supportive treatment, no immunomodulatory treatment
- Stepwise progression of immunomodulatory therapies to be used with IVIG as 1st line of therapy
- All patients with MIS-C should be considered for IVIG (2gm/kg, based on ideal body weight)
- If IVIG in not available, give Methylprednisolone (2mg/kg/day in 2 divided doses)
- Methylprednisolone along with IVIG if the patient is in shock, have organ threatening disease, ill appearing, unexplained tachycardia and highly elevated BNP
- Recent reports suggest use of both IVIG and Methylprednisolone as initial therapy in MIS-C have favorable outcome compared to IVIG alone.
- Not responding to IVIG and low-moderate dose, high dose, IV pulse glucocorticoids (10-30 mg/kg/day) is considered, especially if a patient requires high dose or multiple inotropes and/or vasopressors
- Refractory MISC despite a single dose of IVIG, a second dose of IVIG is not recommended given the risk of volume overload and hemolytic anemia associated with large doses of IVIG
- After defervescence and clinical improvement, steroids can be changed to an equivalent oral dose of Prednisolone at discharge and tapered off over 3-4 weeks
- Cardiac function and fluid status to be assessed before IVIG treatment. Depressed cardiac function requires monitoring and diuretics with IVIG. Patients with cardiac dysfunction, IVIG given as 1 gm/kg daily over 2 days
- Other immunomodulation: Anakinra

Cardiac monitoring[1]

- BNP and/or troponin T at diagnosis should be trended over time until they normalize
- EKGs every 48 hours and during follow up visits for detecting conduction abnormalities
- Echocardiograms at diagnosis and follow up for ventricular/valvular function, pericardial effusion, CA dimensions using z-scores.
- Echocardiograms repeated at a minimum of 7-14 days and 4 6 weeks after presentation

Antiplatelet and anticoagulation therapy[1]

Aspirin

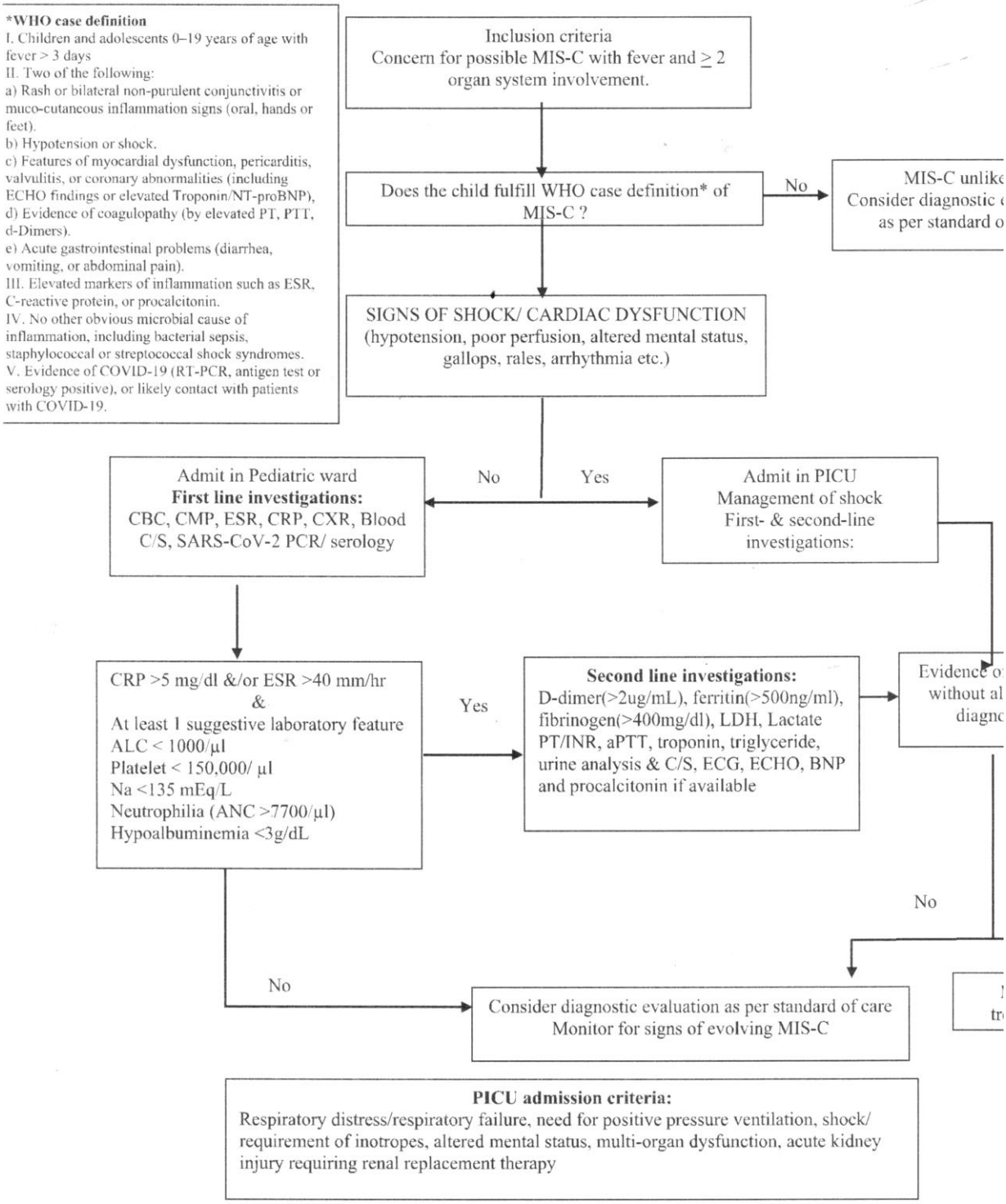
Indications (low dose of aspirin 3-5mg/kg/dose; max 81mg/day)	Contraindications
• All cases with diagnosis of MIS-C • MIS-C with CAAs and a maximal z-score of 2.5-10.0	• Active bleeding • Significant bleeding risk • Platelet count ≤80,000/μL

Enoxaparin:

- MIS-C with CAA z score ≥10.0 should be treated with low dose aspirin and enoxaparin (factor Xa level 0.5-1.0) or warfare.

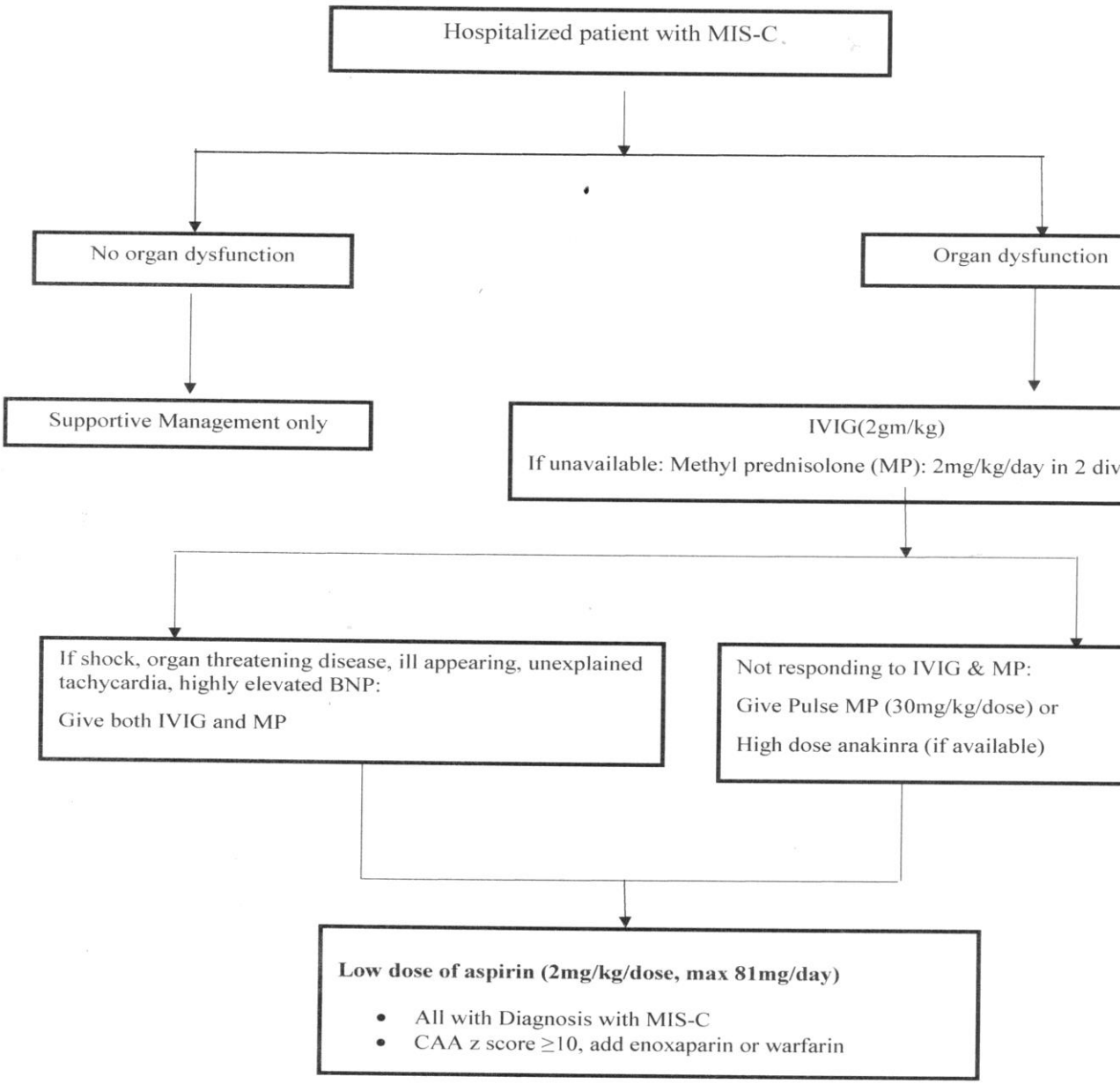
Till when should anti platelets/ anticoagulant be continued:

- Until normalization of platelet count and confirmed normal coronary arteries at ≥4 weeks after diagnosis.
- Patients with documented thrombosis or an ejection fraction (EF) <35% should receive enoxaparin until at least 2 weeks after discharge from the hospital
- CAA with z score >10.0 (indefinite treatment)
- Documented thrombosis (treatment for ≥3 months pending thrombus resolution), or ongoing moderate to severe LV dysfunction.


*WHO case definition
I. Children and adolescents 0–19 years of age with fever > 3 days
II. Two of the following:
a) Rash or bilateral non-purulent conjunctivitis or muco-cutaneous inflammation signs (oral, hands or feet).
b) Hypotension or shock.
c) Features of myocardial dysfunction, pericarditis, valvulitis, or coronary abnormalities (including ECHO findings or elevated Troponin/NT-proBNP),
d) Evidence of coagulopathy (by elevated PT, PTT, d-Dimers).
e) Acute gastrointestinal problems (diarrhea, vomiting, or abdominal pain).
III. Elevated markers of inflammation such as ESR, C-reactive protein, or procalcitonin.
IV. No other obvious microbial cause of inflammation, including bacterial sepsis, staphylococcal or streptococcal shock syndromes.
V. Evidence of COVID-19 (RT-PCR, antigen test or serology positive), or likely contact with patients with COVID-19.
Inclusion criteria
Concern for possible MIS-C with fever and ≥ 2 organ system involvement.
Does the child fulfill WHO case definition* of MIS-C ?
No
MIS-C unlike
Consider diagnostic
as per standard o
SIGNS OF SHOCK/ CARDIAC DYSFUNCTION
(hypotension, poor perfusion, altered mental status, gallops, rales, arrhythmia etc.)
Admit in Pediatric ward
First line investigations:
CBC, CMP, ESR, CRP, CXR, Blood C/S, SARS-CoV-2 PCR/ serology
No
Yes
Admit in PICU
Management of shock
First- & second-line investigations:
CRP >5 mg/dl &/or ESR >40 mm/hr
&
At least 1 suggestive laboratory feature
ALC < 1000/µl
Platelet < 150,000/ µl
Na <135 mEq/L
Neutrophilia (ANC >7700/µl)
Hypoalbuminemia <3g/dL
Yes
Second line investigations:
D-dimer(>2ug/mL), ferritin(>500ng/ml), fibrinogen(>400mg/dl), LDH, Lactate PT/INR, aPTT, troponin, triglyceride, urine analysis & C/S, ECG, ECHO, BNP and procalcitonin if available
Evidence o
without al
diagnc
No
No
Consider diagnostic evaluation as per standard of care
Monitor for signs of evolving MIS-C
PICU admission criteria:
Respiratory distress/respiratory failure, need for positive pressure ventilation, shock/ requirement of inotropes, altered mental status, multi-organ dysfunction, acute kidney injury requiring renal replacement therapy

Flow Diagram 1. Diagnostic algorithm for multisystem inflammatory syndrome in children (MIS-C)[1,5,8-10,17,18]

Treatment algorithm:



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Chapter VII

Crisis responses and psycho-social management for children and adolescents during COVID-19 pandemic

INTRODUCTION

Children differ from adults physically, developmentally, and socially, which results in a need for disaster and crisis response services designed specifically for children of particular age groups. Disasters or crisis poses a higher risk for children because of young children's inability to escape danger, identify themselves, and make critical decisions as well as their dependency on adults for care, shelter, transportation, and protection. Children may not have yet developed the appropriate self-preservation skills, communication skills, or judgment to seek help when they need it in disaster and crisis situations, putting them at even higher risk of harm. It is important to note that young people may experience a wide range of outcomes following disasters and crisis of all types, including natural disasters, pandemics like COVID-19. However, after experience of any kinds of disaster and crisis, children and adolescence may also develop various symptoms such as physical symptoms (stomach pain, trouble sleeping, back pain, indigestion, fast heartbeat, etc.) following immediately after disaster or crisis. In addition to that they may experience fear or anxiety, negative behavior at school or home, decline in academic performance, increased clinginess, difficulty with behavioral control, withdrawal, and aggressive behavior. Presence of these symptoms doesn't mean they all have mental disorders and only a small percentage of children and adolescence will develop mental and/or substance use disorders after disasters and crisis. If the children get appropriate assistance and support from adults during the stressful period, they will prevent from developing severe reactions to stress following after disaster or crisis events. Meanwhile children who have lost their loved ones may go through lengthy periods of grief. All these factors contribute to the unique needs of children in disasters, crisis and emergencies.

Around 40% of Nepalese population are children under 18(1).The Child and Adolescent (C&A) mental health (CAMH) needs and services in Nepal have a significant gap. CAMH in Nepal suffers from lack of specialized training in the field as well as scarcity of human resources and services. There is only one full time child and adolescent psychiatry (CAP) out-patient clinic in the country, which is located in the capital city(2).Some recent activities have focused on CAMH in Nepal but the COVID 19 pandemic has produced new challenges.The COVID-19 has affected many countries around the world, including Nepal. As a precautionary measure, the government of Nepal has implemented a lock down throughout the country. Nationwide lockdown due to COVID-19 began in Nepal during March 2020 and with restriction of both air and road travels, as well as closure of borders with India and China(3). All people including C&A were confined to their homes and schools were closed. Some schools, mostly those privately run, resumed classes through online platforms while schooling remains disrupted for the majority of students in Nepal. Deficient mental health services funding, increased social media use, suddenly imposed lockdown, poor understanding of lockdown restrictions, sudden student life changes, postponement of exams were stated as risks for COVID 19 related mental health problem for the young population(4).Again there has been trend of increasing the

COVID-19 cases and fear among the people has been again increasing. There is uncertainty to reopen the school for children. However, children might not be fully understood about the situation of COVID-19. A sense of unpredictability and uncertainty can be overwhelming. The impact of COVID-19 on CAMH and restricted access to available support systems and services highlight a critical need to reach C&A as well as their caregivers across Nepal (5).To address these needs, online platform can be a suitable approach and has the potential to reach C&A across Nepal. With this view, a COVID 19 related multi-tier CAMH intervention model was developed, which utilizes online platform for training of mental health professionals across Nepal, who would then facilitate sessions for C&A, teachers, parents and caregivers; and link them to CAMH services locally and remotely through teleconsultation. This started as a pilot from June 2020 and continued till end of February2021.Fifty thousand (50,000) C&A, parents, teachers and caregivers were successfully reached across all 7 provinces in Nepal by this model of services. The protocol developed to work with C&A is described on details below:

A. SECTION I: HELP CHILDREN AND ADOLESCENT UNDERSTAND ABOUT COVID-19, INCLUDING QUERIES AND SAFETY MEASURES

Exploration about COVID-19

Ask age appropriate questions-

- **Under 6 years**

- Ask the child, “do you know why schools are closed” (Explore on what children say)

- Then use a story to tell children about COVID -19.

- **6-12 years**

-Ask the child, “Do you know anything about the '**COVID-19**' that people are talking about or having? (Explore on what children say)

- Read the story to the children.
- Then discuss about corona virus **(COVID-19)**

- **13-18 years**

- Ask them to tell what they know about COVID-19. Depending on their response ask children the following questions if needed
    - Do you know what COVID-19 is?
    - What happens to a person infected with it?
    - How does it spread?
    - How long can it take for symptoms to show?
    - What are carriers and who could they be? and Who is it dangerous for?
- Clarify misconceptions they might have (things that they could have said earlier) by providing facts and figures related to corona virus.

Delivering information

Note: -All the information should be age appropriate. Information should be provided in a language that the child can understand. More information can be given for older children and adolescents than younger children.
- Always be honest to children. If you are not sure of the answer to their question, tell them that you are not sure and that you will find out and get back to them. Once you have an answer get back to them.
- Use your judgment for children below 6 years of age for any task

B. SECTION II: UNDERSTAND MENTAL HEALTH NEEDS OF CHILDREN AND ADOLESCENTS DURING THIS CRISIS

Ventilation

- While exploring, the children and adolescents of all age groups have already revealed their understanding on COVID-19. They might have also mentioned some of their worries and concerns.
- Once children and adolescents understand COVID-19, they may have other concern and worries, let them to talk about.
- Mention that this is a safe space and I respect your concerns and privacy and ensure the confidentiality.
- Don't force to speak unless children and adolescents wish to.
- Allow them to talk about their worries about the present and the future.
  - Could ask them, how their lives have changed and the difficulties they face.
  - Allow them to express their thoughts and feelings.

Understanding their emotions

- **Children between 6 -12 years**
  - Ask children to identify different emotions. Ask them about their experience of various emotions. For e.g. "when do you feel happy or sad or scared?"
  - Refer to the concerns they had shared earlier while discussing about COVID-19 and how that thought made them feel.
  - Highlight the relationship between thoughts and emotions.
- **Children from 13-18 years**
  - Explain that our thoughts affect our emotions.
  - Refer to their examples of thought and emotions associated with it.
- **Acknowledge** the thoughts, feelings and concerns that have been mentioned.
- **Universalize and normalize-**tell them that similar things have been felt by other children and adolescents all over the world, and that it is **okay** to be feeling this way because it is a difficult time for everyone and that they are not alone.
- **Validate** their thoughts, feelings and concerns as being important and thank them for sharing.
- Be **empathetic** and show **unconditional positive regards.**
- **Empathize** with the **child and adolescent** and try to understand a child's or adolescent concern from their view point and respond accordingly
  -You could tell them that anyone who is in their place would feel the same way they are feeling and that it is very brave of them to share it with the group.

- Praise the children and adolescents for sharing their thoughts and feelings.
Note: Tell them that "always remember to share your thoughts with a trusted adult".

Identifying when they are stressed

Tell the children and adolescents that during times like this many children and adolescents feel sad and scared. They have many thoughts in their mind which causes stress. This can cause problems in the following:

- **Problems with feelings/emotions**-
  - Start with how all emotions are normal, there are no good or bad emotions.
  - Every emotion is felt by everyone at one time or another. Sometimes, some emotions trouble us. This is when we feel sad, irritated, angry or scared.
- **Problems in the body**-
  - Tell the children that when we have a troubling thought or emotion, it affects our body.
  - Many children are familiar with changes in the body when they are scared.
    - Ask them to identify it. Probing might be needed with younger children. For e.g., you could ask them what happens to their heart (like pain in the chest, heart beating fast) or hands (like shivering)?
  - Then ask each child and adolescent what happens to their body when they are stressed. Discuss about physical symptoms like aches and pain, dizziness, palpitation etc.
- **Problems with actions/behavior**-
  - Tell them that when they are stressed, they may not enjoy things like they use to before like playing, talking to friends and reading. They may experience in change in their behavior. Encourage to tell a trusted adult about their problems like thoughts, feeling and action.

C. SECTION III: ENHANCE WAYS TO COPE WITH STRESS DURING CRISIS

There are some simple ways that can be used to help children and adolescent when they are distressed.

The following can be helpful.

- *Make a **daily routine**- an active mind is a happy mind"*

  -Keep in mind the age of the child while suggesting activities.

  -For younger children we can show a chart containing multiple activities, we can ask them to choose activities as well as add activities of their choice)

  -Tell children and adolescents to do things at the same times every day like wake-up time, meals time, activities time, and exercise time, all the way till bed time.

  - Encourage children to keep activities they enjoy in their daily routine. This could be like music, art, drawing and hearing/reading stories.

  - Inform children that the use electronics or gadgets are allowed only for a limited time, maybe 1 to 1.5 hours every day.

  *-Explain the importance of spending **quality time with parents**. For example, eating meals together, playing games like chess, ludo, carrom-board, etc.*

  -Encourage them to study for an hour or two, the time can be increased gradually.

- *Use distraction methods, like the five sense organs activity. Focus on touch, noise/ sounds, taste, smell and things around them.*
- *Use relaxation techniques like deep breathing and progressive muscular relaxation technique (a sample script/ picture given in the appendix 3&4).*
- *Activity for all ages: Make a hand print of you (refer to the appendix 1)*

Discuss the management of stress in children and adolescents with caregivers in the following ways:

- *Acknowledge, validate and empathize the thoughts, feelings and concerns of children and adolescents. Tell children about transition period to new situation of lockdown/ pandemic. Acknowledge that it can be stressful to everybody.*
- *Have a structured routine- but be flexible. Make learning activities fun. Keep the classes short in the beginning or have some fun activities in the beginning of classes, gradually increase the duration. Allow breaks when needed.*
- *Provide positive reinforcement to keep up motivation- use praises, stars, tokens, etc.*
- *Keep homework to the minimum. Instead, advice children to spend quality time with family.*
- *Encourage activities like indoor games, drawing & coloring, writing stories and poems, playing musical instruments, dancing, singing, etc. Encourage children and adolescents to take up hobbies or learn new skills. Encourage engagement in house hold chores. Advice for limiting electronic gadget use to no more than 1-2 hours per day. Limit the child and adolescent's exposure to news about COVID-19. Provide correct information provided by authorized bodies, keeping in mind the developmental level of the child or adolescent.*
- *Do not punish the child for regressive behaviour (know that this is only temporary). Praise and recognize responsible and age appropriate behavior.*
- *Work with the school, since short term memory might be impacted which makes test taking challenging. Remember that a decrease in grades/school performance is only temporary.*
- *Do not ignore threats of harm to self or others, seek professional help*
- *Provide opportunities to talk about the disaster/trauma event, but do not pressure the child/adolescent.*
- *Encourage children and adolescents to help develop a family disaster plan*
- *Re-establish safety, security and protection*
- *Secure their physical well-being through proper nutrition and health care*
- *Encourage them to continuous normal activities as soon as possible*
- *Help them to understand their experiences by giving more information*
- *Help them to process their sensory impressions and emotions.*
- *Distribution of booklets, facts sheets, colouring books if possible*
- *Help to create support groups for Adolescence if possible*
- *Help the to involve in creative activities such as: Songs, dances, plays, physical activities and exercises, art expressions, storytelling, puppet play, drama and theatrical representation, free writing*
- *Self-calming exercises ,breathing exercises, Mindfulness and Meditation, progressive muscle relaxation*
- *Organize school based online program. Teach them skills to cope with stress and emotions.*

D. SECTION IV: WHEN TO SEEK HELP

There are 3 ways in which stress can affect everybody including the children and adolescents**.** Many children have these problems and sometimes they are able to manage it by some of the methods that have been discussed earlier, while at other time they may need more help.

Sometimes these problems can make doing day to day life very difficult. This could be because of:

- **Problems with feelings (Emotional symptoms) -** e.g.: feeling sad, angry, irritated, crying, fearful and anxious.
- **Problems in the body (Physical Symptoms)** - e.g. headaches, stomach aches, body aches, fainting- like episodes, trembling, weakness of limbs, etc.
- **Problems in our behavior/action (Behavioral symptoms)** - e.g. Irritation, clinginess to parents, excessive crying, aggression, demanding behaviors, substance use, school refusal, etc.
- There can be problems in **sleep and appetite (eating habits)**

Note:

- *Presence of the above symptoms that are well in excess than normal and haven't responded to normal intervention. Symptoms are severing enough to cause disruption of daily functioning (even after applying stress management techniques), then the child should be referred for further evaluation to a mental health professional*
- *For Assistance contact: 9808522410- CAP KCH Helpline and 16600110666 CAP KCH Hotline.*
- *A List of organizations who can provide services are given in Appendix 5 below.*

End of the session/ Closing

- Summarize what was discussed in brief.
- Mention the key points of the session
- Praise children and adolescents for their participation
- Take away message and discussion

Appendices (Some coping activities can be done with child and adolescents)

Appendix 1: Draw a Handprint instruction

Process:

- Draw the your hand on the paper
- Write your good habits/Strengths/things you like most inside the hand print. Or you can tell me your good habits/Strengths/things you like most. Then I will help to write them inside your hand print (write: by the clinician, especially for younger children)
- Keep it safely inside your folder.
- Tell them: Those are your own strengths which makes you feel really strong. Remember or revise your folder whenever you have free time and whenever you need. These all strengths can be helpful during your stressful and difficult situations.

Appendix 2.Daily Routine instruction

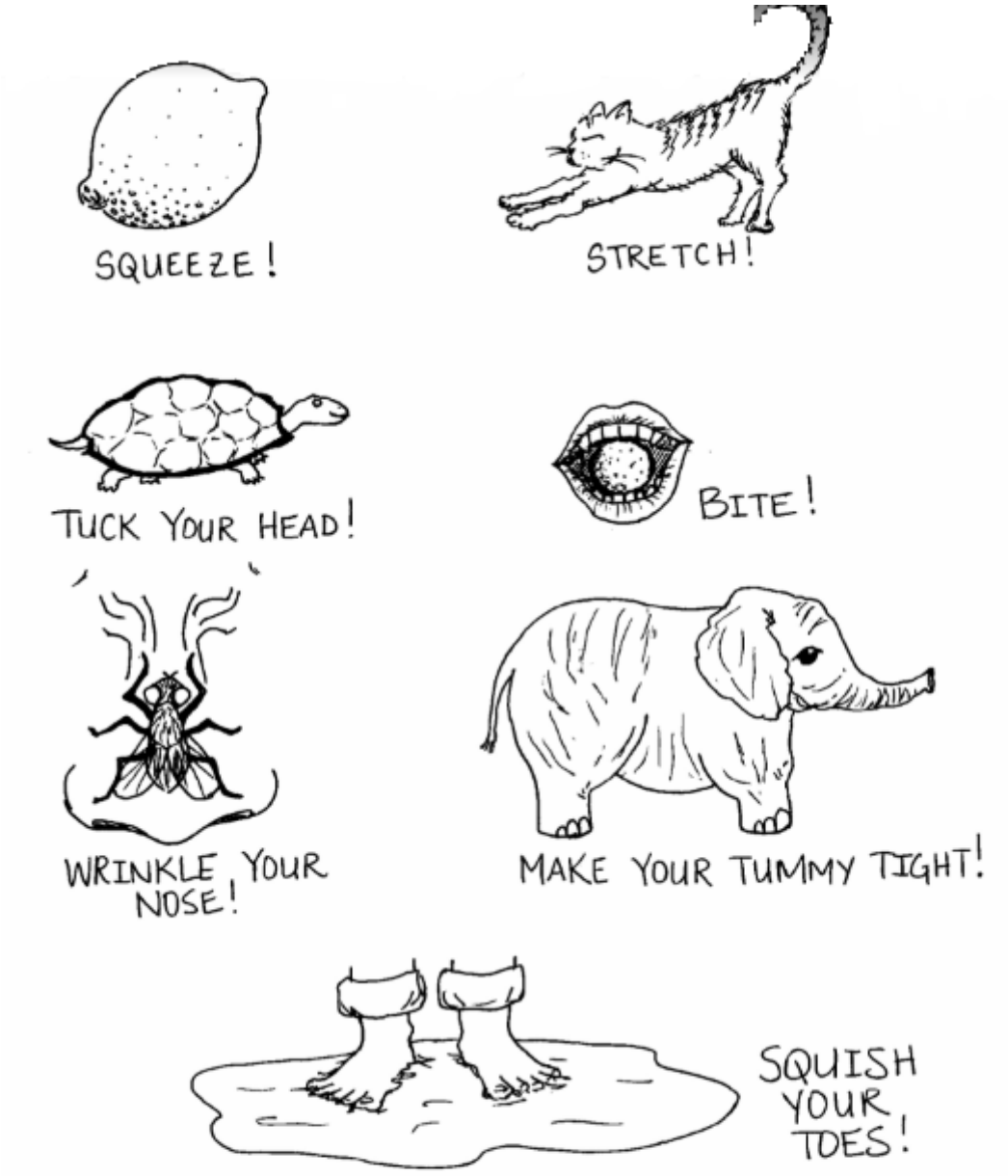
- Make a list of activities that the child enjoys and incorporative in the routine.
- If the child is unable to identify activities, he /she like, ask them what they did in their free times of holidays earlier. You can give those options.

Appendix3. Deep breathing script

I want to teach you a method that you could do to make your self-relaxed and comfortable.

- It is called **deep breathing.**
- In deep breathing you have to take a long and deep breath and count till 4 in your mind.
- When you **breathe in** your stomach should be out like balloon. When you blow air in a balloon it becomes big. Similarly, when you take a long breath a lot of air will go in your stomach and it should be big.
- **Count in your mind – 1 2 3 4**
- after you count till 4, I want you to **breath out** from your mouth even more slowly till 5
- **Count in your mind- 1 2 3 4 5**
- One last thing I want you to do is to **focus on your stomach** going in and out.
- It will help you if you do it for 5 minutes before sleeping and 5 minutes after waking up. You can also do it if you are not feeling well.

Appendix 4:Relaxation for Children(For All age group)



Appendix 5: Provide Service Related Information

मानसिक स्वास्थ्य र कोराना भाइरस (कोभिड -१९) लाई सम्बोधन गर्न सञ्चालित सेवाहरुको बारेमा जानकारी

कोभिड-१९ ले निम्त्याएको संकटको यस समयमा यदि तपाईंलाई दैनिक जीवनमा आएका परिवर्तनहरु सामना र समाधान गर्न कठिन भइरहेको छ भने तपाईंलाई मनोवैज्ञानिक, मनोसाजिक वा मानसिक स्वास्थ्य सहयोग आवश्यकताको महशुस भएमा विभिन्न संघ-सस्थाहरुले सञ्चालनमा ल्याएका हेल्प लाइनमा फोन गरी सेवा लिन सक्नु हुनेछ ।

संस्था	हेल्प लाइन अन्तर्गत टोल फ्रि नं
टिपिओ नेपाल	१६६० ०१ ० २००५
सिएमसि नेपाल	१६६० ०१ ८ ५०८०
कोशिस नेपाल	१६६० ०१ २ २३२२
आत्महत्या रोकथाम र मानसिक स्वास्थ्य सहयोग केन्द्र	१६६० ०१ २ २२२३
* यी माथिका नम्बरहरुमा टेलिकमको नेटवर्कबाट फोन गर्दा पैसा लाग्दैन ।	
संस्था	**हेल्प लाइन नम्बरहरु**
त्रि. वि. शिक्षण अस्पताल महाराजगंज मनोचिकित्सा हेल्प लाइन	९८४९६३०४३०
त्रि. वि. शिक्षण अस्पताल महाराजगंज, आत्महत्या रोकथाम हेल्प लाइन	९८४००२१६००
क्रान्ति बाल अस्पताल, बालमनोचिकित्सा हेल्प लाइन	९८०८५२२४१०

माथिका यी सबै नम्बरबाट निशुल्क मनोवैज्ञानिक, मनोविमर्श तथा मानसिक स्वास्थ्यका सेवा पाइन्छ ।

नेपाल सरकार
स्वास्थ्य तथा जनसंख्या मन्त्रालय

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