

## RECOMMENDATIONS

### IAP Guideline on Practicing Safely During COVID-19 Era: Clinics and Small Establishments

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**Justification:** The unprecedented COVID-19 pandemic has had a formidable impact on Indian health care. With no sight of its end as yet, various establishments including the smaller clinics and nursing homes are restarting full operations. Hence, there is the need for recommendations to allow safe practice ensuring the safety of both the health care worker (HCW) and patients. **Process:** Indian Academy of Pediatrics organized an online meeting of subject experts on 27 July, 2020. A committee was formed comprising of pediatricians, pediatric and neonatal intensivists, and hospital administrators. The committee held deliberations (online and via emails) and a final consensus was reached by November, 2020. **Objectives:** To develop recommendations to provide a safe and practical healthcare facility at clinics and small establishments during COVID times. **Recommendations:** The key recommendation to practise safely in this setting are enumerated. Firstly, organizing the out-patient department (OPD). Secondly, appropriate personal protective equipment (PPE) to provide protection to the individual. Thirdly, decontamination/disinfection of various common surfaces and equipment to prevent transmission of infection from fomites. Next, maintaining the heating ventilation and air conditioning (HVAC) to provide a stress-free, comfortable, and safe environment for patients and HCWs. Finally, steps to effectively manage COVID-19 exposures in a non-COVID-19 facility. All these measures will ensure safe practice during these unprecedented times in clinics and smaller establishments.

**Keywords:** Preparedness, Physical distancing, Resource-limited setting, SARI.

The healthcare industry not only bears the brunt of the coronavirus disease (COVID-19) epidemic, but has also to mitigate its spread too. In this regard, putting strict practices and processes in place that are suitable to the local needs and resources will be paramount in fighting this disease effectively.

The Indian Academy of Paediatrics (IAP) has therefore come out with the following guidelines on practicing safely in clinics and small establishments during these unprecedented times.

#### OBJECTIVES

To develop recommendations to provide a safe and practical health care facility at clinics and small establishments during COVID times, and to ensure safety of the healthcare workers (HCW), and patients at clinics and small establishments.

#### PROCESS

The Indian Academy of Pediatrics organized an online meeting of subject experts on 27 July, 2020. A committee was formed comprising of pediatricians, pediatric and neonatal intensivists, and hospital administrators. The committee held various deliberations (online and via emails) and a final consensus was reached by November, 2020.

#### RECOMMENDATIONS

The guidelines are applicable for clinics, polyclinics, and level 1 hospitals.

A clinic is defined as a clinical establishment providing examination, consultation, and prescription to outpatients, including dispensing medicines by a single doctor, general practitioner, specialist, or a super-specialist doctor. A polyclinic is similar but managed by more than one doctor,

general practitioner, specialist, or a super-specialist doctor. [2] A Level 1 (A) hospital is a general medical service with an indoor admission facility, provided by recognized allopathic medical graduate(s) and may also include general dentistry services offered by recognized BDS graduates. Example: Primary Health Care Centre (PHC), government and private hospitals, and nursing homes run by MBBS doctors. A Level 1 (B) hospital shall include all the general medical services provided at level 1(A) and indoor and OPD specialist medical services provided by doctors from one or more basic specialties, namely general medicine, general surgery, pediatrics, obstetrics and gynecology, and dentistry. [3]

The guideline will be discussed under these broad subheadings

- Organising the Out Patient Department [OPD]
- Personal Protective Equipment (PPE) and Innovation
- Sanitisation Recommendations
- Heating Ventilation and Air Conditioning [HVAC]
- Protocol for post-Covid-19 exposure in a Non-Covid-19 zone

### Organizing The Outpatient Department

1. *Staff Skills Training and Education* - The first step in organizing the OPD is the education of HCW on PPE, disease transmission, screening techniques, cohorting patients, and newer clinic management protocols. [4] The clinician should be prepared for HCW's illness & subsequent quarantine by training the staff to multitask and alternating their duties. [5] In the Indian scenario, with constraints in the availability of skilled staff, prevention is the key.

2. *Tele Consultation* - With the legalization of teleconsultations, it is recommended wherever feasible. [6] It helps to identify patients who can be managed at home and those who need hospital care. It minimizes patient contact and is a useful triaging tool. The teleconsultation guidelines laid down by the government need to be followed [7].

3. *Appointments and Patient Scheduling* - Limit the number of patients per day. Walk-In consultations should be discouraged to avoid overcrowding. Patient segregation & triaging to be done while scheduling appointments [6].

4. *Physical Distancing and Waiting Areas* - Clinics should preferably have no waiting areas. However, when more than one person arrives, their seats should be at least 1 meter apart. [5,6] Open ventilation is encouraged here [refer section on HVAC]. In single room OPD

chambers, it would be prudent to call one patient at a time; others can wait outside in the open air or their vehicles.

5. *Patient Segregation* - It is prudent to cohort children who are ill from the well-baby visits. Many clinics are operated only by the practicing doctor. However, it is recommended to have a helper who will assist in triaging, maintaining decorum, and educating patients. Preferably an initial screening should be followed by separation of those suspected of COVID-19 from others. These cases should not spend time in the waiting area and should be seen immediately. A separate entry, consultation place & exit, if feasible, will help. [4] As not all clinics have the facilities mentioned above, alternate precautions should be followed:

- Telephonic triaging and schedule appointments for all suspect cases *after* routine OPD [6]
- Exclusive days should be allotted for 'Well baby' & Immunization checks once or twice a week. This may even boost parents' morale who otherwise would be scared to come to clinics for vaccinations.

6. *Patient Education and Awareness* - All patients should follow respiratory hygiene and cough etiquette. Patients should be provided with tissues, contactless bins, contactless sanitizers, and wash areas. Display these instructions in prominent locations. Patient education is also the physician's responsibility, hence putting educative posters, multimedia information at strategic points is useful. [4,6]

7. *One Attendant and Personal Protection* - Allow only one parent or guardian with the child. [5] Everybody, including children above two years, should wear a mask.

8. *Well Ventilated* - Follow the ventilation guidelines provided in this document.

9. *Avoid Fomites* - Remove toys, magazines, and any items that are likely to be shared between patients in the waiting area or consultation chambers. [4]

10. *Novel Techniques* - Innovative methods have been tried by various doctors and can be utilized.

- Using transparent physical barriers between the patient and doctors can help in decreasing direct exposure to droplets.
- Virtual detailed video interaction followed by a rapid, focused examination of the patient in another chamber minimizes the patient contact time.
- Non-Contact Thermal scanners- These are convenient non-contact devices ideally suited for mass screening in a pandemic and have wide acceptability. However, they lack robust evidence. A recent systematic review

showed reasonable diagnostic accuracy in fever detection but may vary with patient characteristics, setting, index test, and the reference standard used. These have an excellent negative predictive value. [9] However, there are more recent studies doubting its accuracy during screening in a pandemic. [10] Hence, no specific recommendations are available for or against the use of these devices.

### **Personal Protective Equipment [11]**

PPE, along with other measures like engineering and administrative protocols, reduces the exposure of HCW to infectious agents, including the SARV-CoV2 virus. *HCW has 11-fold higher chances of getting infected with the SARS-CoV2 virus than the general population.* The use of PPE can reduce that risk by 60-80% when exposed to COVID-19 suspected or proven cases. Various components of PPE and its benefits are given in **Supplementary Table I.**

### **Donning and Doffing PPE**

An essential part of PPE is the proper way of putting it on (Donning) and removing (Doffing) as the maximum chances of contamination and infection occur during doffing. The steps and sequence of donning and doffing of N-95 masks and PPE are given in **Supplementary Table II.** All PPE components, especially face masks are effective only when used in combination with frequent hand hygiene.

### **Type of exposure and use of PPE for HCW**

Every patient should be taken as a COVID-19 suspect unless proven otherwise. Appropriate PPE should be universally worn when attending to any patient, even in a non-COVID-19 centre.

- In non-aerosol generation areas - head cap, face mask, goggles, and gloves.
- For aerosol generation areas and procedures - In addition, wear body gowns, shoe cover, and face shield.
- While attending a proven COVID-19 patient - Full Hazmat suit PPE.
- Nonmedical staff not in direct contact with patients - triple-layer surgical masks and gloves inside the clinic. They must maintain physical distancing and frequently use hand hygiene.

### **Patient PPE**

- All patients and their attendants should wear a mask.
- Using a triple layer surgical mask or N-95, if possible, significantly reduces the risk of transmission.

### **Adjuncts to PPE**

- Patients often complain that the doctor is not audible with PPE. One adjunct is to use a wireless or wired mini personal voice amplifier
- The use of the mobile phone is inevitable but often results in the breach of PPE. Hence, using a blue tooth device, preferably with bone conduction that doesn't plug the ear, is advised.
- Rexene covers or disposable paper covers/sheets for the patient sitting/lying areas.
- Contactless/foot operated dispensers for soap/sanitizer/water in washbasins.

### **Sanitization Recommendations**

Despite consistent evidence of contamination of various surfaces with SARS CoV 2 virus, especially in the hospital setting, there is no direct evidence of fomites being a cause of transmission. [12] However, it is imperative to follow some necessary sanitization precautions for the decontamination/disinfection of COVID-19, as given in **Table I.** These are based on the Hospital Infection Prevention and Control guidelines drafted by the National Centre for Disease Control and the WHO. [13]

### **Spraying and Fogging**

Spraying, fogging, misting, or fumigation of rooms or surfaces is not recommended for COVID-19. Spraying of chemicals is harmful, affecting the mucus membrane, skin, and respiratory system. The recommended method is to wipe with a disinfectant soaked cloth

### **Hand Hygiene**

Patients, attendants, and HCW's are advised to wash hands with soap and water in a washbasin with foot-operated or motion sensor adapted taps. Everyone should use Foot-operated hand sanitizer dispensers before entering the clinic.

### **Sanitizers**

The composition of sanitizers is 60-70% ethanol or isopropyl alcohol. Avoid methanol containing or non-alcohol based sanitizers. Foot operated and Contactless sanitizer delivery systems are safe and effective.

### **Heating ventilation and air conditioning (HVAC)**

Maintaining the HVAC plays a vital role in providing a stress-free, comfortable, and safe environment for patients and health care workers. Maintaining indoor air quality is very important to prevent cross-contamination and hospital-acquired infections.

**Table I Decontamination and Disinfection Guide**

<i>Area</i>	<i>Item/Equipment</i>	<i>Process</i>	<i>Procedure</i>
General area	Dust Mop	Sweeping	<ul style="list-style-type: none"> <li>• Dust/Wet mop to remove surface dust</li> <li>• No broom</li> <li>• Remove gathered dust with hearth brush &amp; shovel</li> </ul>
Clinical areas and waiting rooms	Three buckets each with Hot Water Detergent 1% NaClO <sup>a</sup>	Cleaning & Mopping	<ul style="list-style-type: none"> <li>- Prepare a detergent solution with warm water</li> <li>- Mop with detergent water, allow dry, clean mop with plain water, squeeze dry, then mop with NaClO; Mop twice a day</li> <li>- In areas where there is a spill-using a spill kit, first, discard the sharps in the sharps bin, then cover any spills with 1% NaClO for 10-20 min contact, then wipe and follow the above standard cleaning process</li> </ul>
Ceiling and walls	<ul style="list-style-type: none"> <li>- Dusting tool with a long handle</li> <li>- soap solution</li> <li>- Plain water</li> </ul>	Damp dusting	Damp dusting with very little moisture, just enough to collect the dust. Done in straight lines that overlap one another. Once weekly
	Care of Mop - Clean with hot water and detergent solution, disinfect it with sodium hypochlorite and keep for drying upside down		
Doors and doorknobs	Damp sponge Detergent Water	Thorough Washing	<ul style="list-style-type: none"> <li>- Frequently touched surfaces – cleaned daily</li> </ul>
Stethoscope	ABR <sup>b</sup> /Spirit swab	Cleaning	<ul style="list-style-type: none"> <li>- Disinfection before every patient contact</li> <li>- Cleaning with detergent &amp; water or 70 % Isopropyl Alcohol or 2 % bleach solution (may cause discoloration)</li> </ul> <p>Do not use Hand sanitizers-(due to harmful additives), Do not use any sterilization process, never immerse it in any liquids</p>
BP cuffs and covers	Detergent Hot water	Washing	<ul style="list-style-type: none"> <li>- Disinfect covering by wiping with ABR, Regular washing of the cover</li> </ul>
Thermometer	ABR	Cleaning	<ul style="list-style-type: none"> <li>- Prefer one thermometer per patient</li> <li>- Disinfect with ABR between every patient</li> </ul>
Injection and dressing trolley	Detergent and water Duster Disinfectant (70% Alcohol)	Cleaning	To be cleaned daily with detergent and water. After each use should be wiped with disinfectant.
Refrigerators	Detergent and water Absorbent cloth	Cleaning (weekly)	Defrost, decontaminate, and clean with detergent.
Furniture and fittings	Warm water and detergent, cloth	Dusting	Using warm water and detergent, damp dust all furniture & fittings;
Curtains	Soft clothes Water, Mild soap solution	Cleaning	Clean with water and soap for curtains
Soap dispensers and water jars	Detergent and water	Daily dusting	Soap dispensers- Should be cleaned weekly with detergent and water and dried. Water jars after cleaning as above, water to be boiled and cleaned before refilling
Cleaning of toilets	Sodium hypochlorite 1% Soap powder Long handle angular brush Nylon scrubber	Cleaning	Scrub with soap solution, wash with water, then sterilize with NaClO 1% for floors and commode. For taps, sink, and commode accessories, use only soap and water.
Drying the floors with a separate drying mop should be done			

<sup>a</sup>NaClO = Sodium hypochlorite, <sup>b</sup>ABR=Alcohol based rub.

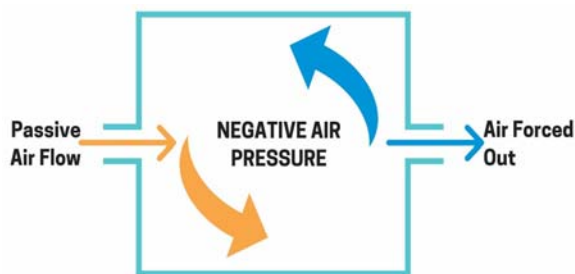
**Importance of HVAC in the context of COVID 19**

- 1) The SARS (Severe Acute Respiratory Distress Syndrome) epidemic in the past has taught us that there was an increased rate of intrahospital spread of infection, and it was attributed to architectural factors and HVAC systems. The SARS-CoV2 virus is resistant to various temperatures. Unfortunately, people are switching off air conditioning [AC] facilities to curb the spread. However, this is ineffective and, in fact, harmful as it creates adverse working conditions.
- 2) It is a misconception that if we maintain moderate humidity, the virus growth and propagation can be prevented. Unfortunately, this virus seems to be very resistant to environmental changes like temperature and humidity. It requires an extreme relative humidity of more than 80 percent and a temperature of more than 50 degrees Centigrade to control. These conditions are neither attainable nor acceptable. [14]

**Air changes per hour (ACR)**

Air changes per hour (ACR) are the number of total replacements of any room’s air in one hour. If the air supply by the HVAC system in one hour is equal to the volume of the space, then it is called one air change per hour. The number of air exchanges required to clean the air depends on the quantum of infected aerosol production. For example, a minimum of 12 ACR is needed in the Intensive Care Unit (ICU). In contrast, only 4 ACR is required for general wards, as the expected amount of aerosol production is different in both areas.

There are two ways to reduce the quantum of infection in contaminated air, either by ‘diluting’ the pathogen (*dilution ventilation*) or by removing the pathogen (*exhaust ventilation*). Dilution Ventilation is also called *positive pressure isolation*, required to prevent infection in an immunocompromised patient. Exhaust Ventilation is called *negative pressure isolation* and is used primarily to avoid a contaminated patient’s



**Fig. 1** Principle of HVAC to prevent airborne spread.

airborne disease [15] (**Fig. 1**).

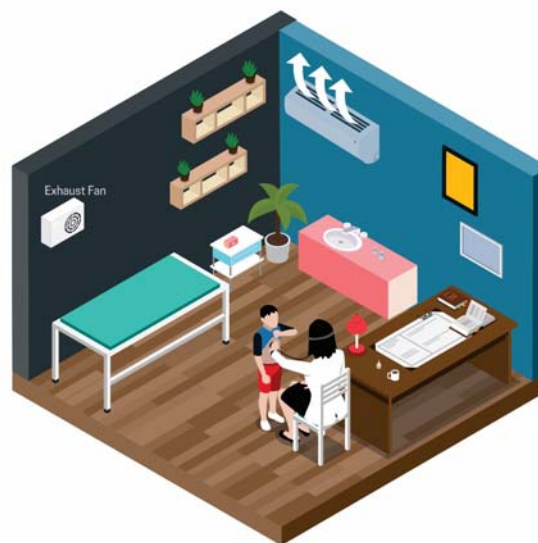
Ways To Create Air Exchanges Via Exhaust Ventilation:

- 1) *Cross Ventilation* by opening up doors and windows: This is the cheapest way, but by this method, we cannot control the thermal and pollution level.
- 2) *Exhaust Fan*: The exhaust fan creates a negative pressure in the room, which sucks the dirty and contaminated air out of the room, and fresh air is pulled to replace it.
- 3) *Fully Controlled Air*: Air inlet, as well as exhaust air, is fully controlled, including the temperature and filtration. This requires a lot of resources, including technology, and is best suited for negative pressure isolation wards and ICUs.
- 4) *Air Purifying Systems*: This cleans the air either via filtration (e.g., HEPA) or via other techniques like ultraviolet rays. Recirculation of air has to be prevented for this system to be effective.

The airflow should be in the direction of clean to dirty and should not be directed towards the patient as it causes turbulence. (**Fig. 2**)

**Plasma Purifiers**

*Plasma purifiers* are specialized newer technology air purifiers. Originally these purifiers were very large and cumbersome, however, with significant advancements in technology, they have become compact and a part of the



**Fig. 2** Clinic setting - Placement of exhaust fan, one feet above the ground. Direction of air should be from clean to dirty (patient side). Flow of AC air should be directed towards ceiling.

HVAC with the ionization tubes mounted in the air conditioning, either in the unit itself or in the ductwork. These ionization tubes form ions (negatively or positively charged particles) as air circulates over them. The ions that are produced act in three ways to purify the air:

- 1) *Sterilize bacteria and mould.* When bacteria, virus and spores of mould come in contact with the ions, they are oxidized and destroyed. They can no longer multiply and are eliminated from the air.
- 2) *Reduce particles in the air.* The ions produced by the system bond with the toxins in the air, causing these particles to become larger. That makes them easier to be captured in the filters, reducing the number of toxin particles in the air.
- 3) *Control odors.* Odors associated with household aerosols or cleaning products are “captured” by the ions, oxidized, and eliminated.

The viricidal properties of the Plasma purifiers may be used while installing the HAVAC in the clinics and small establishments. However further evidence is required regarding its efficacy during this pandemic.

Recommended HVAC Modifications For Healthcare Facilities:

Different recommendations for HVAC for various healthcare facilities are given in **Supplementary Table III** and **Figs. 1,2 & 3**.

### **Covid-19 Exposure In A Non-Covid Health Facility**

There are various situations where a Non-COVID-19 facility is faced with a COVID-19 challenge. The possible problems and recommendations are enumerated.

When patients admitted for unrelated/non-respiratory illness turn out to be COVID-19 positive

1. Inform the local health authorities
2. Assign anyone dedicated HCW, wearing a full PPE, to attend to this case
3. The patient should be shifted to a separate designated isolation area.
4. Arrange for transfer to a COVID-19 isolation facility after due communication
5. Follow appropriate standard precautions while transporting the patient
6. Followed by disinfection procedures at the facility and the ambulance
7. All contacts (see below) should be identified, risk assessment is done and subsequently follow the

testing and quarantine recommendations.

8. All high-risk contacts should be put on Hydroxychloroquine [HCQ] chemoprophylaxis for seven weeks, keeping in mind the contraindications of HCQ.

### **HCW turn out to be positive for COVID-19 [16]**

1. HCWs developing respiratory symptoms (e.g., fever, cough, shortness of breath) should be considered a suspected case of COVID-19.
2. Should immediately inform his supervisor.
3. Should be isolated, and arrangements must be made to refer to a COVID-19 designated hospital (if not already working in such a facility) for isolation and further management. However, asymptomatic, and mildly symptomatic HCW's need to be home isolated under supervision.
4. Should be immediately taken off the roster
5. All health facilities must have a staffing plan in place for such an event to maintain continuity of operations
6. Ensure that the disinfection procedures are strictly followed

The decision on further /continued use of non-COVID-19 facilities where a single/multiple

### **COVID-19 case has been reported [16]**

1. If the hospital authorities are reasonably satisfied that the source case/s have been identified and isolated, all contacts have been traced and quarantined, and adequate disinfection has been achieved, the hospital will continue to function.
2. In addition to the steps taken above, if the health facility continues to report new hospital-acquired COVID-19 cases in the following days, it would be advisable to temporarily close the health facility's defined section where the maximum number of patients are being reported.
3. After thorough cleaning and disinfection, it can be put to use again.
4. Local guidelines for the region should be followed

### **Standard Operating Procedure to be followed in case HCW reports exposure/breach of PPE [17]**

1. All the HCW must report every exposure to COVID-19 to the concerned nodal officer and Head of the concerned department immediately

**Definition of Contacts**

A *contact* is a person who is likely to get the infection from a positive case through any of the following modes of transmission

- Anyone exposed to a COVID -19 positive case 2 days before and 14 days after the onset of symptoms or date of testing
- The duration (>15 minutes) and proximity (< 1meter) of exposure and the use of appropriate PPE during exposure are an important consideration in defining the contact

**Primary /High-Risk Contact**

- Anyone with proximity within a 1-meter distance of the confirmed case
- Anyone who touched or cleaned the linens, clothes, utensils of the patient
- Had direct physical contact with the patient including examination or touched the body secretions including blood saliva, urine, etc. without appropriate PPE
- Anyone who has come in contact with aerosol-generating procedures is considered to be high-risk contact

**Secondary/Low-Risk contact**

- Any contact not fitting into the above description
- Low-Risk contacts also can be spreaders of infection hence need monitoring

**Risk Assessment**

The risk assessment of close contacts with COVID-19 patients is given in **Table II**.

**Recommendations for Monitoring Based on COVID-19 Exposure Risk [17]**

**High- and Medium-risk Exposure Category**

- HCW in the high- or medium-risk category should undergo active monitoring, including restriction from work in any healthcare setting until seven days after their last exposure. [18]
- High-risk contacts will be quarantined for seven days
- Test for COVID-19 done on day 0 of exposure and if negative day 7 of exposure
- If they test positive but are asymptomatic, they will follow the protocol for mild/pre-symptomatic cases
- If they test negative and are asymptomatic, they should complete a 7-day quarantine from the last date

of exposure and then return to work. Further, they should be in self-reporting observation at work for another minimum of 7 days and strictly abide by the mask and physical distancing rules.

- If they develop a fever (measured temperature > 100F or subjective fever) OR respiratory symptoms consistent with COVID-19 (e.g., cough, shortness of breath, sore throat), they should immediately test and self-isolate and notify the senior staff to take further action.

**Low-risk Exposure Category**

- HCW in the low-risk category should perform self-monitoring with delegated supervision until 14 days after the last potential exposure.
- Asymptomatic HCW in this category are not restricted from work.
- They should check their temperature twice daily and remain alert for respiratory symptoms consistent with COVID-19 (e.g., cough, shortness of breath, sore throat)
- Test for COVID-19 between day 5 and 14 of exposure
- Suppose they develop a fever (measured temperature > 100F or subjective fever) OR respiratory symptoms. In that case, they should immediately self-isolate (separate themselves from others) and notify the staff

**Table II Risk Assessment of Close Contacts**

<i>Prolonged close contact with a COVID-19 patient who was not wearing a facemask (i.e., no source control)</i>	
Epidemiological Risk Factor	Risk
HCP PPE: None	High
HCP PPE: Not wearing a surgical facemask or N95 mask	High
HCP PPE: Not wearing eye protection	Medium
HCP PPE: Not wearing a gown or gloves	Low
HCP PPE: Wearing all recommended PPE (except wearing a surgical facemask instead of an N95 mask)	Low
<i>Prolonged close contact with a COVID-19 patient who was wearing a facemask (i.e., source control)</i>	
Epidemiological Risk Factor	Risk
HCP PPE: None	Medium
HCP PPE: Not wearing a surgical facemask or N95 mask	Medium
HCP PPE: Not wearing eye protection	Low
HCP PPE: Not wearing a gown or gloves	Low
HCP PPE: Wearing all recommended PPE	Low

*HCP – Healthcare professional; PPE – Personal protective equipment.*

physician promptly so that they can coordinate consultation and referral to a healthcare provider for further evaluation.

*Disclaimer:* This practice guideline is intended to assist pediatricians and their support staff in safely practicing during the COVID-19 pandemic. The guideline at best serves as a quick reference providing practical advice on continuing medical practice in a safe way in clinics and small establishments. This is a broad advisory and is not intended to override any local or national government policies. This guideline is based on the currently available evidence on COVID-19 and its applicability in the Indian context. With any further developments, the guideline will be subjected to change.

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## Annexure I


### Members of National Expert Committee

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**Supplementary Table I Various Components of Personal Protective Equipment and Their Use**

<i>Type of PPE</i>	<i>Use</i>	<i>Comments</i>
Head cap: 	Covering for hair & scalp which is not readily washable every time  Use where aerosol generation /close patient contact	Disposable- SMS* material or hood of Hazmat suit or reusable cloth
Goggles: 	Fitted eye protection, worn over spectacles, avoid when using a face shield  Use where aerosol generation /close patient contact	Sanitise with soap solution/ ABR #& reuse
Face shield 	Cover the ear lines on both sides and crown to chin vertically  Use where aerosol generation /close patient contact	Disposable ones -transparent sheet on a head ring or sturdy reusable, reliable polycarbonate helmets  For intubation goggles preferred  Sanitize like the goggles
Shoe covers 	Used in Covid wards	Disposable shoe cover for feet or leggings that go up to the knees.
Surgical Gloves: 	Need not change the gloves after each patient, sanitize adequately between two patients. Discard when any minute cuts or breach on the gloves  Use double gloves and discard the outer one after examining suspected patients	Latex or more sturdy and hypoallergic Nitrile ones

<p>Body gowns:</p> 	<p>Recommended when seeing a suspect or proven case.</p> <p>It can be worn as a routine to protect one's clothing.</p> <p>For limited exposure [ like routine examination], use a Surgical cloth gown with a disposable plastic sheet over the gown (Like used in HIV set up). Disposable SMS gowns are light, breathable, and comfortable. Innovative Gowns - reusable cloth gowns with plastic layer sewn over the cloth in front 2/3rds and entirely around the sleeves - used for moderate risk of exposure [body fluid splashing expected].</p> <p>High-risk exposures like while working in COVID19 proven areas or in Operating Theatres must wear Hazmat suits that provide 360-degree protection.</p>	<p>Gowns can be cloth surgical gowns, disposable SMS gowns, or overalls. Aprons - not recommended. Surgical gowns prevent gross contamination of personal clothes are insufficient to prevent infection as they are water-permeable</p> <p>Reusable bodysuits that can be autoclaved or chemically sterilised for a limited number of uses.</p>
<p>Triple-layer pleated surgical mask</p> 	<p>Use genuine brands</p> <p>Masks prevent droplet infection or a splash of fluids.</p> <p>Do not let the mask hanging from the neck.</p> <p>Change mask after 6 hours or as soon as they become wet.</p> <p>Surgical masks, if worn tightly, can show resistance while exhaling, similar to N95 masks.</p> <p>These masks are disposable and are never to be reused.</p> <p>Do not use masks with valves/filters.</p>	<p>Donning- First sanitize hands; unfold the pleats; make sure that they are facing down in front of the mask. Place over nose, mouth, and chin. Fit flexible nose piece over nose bridge and tighten the nose clip adequately. Secure with tie strings, upper string on top of the head above ears, and lower string at the neck's back. Ensure no gaps, adjust to fit.</p> <p>Doffing- remove from behind (without touching the front of the mask). First, untie the string below and then the string above and handle the mask using the upper string. Dispose of in a yellow waste bag. Sanitize hands</p>

<p>Respirators/N95/FFP2 masks:</p> 	<p>These masks fit tightly on the face leading to an effective seal and, hence, efficient for HCW in clinics.</p> <p>They come in a cup shape, D shape, or duckbill shapes.</p> <p>Do not use any respirator mask with an exhalation valve</p> <p>N99, N100, FFP3, P3 reusable respirators filter 99-99.9% of 0.3-micron size particle or larger. These are expensive and are not required except in the high-risk zone like operation theatre.</p>	<p>Use only certified genuine respirators, like certified by NIOSH, USA, or FFP2 \$ approved by the European certifying Committee (CEN).</p> <p>Genuine N95 masks can be identified by having words 'NIOSH certified' and 'TC number' printed on the mask. One can verify the manufacturer from the NIOSH website.</p> <p>Do not touch the N95 mask once worn. If touched, sanitize</p> <p>Never keep the mask hanging below the nose or chin.</p> <p>Use an N95 respirator for a maximum of 8 hours</p> <p>Don't reuse N-95 respirator after accidental contamination with blood or body fluids.</p>
<p><b>Donning:</b> Sanitize hands. Do not allow facial hair, clothing, or anything else to prevent proper seal between the face and the respirator. Position the respirator in hand with the nose piece at your fingertips. Cup the respirator in your hand, allowing the headbands to hang below your hand. Hold the respirator under your chin with the nosepiece up. While wearing, first wear the lower strap over your neck and then the upper strap over your ears/head. Tighten the straps adequately as required for the leak test. The top strap rests at the top back of your head. The bottom is positioned around the neck and below the ears. Do not crisscross.</p> <p><b>Leak test:</b> After wearing an N95 mask, do a proper fit and a leak test. Place both hands over the respirator, take a quick breath in to check whether the respirator seals tightly to the face. Place both hands completely over the respirator and exhale. If you feel leakage, there is not a proper seal. If air leaks around the nose, readjust the nosepiece clip. If air leaks at the mask edges, readjust the straps along the sides of your head until a proper seal is achieved. When you inhale sharply after a properly fitting mask, the mask tip should suck in a bit towards your face.</p> <p><b>Doffing:</b> Sanitize your hands. Remove the lower strap and leave it in front hanging. Next, remove the upper strap and remove the mask without touching the front part of the mask. Hold the mask from the sides where the straps are attached and put it in a paper bag for future use or dispose of in a yellow waste bag.</p>		

\*-SMS - Spunbound Meltblown Spunbound, #- ABR – Alcohol Based Rub, \$ FFP Filtering Face Piece

**Supplementary Table II Steps and Sequence to Wear an N-95 Mask and PPE**

<i>Donning of Mask</i>	<i>Leak test</i>	<i>Doffing of Mask</i>
Sanitize your hands	After wearing the N-95 mask, do a proper fit and a leak test.	Sanitize your hands.
Do not allow facial hair, clothing, or anything else to prevent proper seal between the face and the respirator	Place both hands over the respirator, take a quick breath in to check whether the respirator seals tightly to the face.	Remove the lower strap and leave it in front hanging.
Position the respirator in hand with the nose piece at your fingertips.	Place both hands completely over the respirator and exhale. If you feel leakage, there is not a proper seal.	Next, remove the upper strap and remove the mask without touching the front part of the mask.
Cup the respirator in your hand, allowing the headbands to hang below your hand.	If air leaks around the nose, readjust the nosepiece clip.	Hold the mask from the sides where the straps are attached and put it in a paper bag for future use or dispose of in a yellow waste bag
Hold the respirator under your chin with the nosepiece up.	If air leaks at the mask edges, readjust the straps along the sides of your head until a proper seal is achieved.	
While wearing, first wear the lower strap over your neck and then the upper strap over your ears/head.	When you inhale sharply after a properly fitting mask, the mask tip should suck in a bit towards your face.	
Tighten the straps adequately as required for the leak test. The top strap rests at the top back of your head.		
The bottom is positioned around the neck and below the ears		
Do not crisscross		
<b>PPE Donning Sequence</b>		<b>PPE Doffing Sequence</b>
Hand hygiene		Outer glove
Cap		Gown
Shoe cover		Shoe cover
Hand hygiene		Goggles/ Face shield
Inner glove		Mask
Gown cover all		Cap
Mask [Three ply/N95]		Inner glove
Goggles/Face shield		Hand hygiene

**Supplementary Table III Humidification Ventilation and Air Conditioning Modifications for Healthcare Facilities**

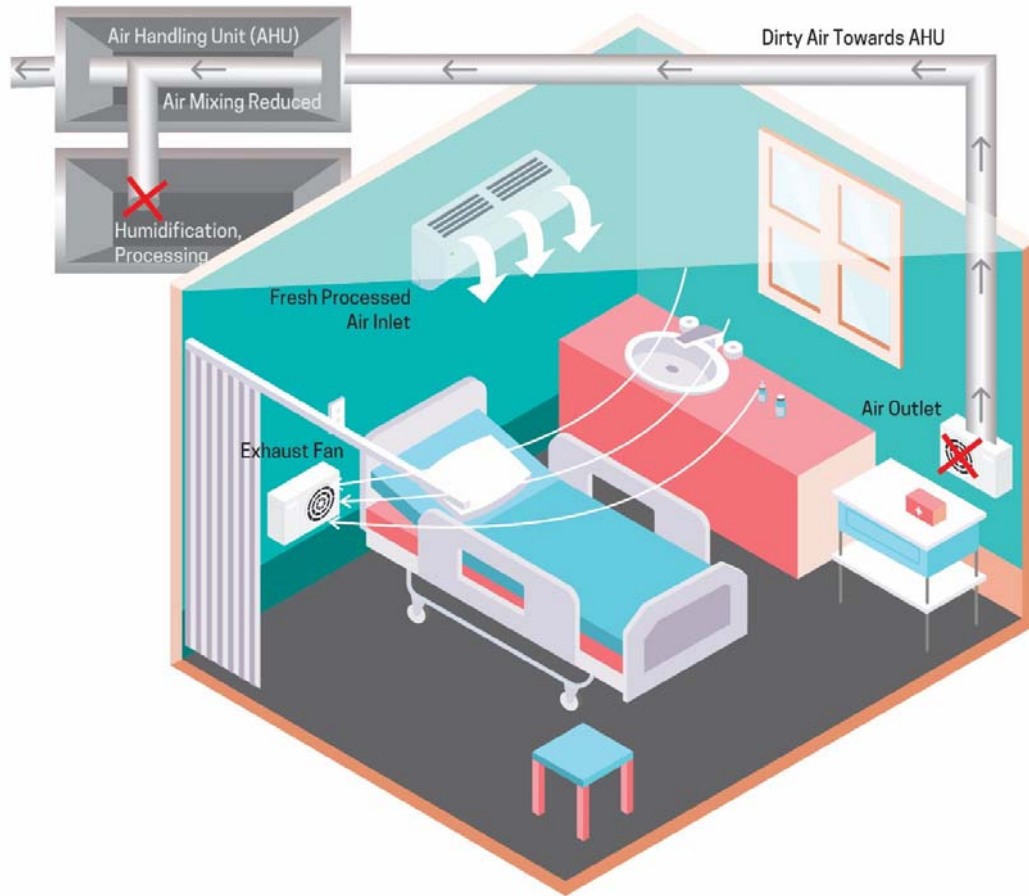
<i>Health Care Facility</i>	<i>HVAC Modification</i>	<i>Remarks</i>
Single room clinics (see figure 2)	1) Install exhaust fan 12 inches above floor towards the patient end with windows sealed.	In case an adjacent washroom is available with an installed exhaust fan, the fan should be switched on; it may require increasing the strength for making it useful.
	2) Air conditioner temperature should be set to provide comfort to occupants. May require increasing the cooling strength or install one more AC	<ul style="list-style-type: none"> <li>• Draft of air from AC* or cooler should not be directed towards occupants</li> <li>• Air exhaustion can compromise the cooling of the clinic.</li> </ul>
	3) If the installation of an exhaust fan not possible, then a medical-grade air purifier can be used	The selection of air purifiers should be based on the size of the room. The HEPA # filter should be a grade of 13 plus or MERV 17 plus. Air Purifier, on its own, is inferior to exhaustion of air.
	4) Droplets based ultraviolet C rays sanitation (cleaning of floor and walls) methods are of limited use. Air sterilization methods require sophisticated equipment with high radiation strength and are expensive	<p>There should be a gap of at least 7 feet between occupants and UVC\$ irradiation.</p> <p>UVC (254 nm wavelength) irradiation with an exposure time of 15 minutes at an irradiation intensity of 4016 <math>\mu\text{W}/\text{Cm}^2</math> resulted in complete inactivation of SARS-CoV ‡</p>
2) Clinic without facilities of air cooler, air conditioners, exhaust fan.	Improve cross-ventilation by opening doors and windows.	<p>Opening windows and doors increases air exchange per hour to more than 8.</p> <p>However, it compromises the quality of air and can lead to thermal stress</p> <p>Difficult to tolerate PPE ^ in uncontrolled temperature</p>
3) Polyclinic – Multiple rooms	Placement of PVC** ducts with exhaust fans (see figure 3)	Air should be exhausted safely. Care to be taken not to exhaust air to other occupied areas.
4) Conversion of an emergency room in the isolation	Natural ventilation – open door and windows – permit cross ventilation	Air temperature should be monitored to avoid thermal stress.
	Anteroom available – Place exhaust fan in the washroom and convert	

room	anteroom to the positive pressure room	
	Anteroom not available – Place inline exhaust fan (figure 7 )	
5) Conversion of ICU in the temporary isolation room. (figure 5,6,7)	<p>1) Placement of PVC ducts with exhaust fans (see figure 3). PVC ducts should be placed above the false ceiling, and all inlets which transfer the air from contaminated area to the air handling unit should be sealed. AHU## should be provided fresh air as much as technically possible.</p> <p>2) Place HEPA based air purifier (figure 4)</p>	<p>1) Decontaminate air by applying HEPA filter or exhaust 3 meters above the highest point of the building</p> <p>2) Intake of HEPA filter should be from fresh source as well as air should be exhausted out of room to prevent recirculation</p> <p>3) Room doors and windows should be sealed for 5 PSI negative pressure to be created.</p> <p>4) Minimum of 12 air exchanges to be produced</p> <p>4 ) Use Maghelic pressure gauze or Smoke/tissue to ascertain effective negative pressure.</p>
Exhaust fan capacity selection	As per the size and air exchanges required	$CFM \frac{\$}{\$} = \frac{\text{Volume of the room} \times \text{Air changes desired per hour}}{60 \text{ (Minutes)}}$
Selection of HEPA filters	<p>1) Medical grade</p> <p>2) HEPA 13 plus (Particle size less than 0.3 microns) clearance by 99.7 efficiency or MERV value 17 plus (Hyper HEPA filters)</p>	The HEPA filter on its own is not effective in preventing spread, prevention of recirculation of the contaminated air
<p>Example - Calculation of air exchange per hour for selecting air purifier based on HEPA filter</p> <p>Room Volume= 15X15X8.5 =1913 cubic feet</p> <p>150 CFM X 60 minutes /1913 Cf = approx. 5 ACH</p>		

\*AC – Air Conditioner, # HEPA- High Efficiency Particulate Air, \$ UVC – Ultra Violet C rays, † SARS-CoV – Severe Acute Respiratory Syndrome Corona Virus 2, ^ PPE – Personal Protective Equipment, \*\*PVC – Polyvinyl Chloride, ## AHU Air Handling Unit, \$\$ CFM – Cubic Feet per Minute, #ACH Air Exchanges per Hour



**Supplementary Fig. 1** Minimising risk of transmission- All wear masks, HCW with goggles-PPE, Exhaust ventilation-aerosols exhausted, droplets on various surfaces and AC directed from clean to contaminated.



**Supplementary Fig. 2** Conversion of existing ICU to isolation room. Air duct containing dirty air should be blocked. Air Handling Unit [AHU] should provide fresh gas as much as possible. Install a negative pressure exhaust system.



**Supplementary Fig. 3.** In figure a there is no exhaust fan and occupants of chair face will be directed towards each other whereas in picture b is chair are arranged facing wall and exhaust fan has been installed