



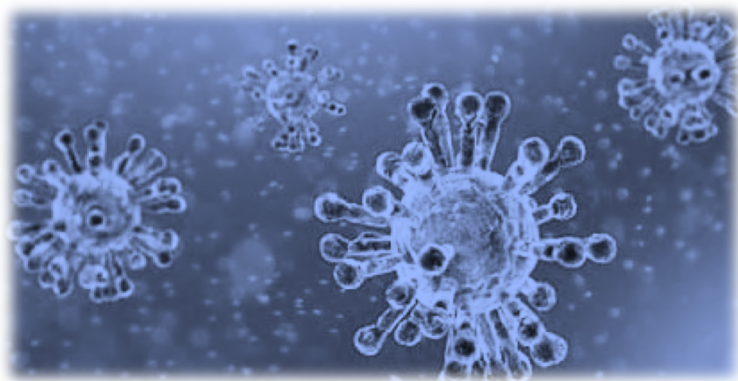
Prevention and Control of SARS CoV-2 Infections in Hospital

Hospital Infection Control Division

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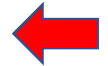
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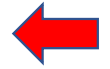
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Patient Management - Broad principles

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

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Screening, Admission and Exclusion



Definitions of patients with COVID - 19

- **SARI** - An ARI with history of fever or measured temperature $\geq 38^{\circ}\text{C}$ and cough; onset within the last ~10 days; and requiring hospitalization

- **Surveillance case definitions of SARI -**

1) SARI in a person, with history of fever and cough requiring admission to hospital, with no other etiology that fully explains the clinical presentation

AND

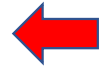
Any of the following:

- a) History of international **travel** in 14 days prior to symptom onset; or
- b) The disease occurs in a **health care worker** who has been working in an environment where patients with severe acute respiratory infections are being cared for, without regard to place of residence or history of travel **or**
- c) The person develops an unusual or **unexpected clinical course**, especially sudden deterioration despite appropriate treatment, without regard to place of residence or history of travel, even if another etiology has been identified that fully explains the clinical presentation



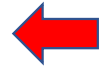
2) A person with acute respiratory illness of any degree of severity who, within 14 days before onset of illness, had any of the following exposures:

- a) **Close physical contact** with a confirmed case of COVID - 19 infection, while that patient was symptomatic or
- b) Healthcare facility in a country where **hospital-associated** COVID - 19 infections have been reported



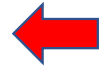
Close Contact

- **Defined as:**
 - **Health care associated exposure**, including providing direct care for COVID – 19 patients, working with health care workers infected with COVID – 19, visiting patients or staying in the same close environment of a COVID - 19 patients.
 - Working together in close proximity or sharing the same classroom environment with a COVID - 19 patient
 - Travelling together with COVID - 19 patient in any kind of conveyance.
 - Living in the same **household** as a COVID - 19 patients.



Outpatient (OPD) management

- Any patient with suspected flu like symptoms should be immediately referred to flu corner of the hospital
 - Can be done by periodic announcement of symptoms in patient waiting area
 - Symptoms include fever AND dry cough and/or shortness of breath
 - Patients with presence of partial symptoms of those mentioned can be prioritise for detail assessment
 - Identified patients can be escorted to flu corner rather than merely referring them
- PPE
 - All doctors should have N95 esp if doing close examination (e.g. Ophthalmoscopy, otoscopy, auscultation of lung fields etc)
 - Security staff and other staff to wear surgical mask
 - If doing any aerosol generating procedure – Full PPE (Cap, N95 mask, goggles, gloves, gown)



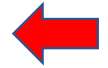
OPD areas - Processes

- Cleaning of equipment
 - As per hospital infection control manual
- Biomedical waste management
 - As per hospital infection control manual
- Crowd management
 - Maintain 1m distance
 - Seating arrangement keeping in view of above. Restrict patient registrations as per seating capacity



Sanitization of OPD area

- Deep cleaning
 - At least twice in a day
 - Spray all areas with 0.5-1% Na hypochlorite
 - Mopping all high touch surfaces with 1% Sodium hypochlorite
 - Flooring cleaning with soap and water
- Periodic cleaning
 - Mopping all high touch surfaces at least every 2-4hrs with 0.5-1% Sodium hypochlorite
 - Repeat the procedure at any time when there is contamination



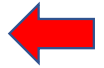
Emergency/Casualty area

- Despite being having flu corner in the hospital there may be patients with severe/critical illness visiting to emergency
 - Triaging area (All staff full PPE)
 - Initial assessment by nursing staff and doctor
 - Critical ill → Refer to ICU after stabilising
 - Severely ill but stable → Refer to medicine ward area
 - All patients with suspected COVID illness must be transferred with full respiratory precautions
 - All triaging and stabilisation should be done as soon as possible to facilitate decongestion of area and providing settling and cleaning time



Sanitisation of emergency area

- Deep cleaning
 - At least twice in a day
 - Spray all areas with 0.5-1% Sodium hypochlorite
 - Mopping all high touch surfaces with 1% Sodium hypochlorite
 - Flooring cleaning with soap and water
- Periodic cleaning
 - Mopping all high touch surfaces at least every 2-4hrs with 1% Sodium hypochlorite
 - Repeat the procedure at any time when there is contamination



Isolation area

(includes observation ward area, isolation wards, and an isolation ICU area)

- Suspected and confirmed patients shall be separated in different ward areas
- Suspected patients
 - Shall be isolated in separated single rooms
 - The room shall be equipped with facilities such as a bathroom and the patient's activity must be confined to the isolation ward
 - When separate rooms are not available cohorting may be done and keep distance of 1m distance
 - The suspected patients must wear mask all the times and do frequent hand hygiene
- Confirmed patients can be arranged in the same room with bed spacing of not less than 1.2 meters (appx 4 feet)



Isolation area

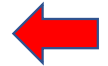
(includes observation ward area, isolation wards, and an isolation ICU area)

• Patient Management

- Family visits and nursing shall be declined. Electronic communication devices should be allowed
- Educate patients to help them prevent further spread of COVID-19, and provide instructions on how to wear surgical masks, proper handwashing, cough etiquette, medical observation and home quarantine

• Staff Management:

- Staff must undergo strict training and examinations to ensure that they know how to put on and remove personal protective equipment
- Staff should be divided into different teams. Each team should be limited to a upto of 4 hours of working in an isolation ward
- Before going off duty, staff must wash themselves and conduct necessary personal hygiene regimens to prevent possible infection of their respiratory tracts and mucosa



Isolation area

(includes observation ward area, isolation wards, and an isolation ICU area)

- **General Management:**

- The front-line staff in the isolation areas shall live in an isolation accommodation and shall not go out without permission.
- Nutritious diet to be provided to staff and patients
- Monitor and record the health status of all staff on the job including monitoring body temperature and respiratory symptom
- If the staff have any relevant symptoms such as fever, they shall be isolated immediately and screened through laboratory testing



Key Roles and responsibilities

- **Doctors**

- Management of disease
- Performing invasive procedures
- Taking patient specimens including blood specimens, NP swabs etc.
- Patient and attendants counselling

- **Nursing staff**

- Nursing assisting management of disease
- Periodic monitoring of patients
- Cannulation and iv drug administration
- Cleaning disinfection and packing of procedure trays
- Taking patient specimens including blood specimens, NP swabs etc.
- Patient and attendants counselling

- **Technical staff**

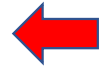
- Equipment maintenance and cleaning
- Assisting doctors and nurses

- **Attendants**

- Assisting doctors, nurses and technical staff
- Safe Transport of specimens
- Shifting of patients

- **House keeping staff**

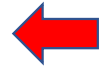
- Periodic deep cleaning
- Disinfectant spraying



Key Roles and responsibilities

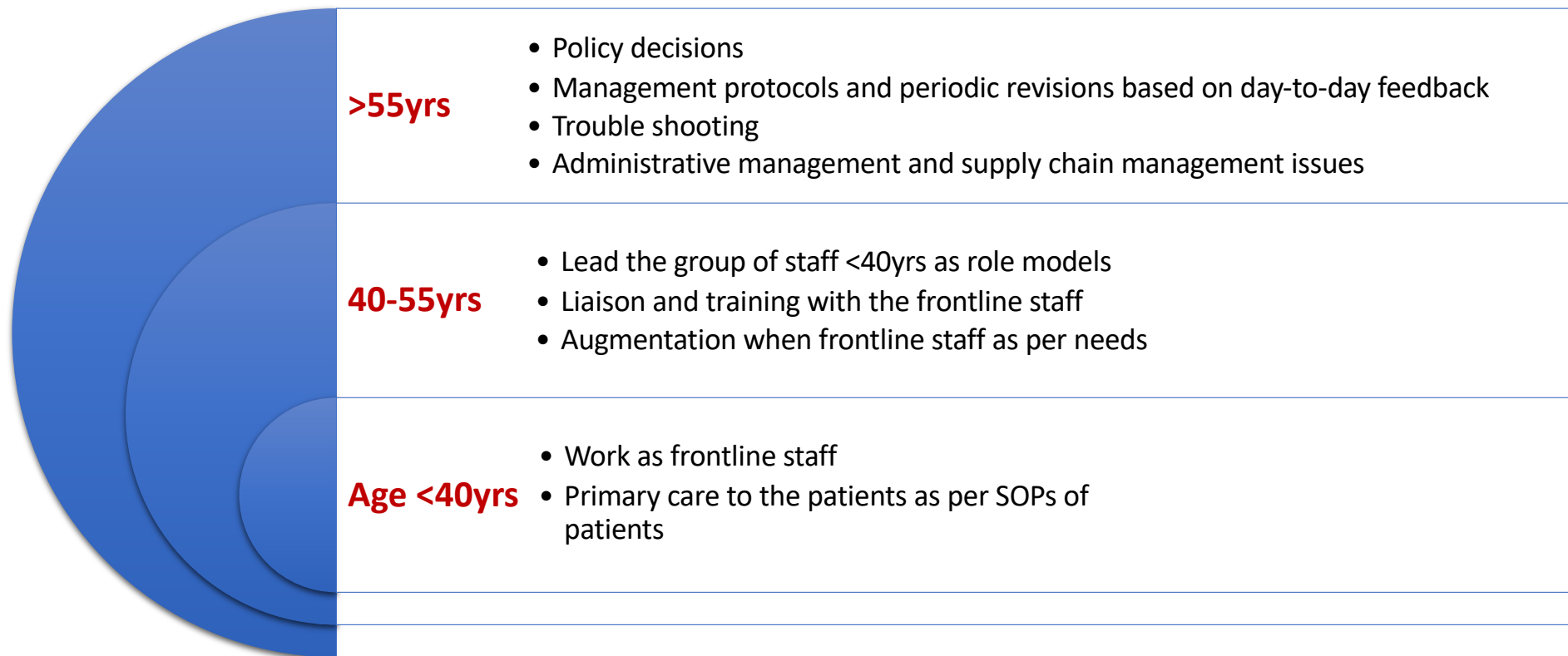
- **Hospital managers**

- Recording feedback from patients, doctors and nurses
- Communicating the analysed feedback to different stakeholders
- Ensuring supply chain management
- Coordination and liaison of communication between different stakeholders
 - Problems/needs of the patients and staff working in different COVID management areas
- Maintain line listing of all suspected/quarantine/isolated/confirmed patients and provide updated information to nodal officers



Doctors and nursing staff- Safety net

Age based roles distribution and backups





Manpower planning - per shift

(Dedicated COVID management) (May change as per patient load)

- **Flu center**

- 6 doctors
- 6 nursing staff
- 3 attendants

- **Counselling team**

- One senior doctor
- One senior nurse
- One hospital manager

- **Emergency/casualty**

- One doctor per four beds
- One Senior nurse
- One nurse per two beds
- One attendant per four beds
- One housekeeping staff per 8 beds
- One hospital manager

- **Isolation ward**

- One doctor per eight beds
- One Senior nurse
- One nurse per four beds
- One attendant per four beds
- One housekeeping staff per 8 beds
- One hospital manager

For ICU : One Doctor per 4 ventilated beds, One nursing staff per 2 ventilated beds, One technician per 8 beds, One attendant per 8 beds, one housekeeping staff per 8 beds

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Rational use of PPE



COVID-19 Related Personal Protection Management

Protection Level	Protective Equipment	Scope of Application
Level I Protection	• Disposable surgical cap • Disposable surgical mask • Work uniform • Disposable gloves or/and disposable isolation clothing, if necessary	• Pre-examination triage (Flu centre) • General outpatient department
Level II Protection	• Disposable surgical cap • Medical protective mask (N95) • Work uniform • Disposable medical protective uniform • Disposable latex gloves • Goggles	• Fever outpatient department • Isolation ward area (including isolated intensive ICU) • Non-respiratory specimen examination of suspected/confirmed patients • Imaging examination of suspected/ confirmed patients • Cleaning of surgical instruments used with suspected/confirmed patients
Level III Protection	• Disposable surgical cap • Medical protective mask (N95) • Work uniform • Disposable medical protective uniform • Disposable latex gloves • Full-face respiratory protective devices or powered air-purifying respirator	• When the staff performs procedures such as tracheal intubation, tracheotomy, bronchofibroscopy, GI endoscopy, etc., during which, the suspected/ confirmed patients may spray or splash respiratory secretions or body fluids/blood • When the staff performs surgery and autopsy for confirmed/suspected patients • When the staff carries out NAT for COVID-19



Out Patient Department (Separate screening area)

S.No.	Setting	Activity	Risk	Recommended PPE	Remarks
1	Triage area	Triaging patients Provide triple layer mask to patients	Moderate risk	N 95 mask /Triple layer surgical mask Gloves	Patients get masked
2	Screening area help desk/ Registration counter	Provide information to patients	Moderate risk	N 95 mask /Triple layer surgical mask Gloves	-
3	Temperature recording station	Record temperature with hand held thermal recorder	Moderate risk	N 95 mask Gloves	-
4	Holding area/ waiting area	Nurses / paramedic interacting with patients	Moderate risk	N 95 mask Gloves	Minimum distance of one meter needs to be maintained.
5	Doctors chamber	Clinical management (doctors, nurses)	Moderate risk	N 95 mask Gloves	No aerosol generating procedures should be allowed.
6	Sanitary staff	Cleaning frequently touched surfaces/ Floor/ cleaning linen	Moderate risk	N 95 mask Gloves	
7	Visitors accompanying young children and elderlies	Support in navigating various service areas	Low risk	Triple layer surgical mask	No other visitors should be allowed. Those allowed should practice hand hygiene

In-patient Services

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S.No.	Setting	Activity	Risk	Recommended PPE	Remarks
1	Individual isolation rooms/ cohorted isolation rooms	Clinical management	Moderate risk	N 95 mask Gloves	Patient masked. Patients stable. No aerosol generating activity.
2	ICU/ Critical care	Critical care management	High risk	Full complement of PPE	Aerosol generating activities performed.
3		Dead body packing	High risk	Full complement of PPE	-
4		Dead body transport to mortuary	Moderate Risk/ Low Risk	N 95 mask /Triple layer Surgical Mask Gloves	-
5	Sanitation	Cleaning frequently touched surfaces/ floor/ changing linen	Moderate risk	N-95 mask Gloves	-
6	Other Non-COVID treatment areas of hospital	Attending to infectious and non-infectious patients	Risk as per assessed profile of patients	PPE as per hospital infection prevention control practices.	No possibility of exposure to COVID patients. They should not venture into COVID-19 treatment areas.
7	Caretaker accompanying the admitted patient	Taking care of the admitted patient	Low risk	Triple layer medical mask	The caretaker thus allowed should practice hand hygiene, maintain a distance of 1 meter



Emergency Department

S.No.	Setting	Activity	Risk	Recommended PPE	Remarks
1	Emergency	Attending emergency cases	Moderate risk	N 95 mask Gloves	When aerosol generating procedures are anticipated
2		Attending to severely ill patients of SARI	High risk	Full complement of PPE	Aerosol generating activities performed.



Pre-hospital (Ambulance) Services

S.No.	Setting	Activity	Risk	Recommended PPE	Remarks
1	Ambulance Transfer to designated hospital	Transporting patients not on any assisted ventilation	Moderate risk	N-95 mask Gloves	-
		Management of SARI patient while transporting	High risk	Full complement of PPE	When aerosol generating procedures are anticipated
		Driving the ambulance	Low risk/ Moderate risk	N-95 mask Gloves / Triple layer surgical mask	Driver helps in shifting patients to the emergency



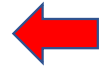
Other Supportive/ Ancillary Services

S.No.	Setting	Activity	Risk	Recommended PPE	Remarks
1	Laboratory	Sample collection and transportation	High risk	Full complement of PPE	-
		Sample testing	High risk	Full complement of PPE	-
2	Mortuary	Dead body handling	Moderate Risk	N 95 mask Gloves	No aerosol generating procedures should be allowed. No embalming.
		While performing autopsy	High Risk	Full complement of PPE	No post-mortem unless until specified.
3	Sanitation	Cleaning frequently touched surfaces/ Floor/ cleaning linen in COVID treatment areas	Moderate risk	N-95 mask Gloves	-
4	CSSD/Laundry	Handling linen of COVID patients	Moderate risk	N-95 mask Gloves	-
5	Other supportive services	Administrative Financial Engineering Security, etc.	No risk	No PPE	No possibility of exposure to COVID patients. They should not venture into COVID-19 treatment areas.



Quarantine facility

S. No.	Setting	Activity	Risk	Recommended PPE	Remarks
1	Persons being quarantined		Low Risk	Triple layer mask	-
2	Healthcare staff working at quarantine facility	Health monitoring and temperature recording	Low Risk	Triple layer mask Gloves	-
		Clinical examination of symptomatic persons	Moderate Risk	N-95 masks Gloves	-
3	Support staff		Low Risk	Triple layer mask Gloves	-

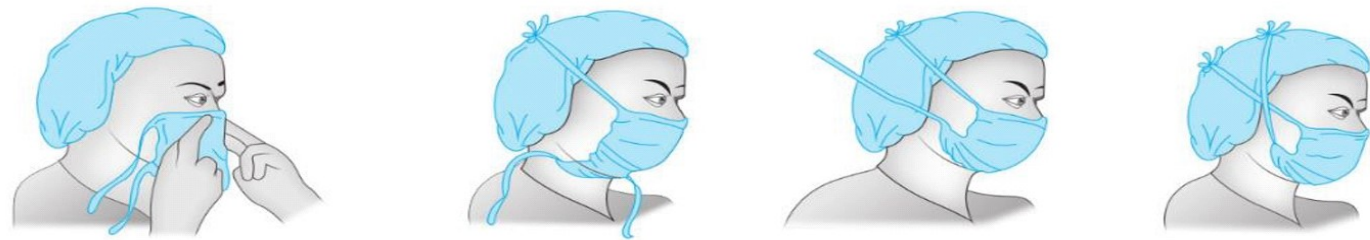


COVID-19 Related Personal Protection Management

- All staff at the healthcare facilities must wear medical surgical masks in patient care areas
- All staff working in the emergency department, outpatient department ENT, outpatient department of respiratory care, endoscopic examination unit (such as gastrointestinal endoscopy, bronchofibroscopy, laryngoscopy, etc.) must upgrade their surgical masks to medical protective masks (N95) based on Level I protection
- Staff must wear a protective face screen based on Level II protection while collecting respiratory specimens from suspected/confirmed patients.

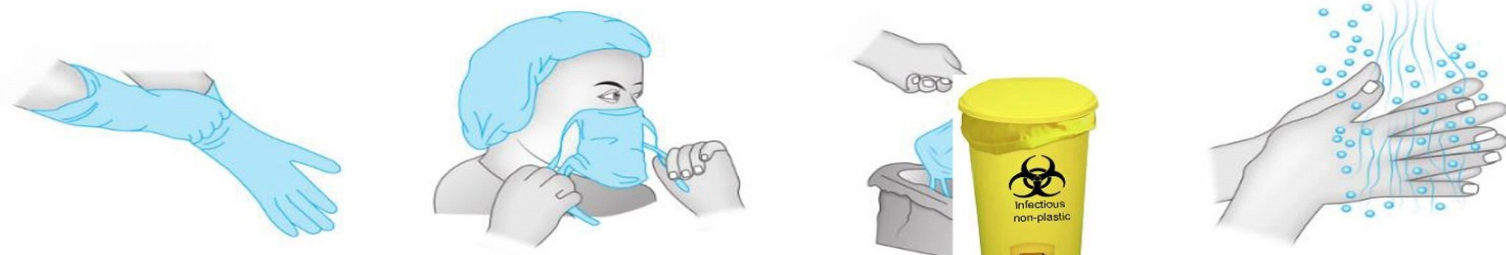
How to wear and remove a triple layer surgical mask?

HOW TO WEAR OF FACE MASK



1. Bring the mask to the face, placing the metal nosepiece over the bridge of the nose to ensure a close and comfortable fit
2. Secure by tying the top set of strings behind the head
3. Pull the bottom of the mask to fit closely under the chin
4. Secure by tying the bottom set of strings, high on the head above the first set

HOW TO REMOVE FACE MASK



1. Remove gloves if worn and decontaminate the hands
2. Untie the strings and remove the mask handling only by the strings
3. Dispose of the mask into the waste bin (YELLOW BAG)
2. Decontaminate the hands



How to wear N95 mask?

N95 MASK



1. Noseclip is located in top panel. Perform the noseclip by gently bending at the center of the panel. Hold respirator in one hand and pull out bottom panel to form a cup



2. Turn respirator over to expose headbands



3. Cup respirator under chin and pull and straps over the head



4. Locate the lower strap below the ears and the upper strap across the crown of the head. Adjust top and bottom panels for a comfortable fit.



5. Using both hands, mould noseclip to the shape of the lower part of the nose. Pinching the nosepiece using only one hand may result in less effective respirator performance.

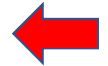


6. The seal of the respirator on the face should be fit-checked prior to wearing in the work area.



Fit check for N95 mask

- **Placement:** The respirator is placed on the face and tied over the head and at base of the neck.
- **Sealing:** N95 mask is compressed to ensure a seal across the face, cheeks and bridge of the nose
- **The positive pressure seal** of N95 mask is checked by gently exhaling. If air escapes, the N95 mask needs to be adjusted.
- **The negative pressure seal** of the N95 mask is checked by gently inhaling. If the N95 mask is not drawn in towards the face, or air leaks around the face seal; the N95 mask is readjusted and the process is repeated.



Masks management

- Place mask carefully to cover mouth and nose and tie securely to minimise any gaps between the face and the mask
- While in use, avoid touching the mask
- Remove the mask by using appropriate technique - i.e. do not touch the front but remove the lace from behind
- After removal or whenever you inadvertently touch a used mask, clean hands by using an alcohol-based hand rub or soap and water if visibly soiled
- Replace masks with a new clean, dry mask as soon as they become damp/humid
- Do not re-use single-use masks
- Discard single-use masks after each use and dispose-off them immediately upon removal

Do's and Dont's of wearing a mask

Do's

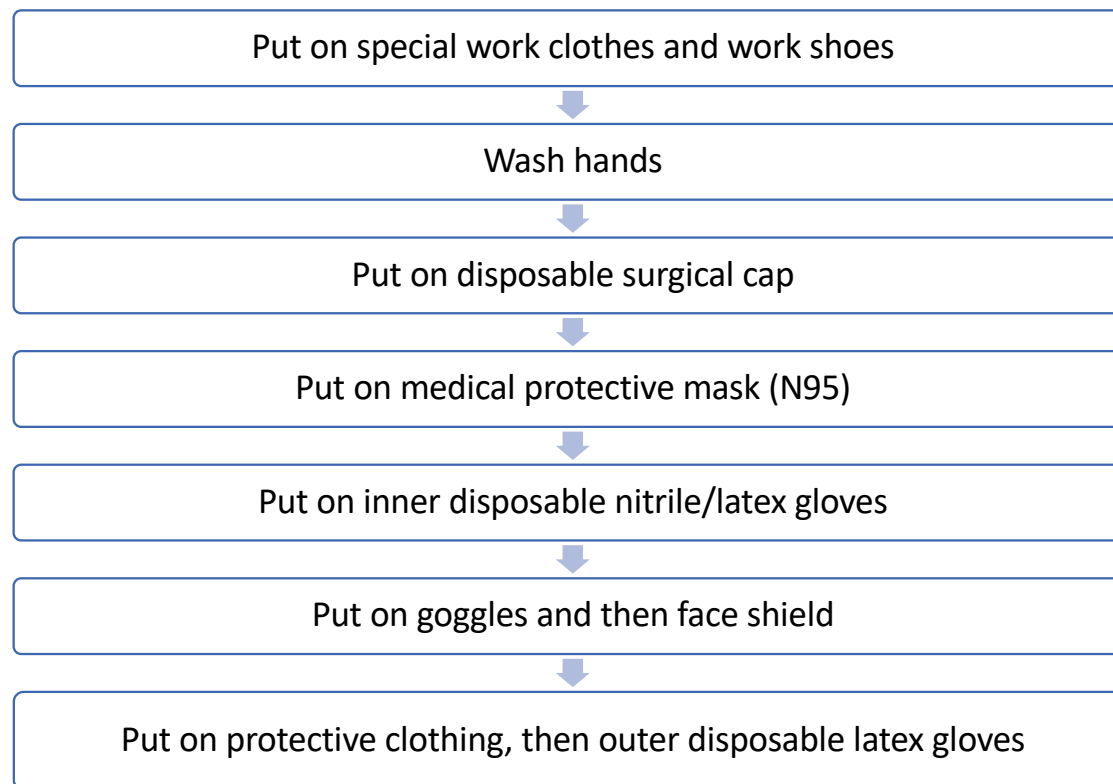
- After removal or inadvertent touching a used mask, wash hands or use an alcohol-based hand rub
- Replace masks with a new clean, dry mask as soon as they become damp/humid
- **Discard after** 4h for surgical mask and 6-8h for N95 mask
- Discard in yellow bags

Don'ts

- While in use, avoid touching the mask
- do not touch the front but remove the lace from behind while removing
- Do not re-use single-use masks
- Do not throw masks here and there after use



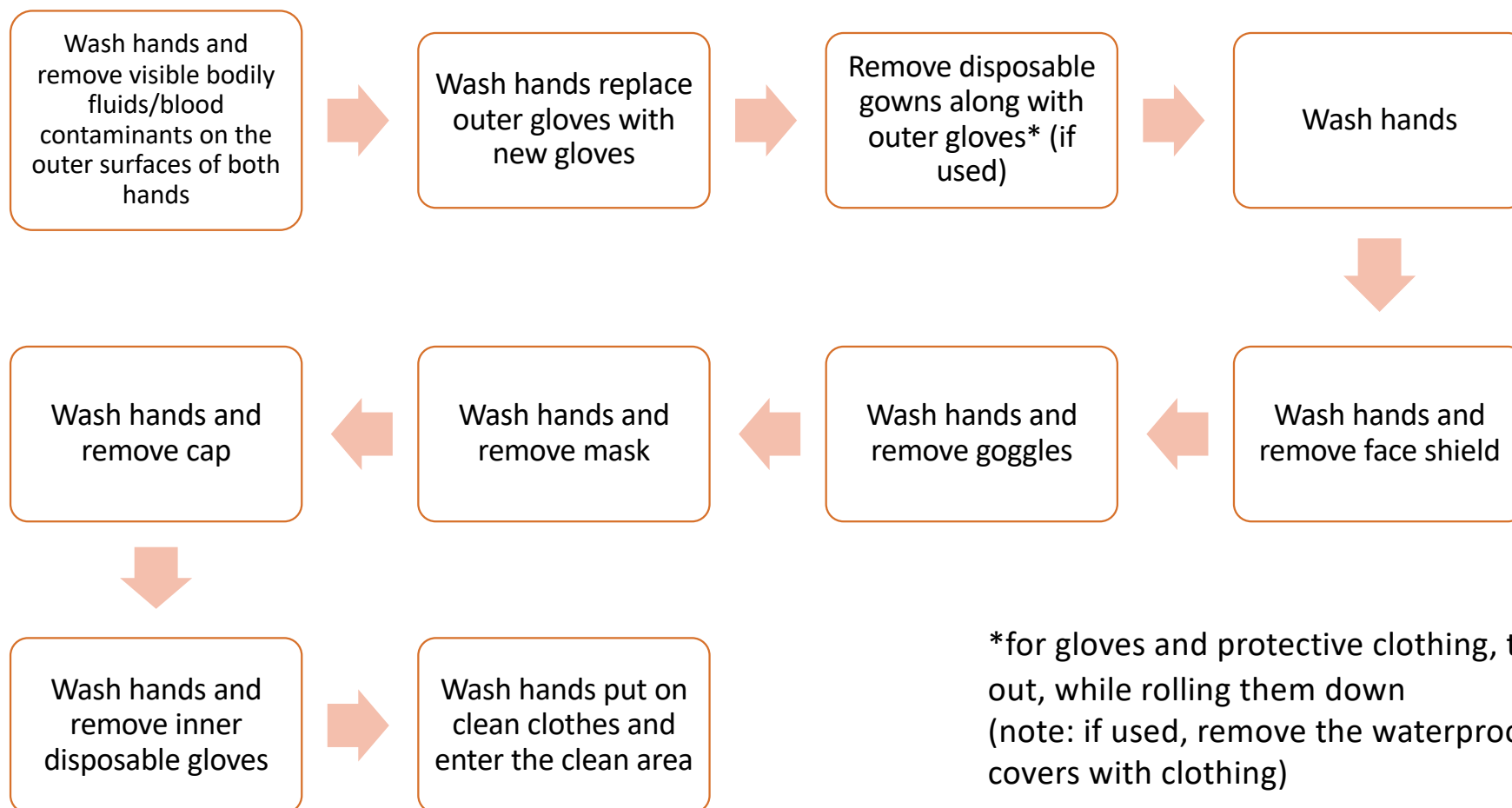
Guidance on donning PPE



(If wearing protective clothing without foot covers, please also put on separate waterproof boot covers), put on a disposable isolation gown (if required in the specific work zone) and face shield/powered air-purifying respirator(if required in the specific work zone)



Guidance of removing PPE



*for gloves and protective clothing, turn inside out, while rolling them down
(note: if used, remove the waterproof boot covers with clothing)



Disinfection Procedures for COVID-19 Isolation Ward Area

- **Disinfection for Floor and Walls**

1. Visible dust shall be completely removed before disinfection and handled in accordance with disposal procedures of blood and bodily fluid spills
2. Disinfect the floor and walls with 0.5-1% hypochlorite through floor mopping, spraying or wiping
3. Make sure that disinfection is conducted for at least 30 minutes
4. Carry out disinfection at least once per shift and repeat the procedure at any time when there is contamination

- **Disinfection of Object Surfaces**

1. Same as above
2. Wipe cleaner regions first, then more contaminated regions: first wipe the object surfaces that are not frequently touched, and then wipe the object surfaces that are frequently touched



Disinfection Procedures for Infectious laundry of Suspected or Confirmed Patients

- **Infectious fabrics:**

1. Bed sheets, and pillow covers used by patients
2. Floor towels used for environmental cleaning
3. Hospital cloths of patients

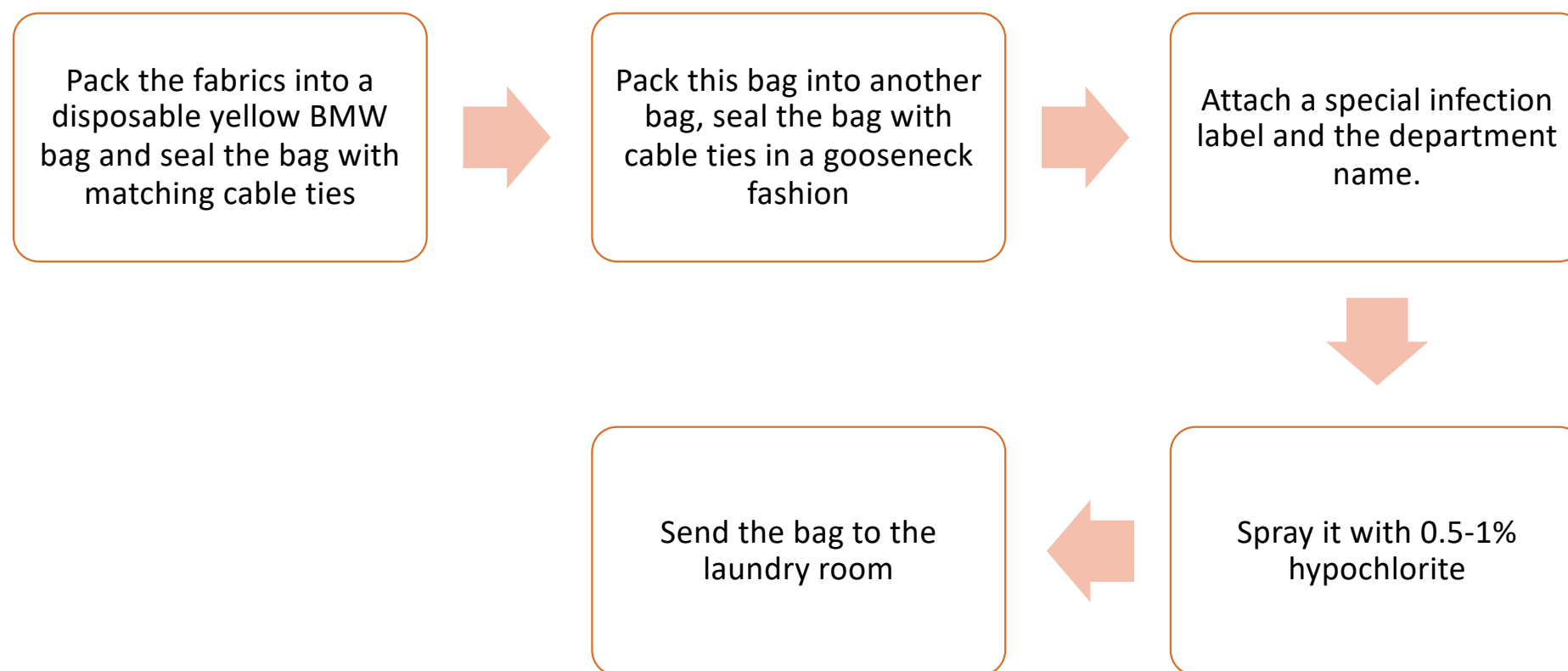
(No curtains should be there in COVID management areas)

- Hospital cloths of healthcare workers shall also be processed in same manner (however, segregated from other laundry)



Disinfection Procedures for Infectious laundry of Suspected or Confirmed Patients

- Collection method





Disinfection Procedures for Infectious laundry of Suspected or Confirmed Patients - Collection method

- **Storage and washing:**

1. Infectious fabrics should be separated from other infectious fabrics (non-COVID-19) and washed in a dedicated washing machine
2. Wash and disinfect these fabrics with chlorine-containing disinfectant at 90°C for at least 30 minutes

- **Disinfection of transport tools:**

1. Tools shall be disinfected immediately each time after being used for transporting infectious fabrics
2. Transport tools should be wiped with chlorine-containing disinfectant 0.5-1% sodium hypochlorite
3. Leave disinfectant for **30 minutes** before wiping the tools clean with clean water



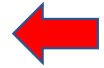
Disposal Procedures for COVID-19 Related Medical Waste

- BMW waste – *ALL waste generated in COVID patient care units is BMW*
 - Put the medical waste into a double-layer yellow (autoclavable) BMW bag
 - Seal the bag with cable ties in a gooseneck fashion
 - Spray the bag with 0.5-1% hypochlorite
 - Affix a special infection label and transfer it
- Sharps Containers
 - Put sharp objects into a sharps container, seal the box and spray the box with 0.5-1% hypochlorite
 - Put the bagged waste into a medical waste transfer box
 - Affix a special infection label, fully enclose the box and transfer it
- Transfer the waste to a BMW storage area along a specified route at a fixed time point, microwave it and store the waste separately at a fixed location



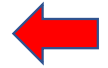
Disposal Procedures for Spills of COVID-19 Patient Blood/Fluids

- Spills of a **small volume (< 10 mL)** of blood/bodily fluids
 - Carefully remove the spills with disposable absorbent materials such as gauze, wipes, etc., which have been soaked in 0.5-1% hypochlorite disinfecting solution
- Spills of a **large volume (> 10 mL)** of blood and bodily fluids
 - First, place signs to indicate the presence of a spill
 - Completely cover the spill with disinfectant powder or bleach powder containing water-absorbing ingredients or completely cover it with disposable water-absorbing materials and then pour a sufficient amount of 1-2% hypochlorite disinfectant onto the water-absorbing material (or cover with a dry towel which will be subjected to high-level disinfection). Leave for at least 30 minutes before carefully removing the spill.
- Fecal matter, secretions, vomit, etc. from patients shall be collected into special containers and disinfected for 2 hours by a 4-5% hypochlorite disinfectant at a spill-to-disinfectant ratio of 1:2



Disposal Procedures for Spills of COVID-19 Patient Blood/Fluids...

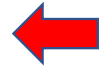
- After removing the spills, disinfect the surfaces of the polluted environment or objects
- Containers that hold the contaminants can be soaked and disinfected with 1% hypochlorite for 30 minutes and then cleaned
- All waste collected should be disposed of as medical waste
- Used items should be put into double-layer medical waste bags and disposed of as medical waste



Lift Area - infection control procedures

- 3-4 people per lift at a time:
Maintain 1 meter distance
- Hand rub/wash before and after lift use
- Touch lift-buttons with elbow →
- Clean high touch area of lift such as lift-buttons, rails and adjacent-wall area, door every one hour
- Clean other area of lift every 8 hourly



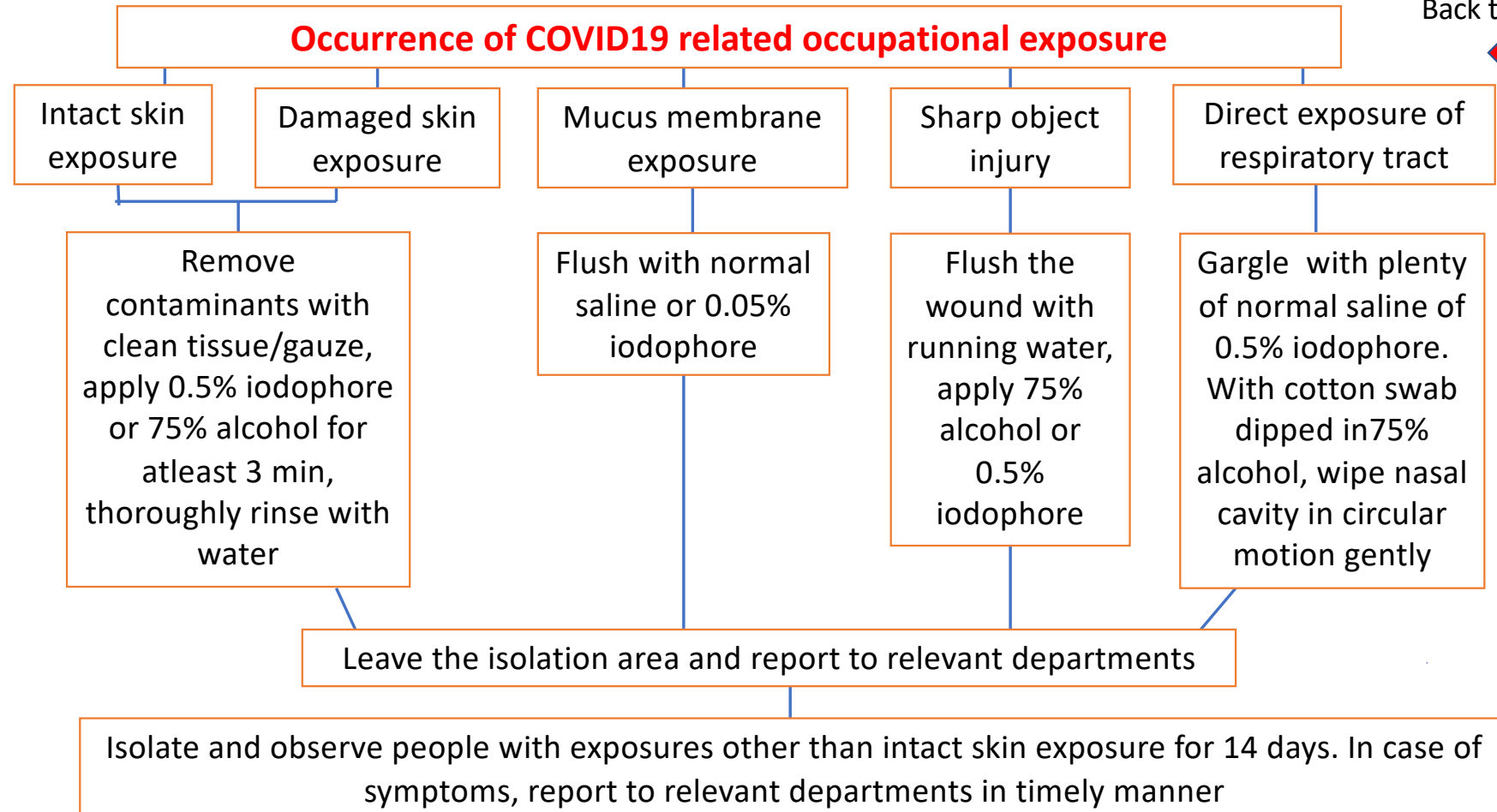


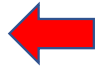
Mobile and laptop cleaning procedures

- Avoid bringing to hospital if not absolute necessary
- Clean front and back surface
- Alcohol wipes
 - Twice per shift
 - Also before leaving workplace
- Switch off during wiping

Procedures for Taking Remedial Actions against Occupational Exposure to COVID-19

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Guidelines for use of hydroxy-chloroquine as prophylaxis for SARS CoV-2 infection

- Eligible individuals:
 - Healthcare workers involved in care of suspected or confirmed cases of COVID patients
 - Asymptomatic household contacts of laboratory confirmed cases
 - Household contacts of suspected symptomatic healthcare worker
- Dose-
 - Asymptomatic health care workers involved in care of suspected or confirmed cases of COVID patients – 400mg 12hourly on day 1, followed by 400mg once weekly for next 7 weeks; to be taken with meals
 - Asymptomatic household contacts of lab confirmed cases - 400mg BD on day 1, followed by 400mg once weekly for next 3 weeks; to be taken with meals



- **Exclusion/Contraindications –**

- Drug not recommended for prophylaxis in children under 15 years of age
- Contraindicated in known cases of retinopathy, known hypersensitivity to hydroxy chloroquine, 4-aminoquinolone compounds

- **Key considerations –**

- Drug has to be given only on the prescription of a registered medical practitioner
- Advised to consult a physician for any adverse event or potential drug interaction before any initiation of medication

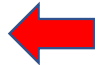
***Drug shall be provided as per duty roster of the health care worker**

Those NOT involved in patient care and COVID testing should not initiate prophylaxis



Dietary Management – COVID patients

- All diets shall be served in disposable containers
- All labelled diets must reach the designated patient care unit
- In special wards (Single room occupancy) designated food shall be placed by hospital attendant wearing full PPE
- Patients will then be informed to collect their food from outside their rooms
- All leftovers/disposables shall be discarded as BMW
- Regular feedback about quality of food shall be taken from the patients



Nursing Care for Patients Receiving High-Flow Nasal Cannula (HFNC) Oxygen Therapy

- **Treatment of Secretions**

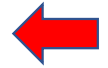
1. Patients' drool, snot, and sputum should be wiped with tissue paper, be disposed in a sealed container with 0.5-1% Sodium hypochlorite
2. Alternatively, secretions removed by oral mucus extractor or suctioning tube and be disposed in a sputum collector 0.5-1% Sodium hypochlorite



Nursing Care for Patients with Mechanical Ventilation

- Intubation Procedures:

1. Number of the medical staff should be limited to the minimum number that can ensure the patient's safety
2. Wear N95 mask along with full PPE
3. Reduce movement of staff in the ward, continuous purify and disinfect the room with 0.5-1% Sodium hypochlorite for 30 min after completion of intubation



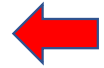
Laboratory testing - Whom to test?

- ALL symptomatic persons (fever, cough, difficulty in breathing) within 14 days of international travel
- ALL symptomatic contacts of confirmed cases
- ALL symptomatic healthcare workers
- All hospitalized patients with Severe Acute Respiratory Illness (Fever AND cough and/or shortness of breath)
- Asymptomatic direct and high risk contacts of a confirmed case should be tested once between day 5 and day 14 of coming in his/her contact. Direct and high risk contact include
 - Those who live in the same household of a confirmed case and
 - Healthcare workers who examined a confirmed case without adequate PPE as per recommendations



Laboratory testing – Who will collect the sample?

- Doctor or nurse on floor will collect the sample after wearing appropriate PPE
- Restricted entry to visitors or attenders during sample collection
- Specimens should be collected as soon as possible once a suspected case is identified regardless of time of symptom onset
- Label each specimen container with the patient's CR number, name, ward, specimen type and the date of collection
- Fill the requisition form completely (As recommended by ICMR/NIV, Pune)



Samples to be collected

- Essential samples:
 - Throat swab (oropharyngeal swab).
 - Nasal swab (Nasopharyngeal swab)
- Other preferred samples:
 - Bronchoalveolar lavage
 - Tracheal aspirate
 - Sputum

} Wide mouth sterile plastic containers
- In lab confirmed patients:
 - Blood
 - Stool and urine

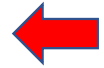
- Wide mouth sterile plastic containers



Samples to be collected

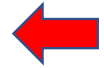
- Essential samples:
 - Oropharyngeal swab
 - Nasopharyngeal swab
- Other preferred samples:
 - Bronchoalveolar lavage
 - Endotracheal aspirate
 - Sputum

} Wide mouth sterile plastic containers
- In lab confirmed patients:
 - Blood
 - Stool and urine – wide mouth sterile plastic containers
- In deceased patients:
 - Autopsy material including lung tissue



Collection of OP and NP swabs

- Optimal timing:
 - Within 3 days of symptom onset and no later than 7 days.
 - Preferably prior to initiation of antimicrobial chemoprophylaxis or therapy.



Respiratory Specimen collection - Materials required

- **Personal Protective Equipment (PPE)**
 1. Scrub tops
 2. Scrub pants
 3. Apron
 4. N 95 masks
 5. Goggles
 6. Face shield
 7. Cap
 8. Shoe covers
 9. Hand gloves
- **Specimen collection material**
 - Nylon/Dacron flocked swabs-2
 - Sterile container - 1
 - Viral Transport medium (VTM)



Respiratory Specimen collection -Materials required

- **Specimen packing**

- Cotton
- Tissue papers
- Parafilm roll
- Scissors
- Cello tape
- 50 ml falcon tubes
- Zip lock pouches
- Plastic container with seal
- Thermocol box
- Ice packs

- **Specimen Transport**

- Labels
- Hard cardboard box

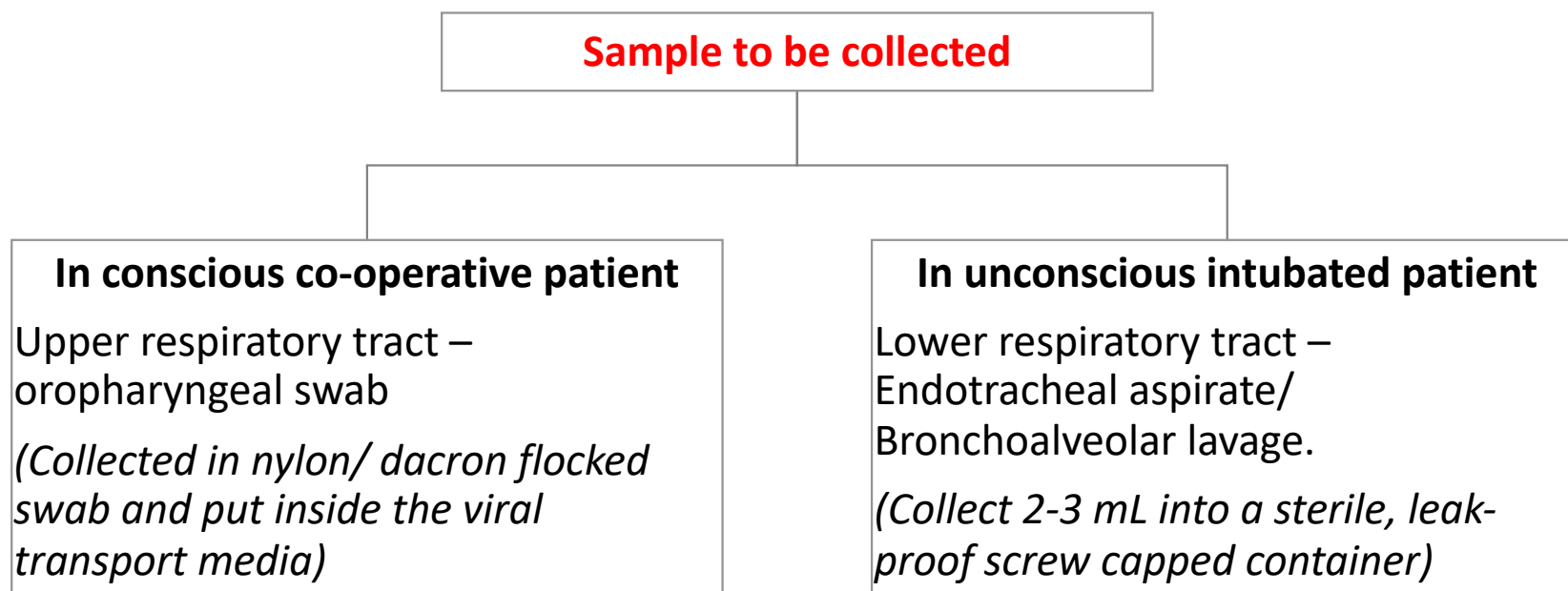


Respiratory Specimen collection – General considerations

- Combined nasal and oral swabs to be collected in viral transport medium
- All uninoculated VTM to be kept at room temperature
 - Turbid VTM must be discarded
- All respiratory specimens collected in VTM must be stored in dedicated refrigerator before packing and transport



Respiratory Specimen collection



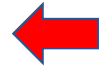
In case of any undue delay, sample must be stored in refrigerator

Specimen collection details:

(Adapted from the WHO guidelines on 2019-nCoV):

Specimen type	Collection materials	Transport to laboratory	Storage till testing	Comment
Nasopharyngeal and oropharyngeal swab	Dacron or polyester flocked swabs*	4 °C	≤5 days: 4 °C >5 days: -70 °C	The nasopharyngeal and oropharyngeal swabs should be placed in the same tube to increase the viral load.
Bronchoalveolar lavage	sterile container*	4 °C	≤48 hours: 4 °C >48 hours: -70 °C	There may be some dilution of pathogen, but still a worthwhile specimen
Tracheal aspirate, nasopharyngeal aspirate or nasal wash	sterile container*	4 °C	≤48 hours: 4 °C >48 hours: -70 °C	Not applicable
Sputum	sterile container	4 °C	≤48 hours: 4 °C >48 hours: -70 °C	Ensure the material is from the lower respiratory tract
Tissue from biopsy or autopsy including from lung	sterile container with saline	4 °C	≤24 hours: 4 °C >24 hours: -70 °C	Autopsy sample collection preferably to be avoided
Serum (2 samples – acute and convalescent)	Serum separator tubes (adults: collect 3-5 ml whole blood)	4 °C	≤5 days: 4 °C >5 days: -70 °C	Collect paired samples: • acute – first week of illness • convalescent – 2 to 3 weeks later

*For transport of samples for viral detection, use VTM (viral transport medium) containing antifungal and antibiotic supplements. Avoid repeated freezing and thawing of specimens.



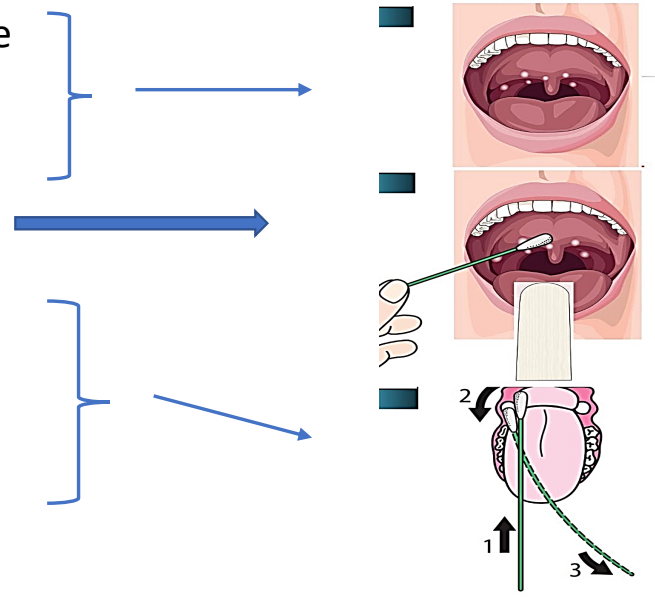
Oropharyngeal swab collection

- **Materials required:**

- Sterile nylon/dacron swab
- Viral transport medium (3 ml VTM)

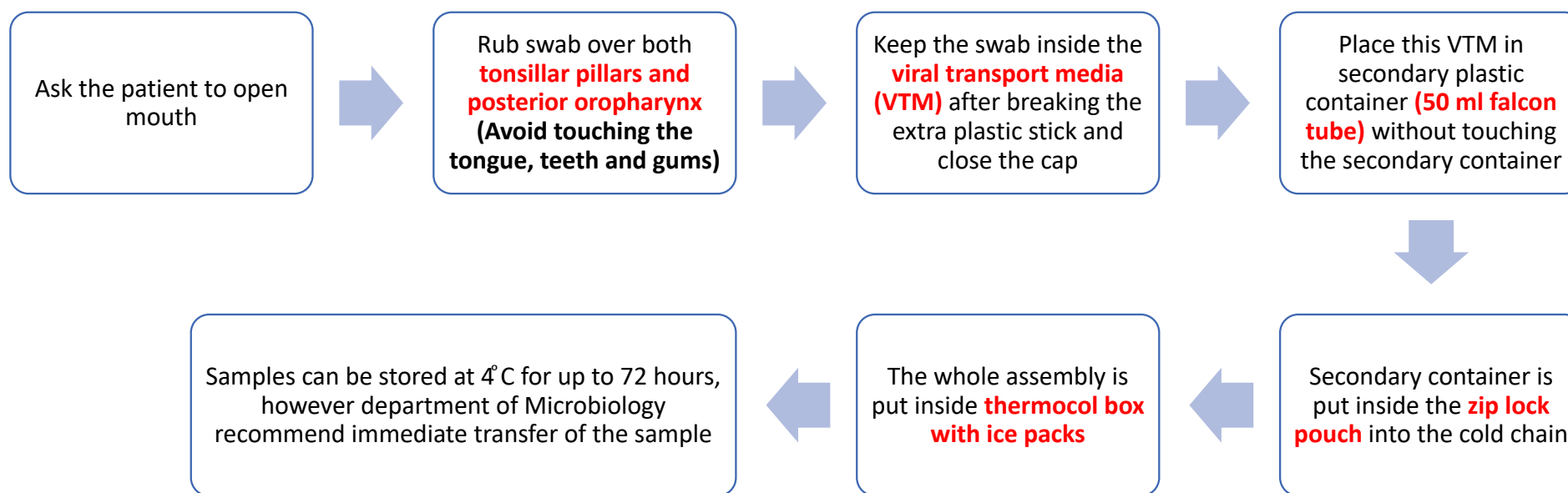
- **Procedure:**

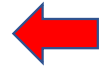
- Instruct the patient to open mouth as wide as possible
- Have the subject say 'ahh' to elevate the uvula
- Hold the tongue out of the way with a tongue depressor
- Use a sweeping motion to swab posterior pharyngeal walls and tonsillar pillars
- Avoid swabbing soft palate and do not touch the tongue, teeth and gums with swab tips
- Put the swab in VTM and break extra stick of the swab





Procedure of Oropharyngeal swab collection





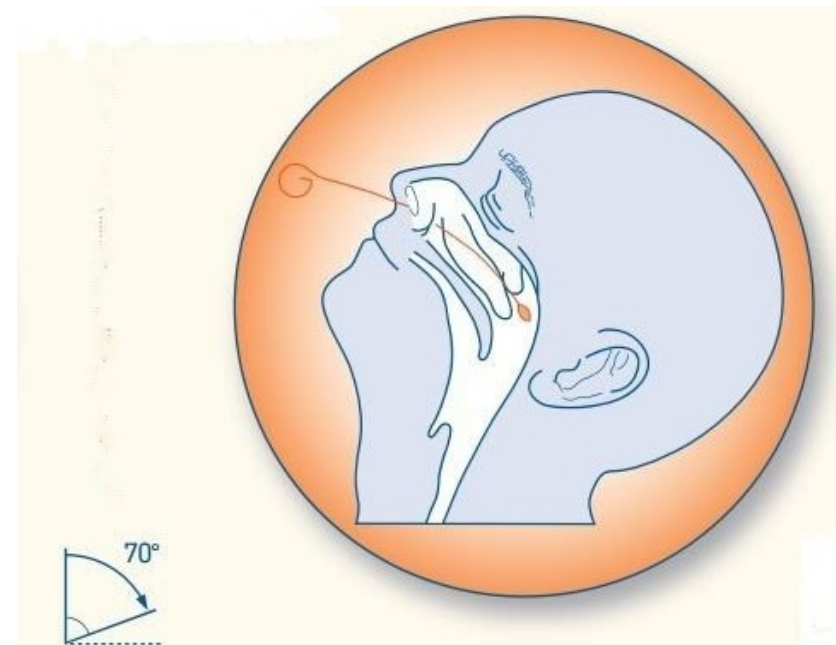
Nasopharyngeal swab collection

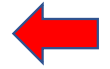
- **Materials required:**

- Sterile nylon/dacron swab
- Viral transport medium (3 ml VTM)

- **Procedure:**

- Tilt patient's head back 70 degrees
- Insert the swab into the nostril (swab should reach depth to distance from nostrils to outer opening of the ear)
- Leave swab in place for several seconds to absorb secretions
- Slowly remove swab while rotating it
- Place the swab in VTM and break extra stick of the swab

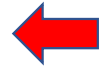




Nasopharyngeal swab collection video

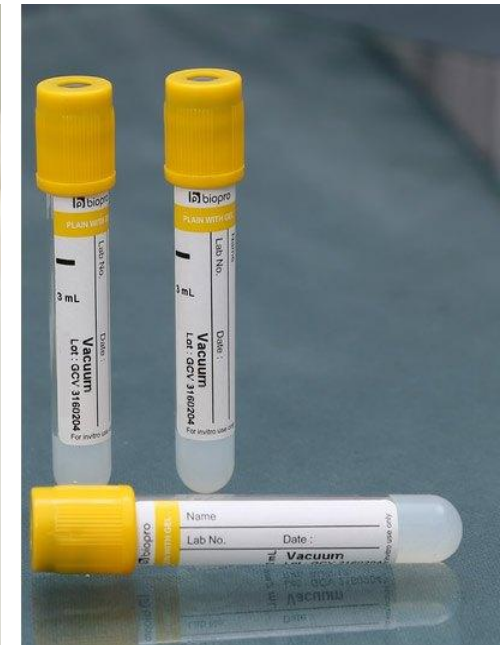


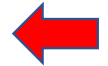
<https://www.youtube.com/watch?v=hXohAo1d6tk>



Blood collection from positive cases

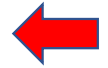
- Blood sample collection from all positive cases
- Plasma sample collection in EDTA vials
- Resin separator tubes for serum sample collection





Guidance for specimen Collection

- A BSL2 containment level is required to handle suspected samples.
- Consider all specimens as POTENTIALLY HAZARDOUS / INFECTIOUS.
- Handle all specimens with gloves in a secure manner.
- Place each specimen into a separate container labeled with the patient's name and identification number, the collection site, the date of collection and the time of the collection.
- Do not contaminate the outside of the specimen container.
- Do not handle laboratory requisition forms with gloves.



Storage of Specimen

- Keep refrigerated (2-8 °C) if it is to be processed (or sent to a reference laboratory) within 48 hours.
- Keep frozen (-10 to -20 °C) if it is to be processed after the first 48 hours or within 7 days.
- Keep frozen (-70 °C) if it is to be processed after a week. The sample can be preserved for extended periods.



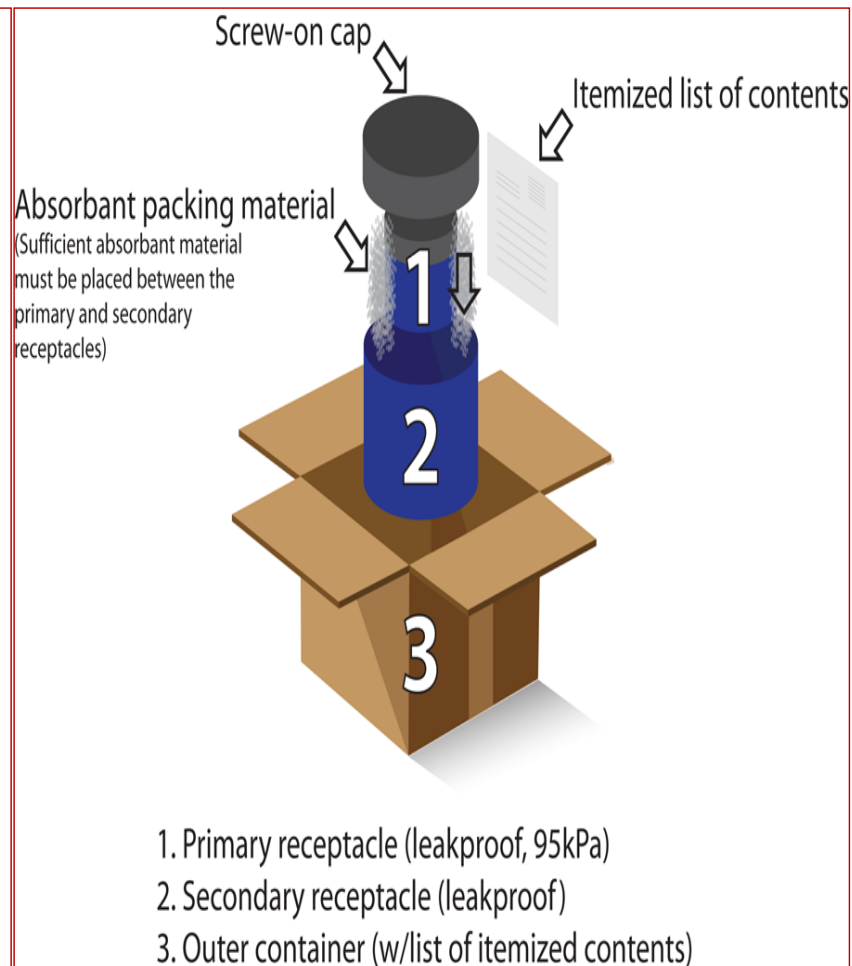
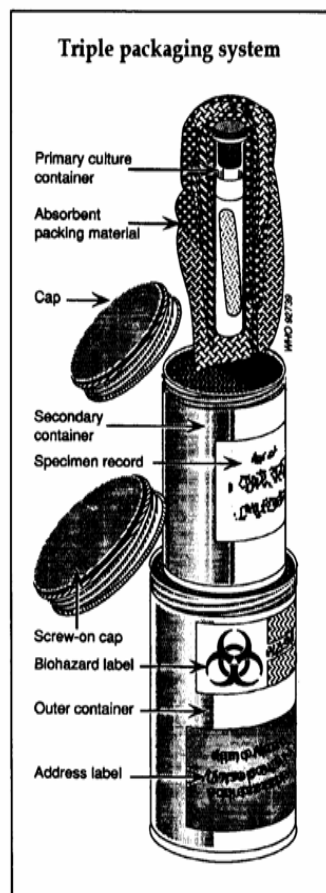
Packaging System

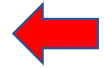
- The original samples should be packed, labeled and marked, and documented as Category B.
- Standard triple packing for Category B to be followed.
- Samples to be sent on dry ice (if possible). However using cold packs is acceptable.
- Sender should provide prior intimation about shipment of samples to the nearest certified laboratory.



Triple packaging system

Primary Container	Secondary Container	Outer Container/ Packaging Box
• Watertight and leak proof • Cap correctly and securely closed. • Keep in upright position during transport	• Watertight • Several clinical specimens may be placed into one secondary container • Containers have to be cleansed and disinfected if they are to be re-used E.g.: Disposable, zip-lock plastic bags; Large centrifuge tubes (50 ml) with screw caps	• Made of strong material that can be cleansed and disinfected • Should have the Biohazard warning label • A content list in a sealed plastic bag inside the transport box may also be included





Labeling of Package

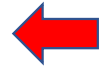
- Sender's, name, address and telephone number
- Whom to contact in case of emergency with telephone number
- Receiver's name, address and telephone number
- Proper shipping name (e.g. "BIOLOGICAL SUBSTANCE, CATEGORY B")
- UN number e.g. 3373
- Temperature storage requirements
- Quantity of dry ice inside the container
- Arrow mark to indicate upright direction





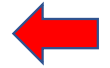
Transport Precautions

- Adequate cushioning materials inside the box to absorb shocks during transport
- Adequate absorbing material to absorb any spillage should it occur
- Do not stick the request form on the specimen
- Specimen request forms should be put into a separate plastic bag
- The outer container, secondary containers and specimen racks for transport should be thoroughly cleansed and disinfected periodically (i.e. at least daily) and when contaminated.



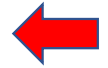
Responsibility of Sender

- Make advance arrangements with the person who is going to transport the samples
 - Transport of sample should be undertaken by the most direct routing
- Ensure all request forms are appropriately filled
- Notify the receiver in advance of transportation arrangements and expected time of delivery of samples to laboratory



Responsibility of Receiver

- Acknowledge receipt of specimen
- Verify the integrity of packaging
- Box to be opened by personnel wearing adequate PPE
- Open within Biosafety cabinet
- Check the specimens with the data sent
- Apply acceptance and rejection criteria



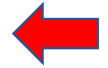
Tests for SARS CoV-2

- No validated serological tests are available
- Only Molecular tests available
- Laboratory protocols designed on the basis of NIV pune and ICMR guidance
- First line screening assay: E gene.
- Confirmatory assays: RdRp and ORF 1b.
- • SoPs and testing protocol as per NIV testing laboratory



Transport of routine blood samples (e.g. biochemistry and haematology tests)

- Well labelled samples for blood investigations shall be sent in double transparent zip lock pouches
- Sample requisition form shall be placed inside the pouch in a way so that patient details are clearly visible from outside without opening the pouch
- All laboratories shall maintain separate register and enter the patient and specimen details without removing the requisition form from the pouch
- All test reports shall be sent through new forms in the laboratory
- Standard precautions as per HIV specimens (NACO guidelines) to be followed.
- In case of suspected exposure, COVID exposure protocol mentioned elsewhere to be followed



Tests for SARS CoV-2

- No validated serological tests are available
- Only Molecular tests available
- Laboratory protocols designed on the basis of NIV pune and ICMR guidance
- First line screening assay: E gene.
- Confirmatory assays: RdRp and ORF 1b.
- SoPs and testing protocol as per NIV testing laboratory



Dead body management – At Patient care unit

- Dead bodies do not transmit disease
- Only the lungs of patients, if handled improperly during an autopsy, can be infectious
- However, Standard infection prevention control practices should be followed at all times. These include:
 1. Hand hygiene
 2. Use of personal protective equipment (e.g., water resistant apron, gloves, masks, eyewear)
 3. Safe handling of sharps.
 4. Disinfect bag housing dead body; instruments and devices used on the patient with 1% hypochlorite
 5. Disinfect linen.
 6. Clean and disinfect environmental surfaces.



Dead body management – Patient care unit

Recommendations

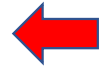
- Dead body to be placed in leak-proof plastic body bag
- If the family of the patient wishes to view the body, may be allowed to do so with the application of Standard Precautions after due permission of hospital authorities
- Embalming of dead body should **not** be allowed to avoid excessive handling
- Autopsies should be **avoided as much as possible**
- Either cremation or cuffing depending up on the religious practice; however cremation is more advisable



Dead body management – Patient care unit

Removal of the body from the isolation room or area

- Healthcare worker attending to the dead body should perform hand hygiene, ensure proper use of PPE (water resistant apron, goggles, N95 mask, gloves)
- All tubes, drains and catheters on the dead body should be removed
- Any puncture holes or wounds (resulting from removal of catheter, drains, tubes, or otherwise) should be **disinfected with 1% hypochlorite and dressed with impermeable material**
- Apply caution while handling sharps such as intravenous catheters and other sharp devices. They should be disposed into a sharps container
- **Plug Oral, nasal orifices of the dead body to prevent leakage of body fluids**
- If the family of the patient wishes to view the body at the time of removal from the isolation room or area, they may be allowed to do so with the application of Standard Precautions
- Place the dead body in leak-proof plastic body bag
- **Exterior of the body bag can be decontaminated with 1% hypochlorite**



Dead body management – At Patient care unit

- Body bag can be wrapped with a mortuary sheet or sheet provided by the family members
- Body will be either **handed over to the relatives** or taken to mortuary
- All used/ soiled linen should be handled with standard precautions, put in biohazard bag and the outer surface of the bag disinfected with hypochlorite solution
- Used equipment should be autoclaved or decontaminated with disinfectant solutions
- All medical waste must be handled and disposed of in accordance with Biomedical waste management rules
- The health staff who handled the body will remove personal protective equipment and will perform hand hygiene
- Provide counseling to the family members and respect their sentiments



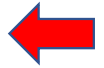
Dead body management – In Mortuary

- Mortuary staff handling COVID dead body should observe standard precautions.
- Dead bodies should be stored in cold chambers maintained at approximately 4°C.
- Mortuary must be kept clean. Environmental surfaces, instruments and transport trolleys should be properly disinfected with **1% Hypochlorite solution**
- After removing the body, the chamber door, handles and floor should be cleaned with **sodium hypochlorite 1% solution**



Autopsies on COVID-19 dead bodies

- If autopsy is to be performed, following infection prevention control practices should be adopted:
 1. Team should be well trained in infection prevention control practices
 2. Number of forensic experts and support staff in the autopsy room should be limited.
 3. Team should use full complement of PPE
 4. Round ended scissors should be used or any other heavy duty blades with blunted points to be used to reduce prick injuries
 5. Only one body cavity at a time should be dissected
 6. Negative pressure to be maintained in mortuary
 7. Reduce aerosol generation during autopsy , especially while handling lung tissue
 8. After the procedure, body should be disinfected with 1% Sodium Hypochlorite and placed in a body bag, the exterior of which will again be decontaminated with 1% Sodium Hypochlorite solution
 9. The body thereafter can be handed over to the relatives.
 10. Autopsy table to be disinfected



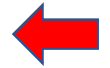
Dead body management – *Transportation*

- Personnel handling the body may follow standard precautions (surgical mask, gloves).
- Vehicle, after the transfer of the body to cremation/ burial staff, will be decontaminated with 1% Sodium Hypochlorite



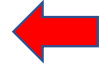
Dead body management – *At the crematorium/ Burial Ground*

- The staff will practice standard precautions of hand hygiene, use of masks and gloves
- Viewing of the dead body **by unzipping the face end of the body bag** (by the staff using standard precautions) may be allowed, for the relatives to see the body for one last time.
- Religious rituals such as reading from religious scripts, sprinkling holy water and any other last rites that does not require touching of the body can be allowed
- **Bathing, kissing, hugging, etc. of the dead body should not be allowed**
- The funeral/ burial staff and family members should perform hand hygiene after cremation/ burial
- The ash does not pose any risk and can be collected to perform the last rites
- Large gathering at the crematorium/ burial ground should be avoided as a social distancing measure as it is possible that close family contacts may be symptomatic and/ or shedding the virus.



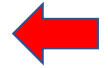
Upkeep of Medical Records

- No records to be collected by MRD personnel
- All records to be retained at COVID patient care units
- Final disposal/transport process to be updated soon



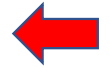
Engineering controls

- At the minimum following should be ensured:
 - Adequate power back must be ensured with response time log for power back up
 - Ventilation should be provided through dedicated HVAC system for each patient care unit (separate AHU for patient care areas and non-clinical areas) with
 - Temperature range of 18-24degrees
 - Humidity 55-60%
 - ACH of 10-12 ACH/hr
 - All recirculated air must come through HEPA filters
 - All pre-filters to be checked weekly and logged
 - Uninterrupted potable water supply to be available
- Medical Gas Pipe line System
 - All patient care units must have piped supply of Medical oxygen, Medical Air and Vacuum
 - Portable cylinders are hazardous, can carry infections - must be avoided.



Key to success

- Keeping calm
- Team building
- Constant training and updates
- Ensure supplies
- Ensure dedicated area for suspected/confirmed COVID patients –
Must avoid mixing with other non-covid patients
- Ensure safety Healthcare Workers and their families
 - Infected HCWs means more reduction of already scarce manpower



Important sites

- ICMR - <https://icmr.nic.in/node/39071>
- MoHFW - <https://www.mohfw.gov.in>