

**PROTOCOL FOR HAEMODIALYSIS UNIT IN COVID 19 PANDEMIC**

**SAFETY OF HEALTH CARE WORKERS AND PATIENTS DURING  
HAEMODIALYSIS IN COVID 19 PANDEMIC IN DIALYSIS UNIT**



**DEPARTMENT OF NEPHROLOGY  
POSTGRADUATE INSTITUTE OF MEDICAL EDUCATION AND RESEARCH  
CHANDIGARH  
INDIA**

**SAFETY OF HEALTH CARE WORKERS AND PATIENTS DURING  
HAEMODIALYSIS IN COVID 19 PANDEMIC**

**CONTENTS**

<b>S NO</b>	<b>TITLE</b>	<b>PAGE NUMBERS</b>
	Abbreviations	3
1	Definitions: standard vs universal precautions	4-5
2	SARI scoring	6
3	General principles for HCWs in dialysis unit	7-11
4	Main haemodialysis unit: Standard/universal precautions	12-16
5	Risk stratification of HCW after inadvertent exposure	17-18
6	Suspected COVID 19 patient and dialysis	19-21
7	RRT for AKI in COVID patient	22-23
8	PPE checklist	24
9	Donning and doffing	25-33
10	Other information	34-35

## ABBREVIATIONS

BMW	Bio medical waste
CKD	Chronic kidney disease
COVID	Novel coronavirus disease 2019
CVD	Cardiovascular disease
CXR	Chest X ray
DM	Diabetes Mellitus
HBV	Hepatitis B virus
HCV	Hepatitis C virus
HCW	Health care worker
HD	Haemodialysis
HDU	High dependency unit
HIV	Human immunodeficiency virus
ICU	Intensive care unit
IHD	Intermittent haemodialysis
PPE	Personal protection equipment
SARI	Severe acute respiratory illness
SOB	Shortness of breath
SLED	Sustained low efficiency dialysis
SR	Senior Resident

## 1. DEFINITIONS: STANDARD VS UNIVERSAL PRECAUTIONS

### Background

Contact transmission plays a major role in transmission of blood-borne pathogens like Human immunodeficiency virus (HIV), Hepatitis B virus (HBV) and Hepatitis C virus (HCV) in haemodialysis patients. The source of contamination may not be obvious and hence, universal precautions which include personal protective equipment (PPE) should be used meticulously for all suspected or confirmed cases of blood-borne infections.

### “Standard precautions”-What does this term mean?

Standard precautions are the basic level of infection control practices that are meant to reduce the risk of transmission of bloodborne and other pathogens amongst healthcare workers and patients. They should be used in for all patients.

### What do “standard precautions” comprise of?

Standard precautions comprise of the following:

1. Hand hygiene is a major component of standard precautions and one of the most effective methods to prevent transmission of pathogens associated with healthcare.
2. PPE use is guided by risk assessment (risk of infectivity of a pathogen) and the extent of contact between health care worker (HCW) and infected patient
3. Respiratory hygiene/cough etiquette is also included in “standard precautions” to contain the source of infection. This is to be used by both HCWs and patients. It includes:
  - a. Covering mouth and nose when coughing or sneezing
  - b. Hand hygiene after contact with respiratory secretions
  - c. Spatial separation of persons with acute febrile respiratory symptoms
4. Additional components of standard precautions for HCWs working at respective areas are as follows:
  - a. Prevention of needle-stick and other sharp instrument injuries
  - b. Environmental cleaning
  - c. Patient care equipment cleaning and disposal

d. Biomedical waste disposal (includes linen and clinical waste)

**“Universal precautions” - What does this term mean?**

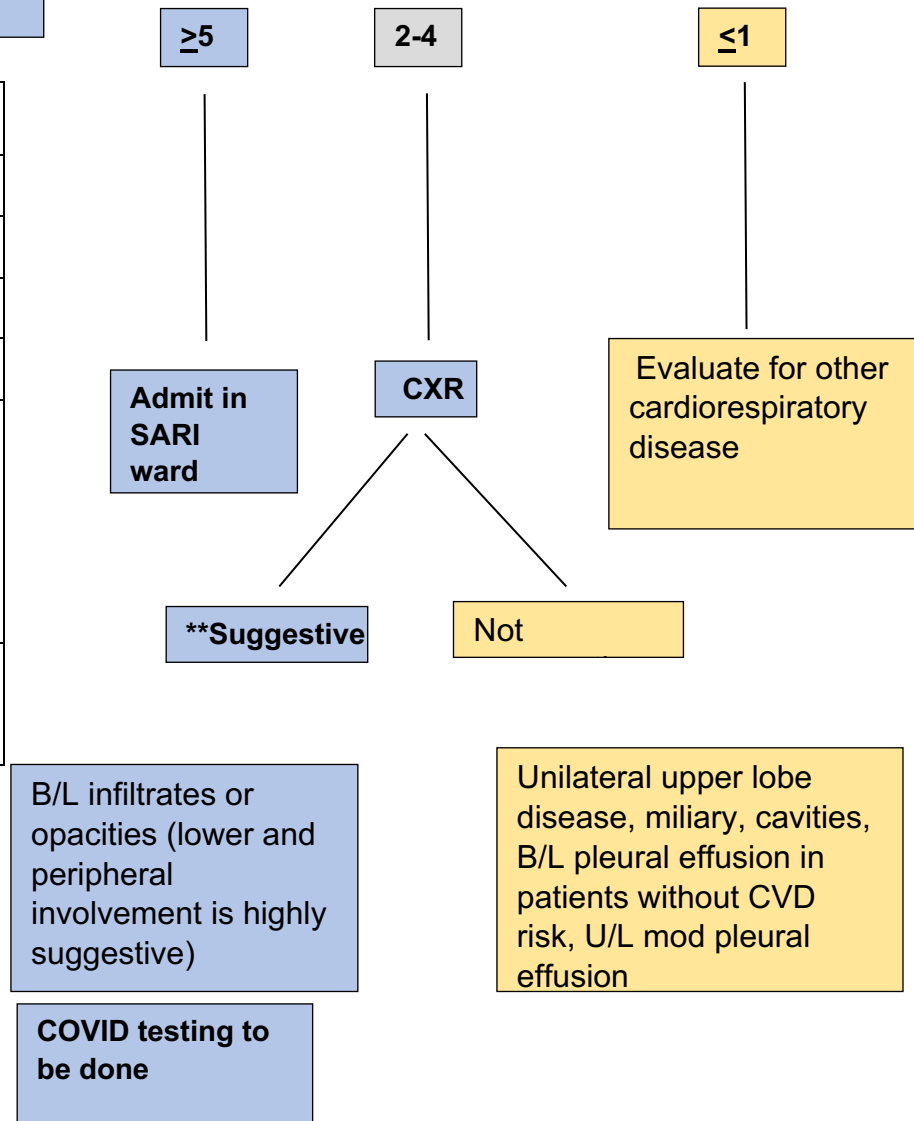
Universal precautions are intended to prevent parenteral, mucous membrane, and nonintact skin exposures of HCWs to bloodborne pathogens. Universal precautions apply to blood and other body fluids containing visible blood. Blood is the single most important source of HIV, HBV, and other bloodborne pathogens in the occupational setting. It includes all the steps of “standard precautions” excluding airborne and droplet precautions.

## 2. SEVERE ACUTE RESPIRATORY ILLNESS (SARI) SCORING

- In maintenance hemodialysis patient do not attribute breathlessness to fluid overload/ inadequate dialysis only
- Fever may not be there in uremic patients
- Infact majority of patients will have score of 5 or more (breathlessness, high risk, Chest X ray findings)

### SARI SCORING SCALE

Parameters	Scores
Fever	3
SOB	2
SpO <sub>2</sub> ≤95%	2
Cough	1
High Risk (age ≥60, pregnancy, DM, CVD, chronic lung ds, steroid use)	1
CXR suggestive** (if available)	3



### 3. GENERAL PRINCIPLES FOR HEALTH CARE WORKERS IN DIALYSIS UNIT

Healthcare worker's protection is most crucial. It needs some protective equipment and most importantly, discipline. A summary of this is as follows:

#### **Personal Protection Equipment (PPE): Components of PPE**

##### **A. Masks: types of masks/respirators**

<https://fastlifehacks.com/n95-vs-ffp/>

##### **1. Triple-layered surgical masks**

Surgical masks are three layered, with 2 sheets of “non-woven” fabric sandwiching a “melt-blown” layer in the middle. It's the melt-blown layer that provides the filtering capability. Only tested surgical masks according to standardized methods are reliable. Surgical masks lack proper face seal. However, previous research suggested no difference between surgical masks and N95 respirators in terms of acquiring influenza amongst HCWs. **N95 Respirators vs Medical Masks for Preventing Influenza Among Health Care Personnel: A Randomized Clinical Trial** *JAMA*. 2019;322(9):824-833. doi:10.1001/jama.2019.11645

##### **2. N95 (American standards)/FFP2 (filtering face piece- European standard) KN95 (Chinese standard)**

- a. These are respirators which have the ability to filter out 95% of all particles before the air is breathed in. Particles bigger than 0.3 micron are typically filtered out by N95 respirators. N95 respirators are shown to have higher efficiency and can filter out particles even smaller than 0.1 micron i.e. it can safely filter out SARS-CoV-2 which is 0.06-1.4 micron in size.
- b. Respirator with exhalation valve will decrease moisture retention, and decreases effort of breathing, but may potentially infect others if the HCW is infected, as exhaled air is not properly filtered
- c. Reuse after decontamination of N95 has been debated, without much consensus on safety standards.

So, it is suggested that HCWs must wear surgical masks (triple-layered), if not

N95 (in case of non-availability), during care of patients in dialysis unit. In case of anticipated aerosol generating procedures, it is must to properly wear N95 masks.

If available, N95 respirator should be worn as mentioned below:

1. It should be adequately sealed around nose and mouth for it to be effective
2. Do not touch the outer surface of the mask
3. Do not take it off and let it dangle around your neck. It can be harmful for you if you use it casually

#### **B. Gloves:**

1. Wear gloves when patient or body fluid/secretion contact is anticipated
2. Wear gloves while working on the HD machine
3. Wear clean non-sterile gloves for environmental or machine cleaning purposes
4. Sterile gloves should be used while performing invasive patient procedures
5. Do not touch other parts of PPE with gloved hands
6. Perform hand hygiene before and after removing gloves
7. Remove gloves after contact with a patient or surrounding using proper technique to avoid hand contamination- the gloved hand must not touch clean body parts anytime during removal
8. Reuse of gloves must not be done

#### **C. Eye protection:**

1. Eye protection in the form of goggles or face shield is important to prevent transmission through eye.
2. Snugly fitted goggles with anti-fog features to cover the corners of the eyes or face shield covering from crown to chin and to the point of ears on the sides should be used.
3. **Personal spectacles/glasses do not provide adequate eye protection**
4. Face shields and goggles can be reused after proper disinfection
5. Used devices should be disinfected with designated disinfectant like 70%



- alcohol, rinsed and allowed to dry before the next use
6. Gloves are to be worn while disinfecting these devices
  7. Each HCW should be assigned his/her eye protection device
  8. A labelled container for used devices should be available with the HCW so that he/she disinfects and wash before reuse.

**D. Gowns:**

1. Disposable impervious (body fluid/secretion resistant) gowns should be worn when fluid penetration is likely
2. Reusable cotton gowns which are clean can be used for other activities, if impervious gown is not available, you can wear disposable plastic apron beneath the cloth gown.
3. The torso should be covered, and long sleeves should fit the wrists snugly

**Disinfection of environmental surfaces:**

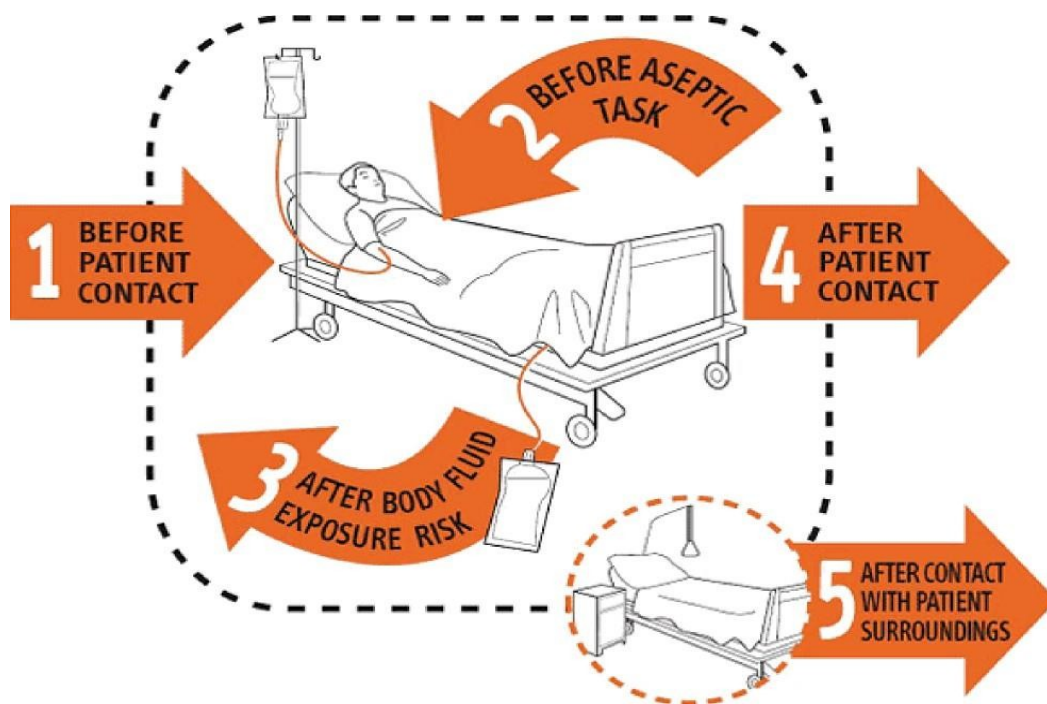
1. Clean and disinfect frequently touched surfaces at least thrice daily and after every shift.
2. (Frequently touched surfaces include dialysis machines, doorknobs, light switches, counter tops, handles, desks, phones, keyboards, toilets, faucets, and sinks etc.)
3. Solutions for disinfection should be composed either of 1% hypochlorite or alcohol for disinfection of surfaces.
4. The front of the HD machine should be cleaned with alcohol-based solution (not sodium hypochlorite).


**Fumigation of the dialysis unit daily overnight:**

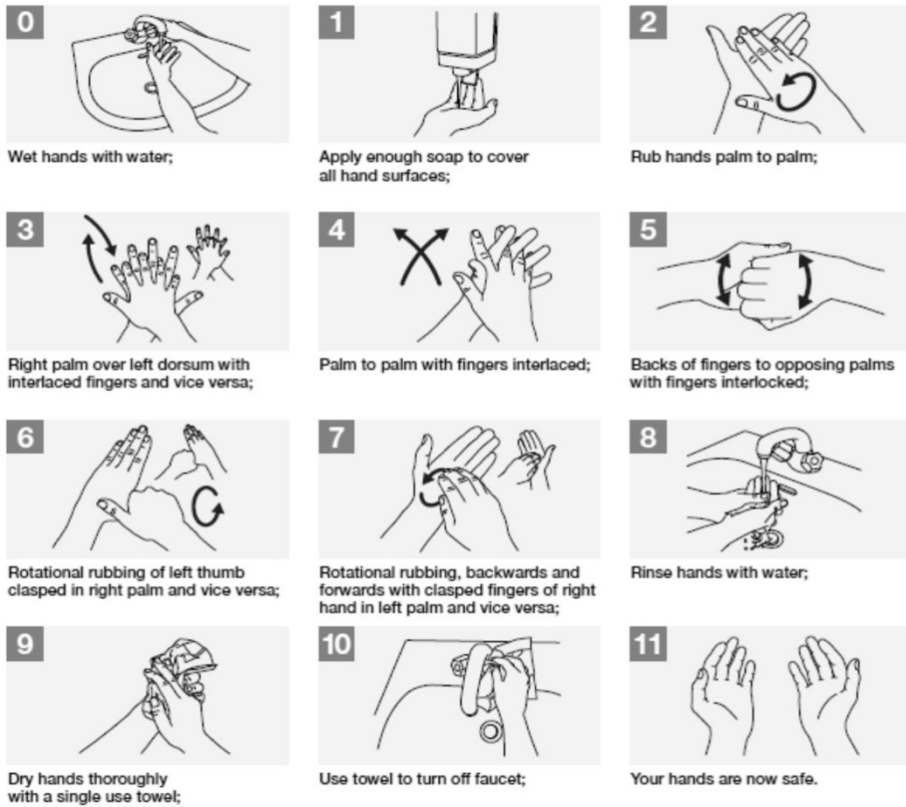
1. First, routine disinfection with 1% sodium hypochlorite, and then
2. Fumigation (using all precautions) with Ecoshield (complex formulation of stabilized 11% W/V hydrogen peroxide with 0.01% silver nitrate solution)
3. Leave the room and seal it for next 12 hours

## **Hand Hygiene:**

This is the backbone of infection control. Health Care Worker should perform hand hygiene using alcohol-based hand rub for 20 seconds or by washing with soap and water for at least 40 seconds. If hands are visibly soiled, use soap and water for hand wash. Hand washing should be done before and after using the bathroom, before and after eating /drinking, after coughing, blowing or sneezing, after touching garbage and the following moments of patient contact:



 Duration of the entire procedure: 40-60 seconds



For Hand Washing, steps can also be remembered by the mnemonic “**SUMAN K**”  
 “समन**K**”

• S-	Seedha	सीधा
• U -	Uita	उलटा
• M-	Mutti	मुट्ठी
• A-	Angoota	अंगठ्ठा
• N-	Naakhun	नाखनू
• K-	Kalai	कलाई

(Courtesy: Department of Virology, PGIMER, Chandigarh)

#### 4. **MAIN HAEMODIALYSIS UNIT: STANDARD / UNIVERSAL PRECAUTIONS**

##### **PATIENTS**

###### **Screening of patients**

1. Thorough screening at the entrance by nursing officer, in case of any doubt ask the patient to wait in waiting area, inform the senior resident and then he/she will take final decision with consultant whether patient to be wheeled in or labelled suspect, where in dialysis will be done in COVID isolation at night after the last shift.
2. COVID-19 symptoms Ø Fever (thermal screening) Ø History of contact with a diagnosed COVID-19 patient Ø History of recent travel or contact with person who has travelled recently?
3. Patient must wear a mask and ambulatory patients must wash their hands for 20 seconds in the screening area before going to their respective beds. Those who find it difficult to wash hands, kindly assist them in sanitizing their hands.
4. No food/meals to be taken inside the dialysis unit
5. One patient to be wheeled in at a time.
6. Sanitizer should be within reach of the patient

##### **DIALYSIS STAFF**

Inquire about new onset of flu like symptoms, fever and accordingly quarantine and request for COVID testing.

**All Nursing officers/technical officers who stay in main dialysis hall for duration of the duty and in screening area must take universal precautions and wear personal protective equipment-** Donning can be done in changing room. PPE will include the following:

1. Dialysis scrubs
2. Cap
3. Shoe cover
4. Gloves (disposable whenever touching surfaces or patient), Sterile gloves during connection/disconnection
5. Goggles or face shield (clean goggles with soap and water and sterillium). Face

shield frame to be cleaned with alcohol-based disinfectant. Face shield is locally made using a frame and plastic (over-head projector, OHP) sheets. After each use, dispose the OHP sheet and stick a new OHP sheet over the frame for next use. You can stick a new OHP sheet over the frame (these sheets will be given to you).

6. Gown
7. N-95mask

**Please follow complete instructions for N-95 mask. Once you wear N-95 mask, don't touch it with your hands, DO NOT remove N-95 mask and let it dangle from your neck on your shirt and wear again say while during or after tea etc. This is harmful for you. N-95 mask is useful, provided you use it properly. Masks should not be removed in the working area.**

1. Hand hygiene to be done frequently, clean with soap and water or use sanitizer- 60% alcohol based
2. Social distancing amongst dialysis team members (1 meter at least), remember talking loudly, forcefully or laughing is akin to aerosol generating procedure.
3. Patients to be instructed not to take food during dialysis: this is again aerosol producing act.
4. Trash can with yellow bag to be available next to patient's bed.
5. All surfaces to be cleaned with 1%hypochlorite (counters, tables, door handles, landline phone, light switches, weight measuring machine side handles), hand rests of wheelchairs, trolleys
6. Frequency of cleaning: every 3 hours and at the end of shift. WEAR GLOVES (clean disposable gloves) while cleaning and disinfecting and then discard them in yellow bucket with yellow bag. Wash hands with soap and water thoroughly after degloving.

## **IN BETWEEN TWO SHIFTS**

1. **Linen** to be put in red bucket which has 1% hypochlorite, let the linen soak for 20 minutes and then, send for laundry. **HD sets/trays** with instruments to be put in red bucket which has 1% hypochlorite, let them soak for 20 minutes and then to send for sterilization.
2. **HD machines:** Hot disinfection to be done (with citrosil), **HD machine surface** to be cleaned with 1% hypochlorite followed by mopping with dry cloth. **HD machine front screen to be cleaned with alcohol-based sanitizer.**
3. **Surface cleaning:** All surfaces to be cleaned with 1% hypochlorite (counters, tables, door handles, landline phone, light switches, weight measuring machine side handles/bars)
4. **Oxygen saturation probes and BP cuff to be cleaned with alcohol**
5. **Beds:** Clean beds with 1% hypochlorite
6. **Bins:** Clear all the bins
7. **Floor:** Mop with 1% hypochlorite.

**DOFFING STEPS: Once your duty is over (Doffing to be done in doffing area)**

Remove gown, inside out, touching inner surface. **Put your green cloth gown in red bucket containing 1% hypochlorite for at least 20 minutes, then it goes for**

**laundry**



Hand hygiene



Remove face shield put it in reusable bin red containing 1% hypochlorite, Face shield frame to be cleaned with sterilium, you can stick a new OHP sheet in the frame, these sheets will be given to you.



Hand hygiene



Remove cap, put in yellow bin for disposal



Hand hygiene



Remove shoe cover, put in yellow bin for disposal.



Hand hygiene



Remove gloves



Wear fresh pair of gloves



Hand hygiene



Remove N-95 mask, be careful in taking off N-95 mask, remove lower strap first, bend forwards, remove upper strap and throw it in dustbin)



Remove gloves followed by hand hygiene

**Practice these and tell others**

**Cough etiquette: coughing/sneezing into your elbow, not your hands  
Leave your belongings in locker (this is tough but doable)**

**Frequent hand washings**

**Patient wearing surgical mask- significantly decreases infection risk**

In case of no aerosol generating procedure, provided patient is wearing triple layer surgical mask and HCW is wearing PPE as described above, HCW falls in Low Risk category, thus no quarantine is required

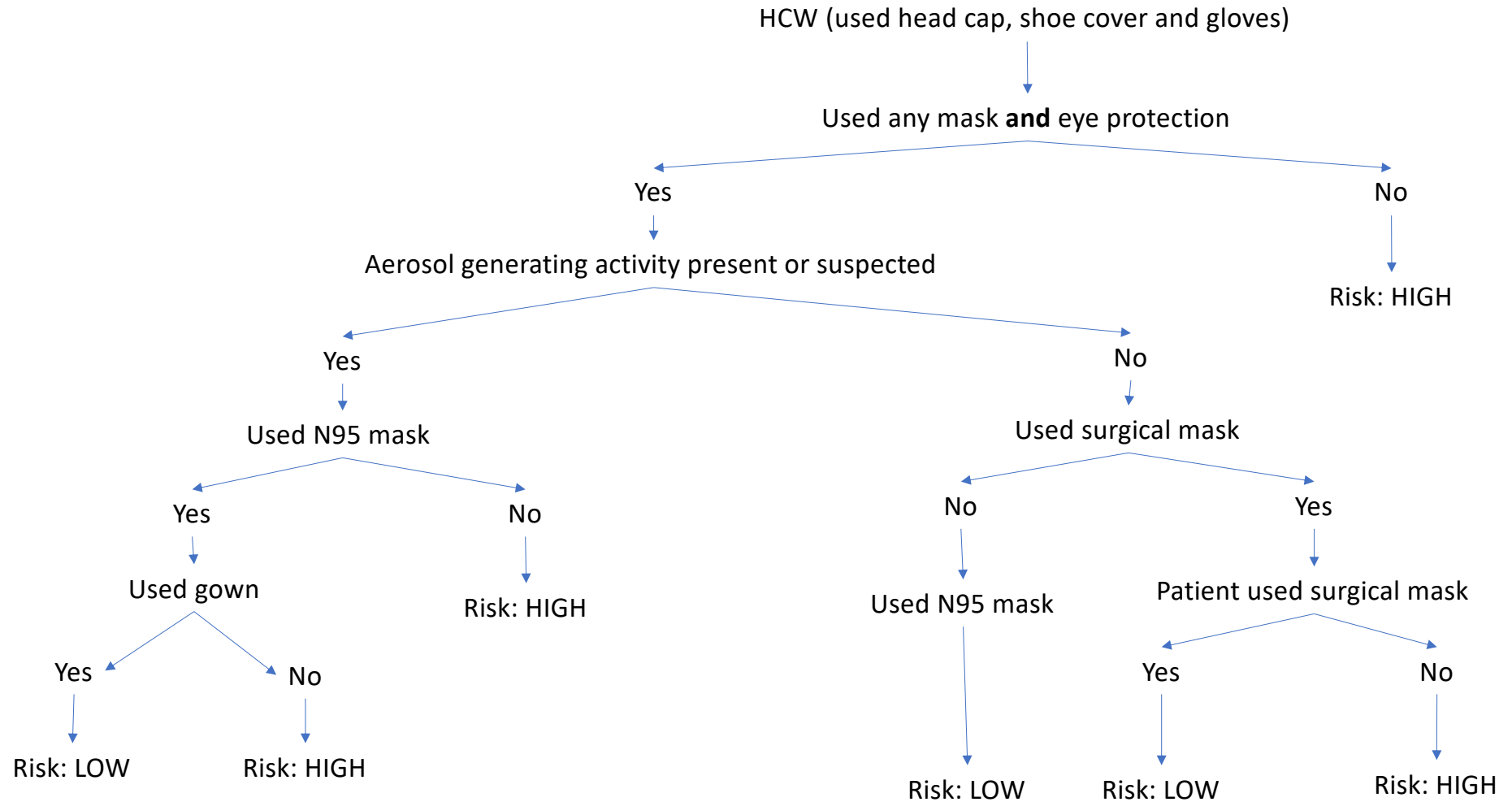
Patient not wearing surgical mask-

Covering all mucosal surfaces i.e. eyes, nose and mouth is must to prevent transmission of infection for the HCW irrespective of aerosol generating procedure



## 5. RISK STRATIFICATION OF HCW AFTER INADVERTENT EXPOSURE

**Clinical Situation:** Patient received dialysis but was later found to be COVID 19 positive



**Action:** If risk category

1. **Low:** Self-monitor for temperature and symptoms, no quarantine
2. **High:** Monitor for symptoms and test on day 5 and 14, quarantine for 14 days

**Please note the following:**

1. Aerosols are air-borne infectious particles which are small typically less than 5 micron in size) which remain suspended in the air for long periods; Aerosol generating activities include coughing, sneezing, endotracheal intubation, cardiopulmonary resuscitation, extubation, suction of respiratory secretions, etc. which involve handling respiratory secretions.
2. If aerosol generating procedure is there, then N 95 mask (properly sealed), eye protection, gown are crucial
3. HCWs in “low risk” category will not require work restrictions and can continue with self-monitoring which includes temperature check twice a day and monitoring for symptoms such as cough, sore throat, difficulty in breathing, etc.
4. Testing on day 5 and 14 would be based on the common hospital administrative protocol
5. During patient care, gloves are important to prevent transmission through fomite (especially when possibility of respiratory secretions contaminating body or clothing is high)

## 6. **SUSPECTED COVID PATIENT AND DIALYSIS**

**CONSIDER ALL SUSPECTED PATIENTS AS COVID POSITIVE UNLESS PROVEN OTHERWISE. TAKE ALL THE PRECAUTIONS LISTED BELOW. If the dialysis/ward resident or consultant have any suspicion, consider patient as COVID positive even when the Infectious Disease team has not categorized him as suspected case of COVID.**

**Majority of such dialysis patients will be suspected ones as COVID positive will be shifted to dedicated COVID hospital, Nehru hospital extension.**

For suspected patients try to provide RRT at point of care (in ICUs/HDU). In some suspected patients, HD may have to be provided in main dialysis unit

In the main dialysis unit, dialysis will be done after the last shift around 8.30PM onwards when no other patient is there in the unit. Haemodialysis will be done in designated COVID isolation room. **Procedure room has been converted to COVID 19 isolation room.**

**Resident/Nursing/technical officer/sanitation attendant have to wear scrubs provided to them and keep their mobile phones/personal items in the lockers provided to them.**

Step1: The resident on call will inform the dialysis resident (D1) about dialysis of diagnosed or suspected patient.

Step 2: The D1 will inform the nursing officer and the technical officer on duty immediately.

Step 3: The technical officer/nursing officer will again confirm the patient.

Step 4: The resident on call will inform call D1 and give the following details- time to shift the patient, anticoagulation requirement and ultrafiltration goal.

Step 5: Upon starting of shifting- the SR will once again call the D1 and inform.

**Step 6:** D1 along with technical officer/nursing officer- will ensure sanitation of the passage to the dialysis room, with all the doors open so that patient can be wheeled in the COVID isolation room straight away. The dialysis machine will be set in order with the dialyser connected, primed and heparin connected. Also, the nursing officer will keep the emergency drugs like adrenaline, noradrenaline in saline (500ml), avil and hydrocortisone ready. Check the disposable trash is ready with double cover (foot-operated). The nursing officer will don the PPE in the scrub area of isolation room (steps mentioned in Donning of PPE... PLEASE SEE THAT, see the video also) will enter the isolation from the side door and then enter COVID isolation from the sliding door adjacent to scrub station. The resident will follow the same. Keep a ringing bell and check its function. Dialysis machine, portable RO should be ready.

Step7: The patient will be shifted directly to the isolation through the cleared passage (Step 6) there will be nobody in the passage (Please ensure step 6 before this again) **CLOSE THE DOOR OF COVID ISOLATION ROOM.**

Step 8: The resident will proceed with dialysis access (double lumen femoral vein catheter) and start dialysis.

Step9: Once the dialysis is over, please close the circuit and leave the DL catheter in- situ with heparin and adequate dressing.

Step 9a: Syringes, needles, dialyser, tubing and any other surgical/ medical waste to be put in yellow bucket which has double yellow waste bags. Linen has to be put in perforated bags in a red bucket with which has 1% bleach at least for 30 mts. Both these bins will be in isolation room.

Step 10: Please ring the bell. The security will be alerted, and he will call the standby resident (Dialysis number 2 or on-call SR). He will ensure the sanitation of the passage till lift is done.

Step 11: Once all clear message is given, OPEN THE DOOR, SHIFT THE PATIENT OUT ON PATIENTS' TOLLEY. From there patient will be taken by concerned ward attendant wearing PPE.

Step 12: Machine disinfection: hot chemical disinfection with citrosil to be done. Portable RO should be properly disinfected with hypochlorite (1% Sodium Hypochlorite).

Step 13: The resident will then go the doffing area (which is waiting room no 2, old kidney biopsy area). Doffing steps have been listed below separately. A video of the same has also been circulated to all. After doffing staff will exit from the door towards artificial kidney unit ward and go to artificial kidney unit ward shower room.

***Do not shake dirty laundry. This will minimize the possibility of dispersing virus through the air.***

Step14: The sanitation attendant with PPE will come and firstly take the biomedical waste to the rear end of dialysis unit and keep it in area demarcated by red line. He will move in corridor only between the 2 green lines which are the colour of tiles (Nursing officer to make SA familiar with the route and his movements). Subsequently he will clean the room with 1% bleach (trolleys, beds, floor, wall) under the supervision of nursing officer. In addition to the procedure room, the "unclean area" the whole corridor of dialysis unit and corridor till entrance to Nephrology department has to be cleaned with 1% bleach

Step 15: After cleaning he will doff his PPE in doffing room and leave the room from the door which opens towards artificial kidney unit ward corridor.

Step 16: The nursing officer will call the hospital sanitation attendant for disposal of the trash by incineration.

**Bio medical waste disposal incharge: Ms Meena Dutta, Phone: 7087008640**

## 7. RENAL REPLACEMENT THERAPY (RRT) FOR AKI IN COVID PATIENT

**Place: COVID ICU: Follow the arrows of clean area and enter donning room, Don PPE and then go to ICU**

**Type of RRT: SLED/IHD**

1. **Indication:** Practice indication dialysis and not preemptive or early dialysis. Volume status is vital, so need to factor the USG of the lungs and IVC while considering for renal replacement therapy.
2. **Modality:** SLED/intermittent hemodialysis will be offered to the patients, with a blood flow rate of at least 200 ml/min and a dialysate flow rate of at least 200-300 ml/min.
3. **Vascular access:** Double lumen femoral catheter. Do not remove the catheter post-dialysis. Initiate anticoagulation with UFH 5000 units SC twice daily if there are no contraindications (standard) (**as COVID is hypercoagulable state**), so that there is no thrombus formation at the in-situ catheter site. Ensure the flushing of catheter hub with heparin at the termination of dialysis.
4. **Priming:** Saline priming if the patient is hypotensive and prime with PRBC transfusion if hemoglobin < 7g/dl. In case of a patient on inotrope, increase the dose of the inotrope or add an additional agent (if the therapeutic dose of the first inotrope reached) before commencing dialysis. In the case of borderline BP, it may be prudent to add low-dose NA, so that we have a secure hemodynamic status during dialysis.
5. **UF target:** Keep a low UF target of 250 ml/hour (preferable, but never > 500 ml/hour) and then titrate based on the hemodynamic stability. In the case of aggressive UF, we may end up giving more fluids due to the consequential ultrafiltration related hypotension.
6. **Anticoagulation:** Prior to deciding on dialysis, it is advisable to know the fresh coagulation profile. Based on the coagulation profile and bleeding status of the patient, decide the anticoagulation dosing (standard or tight heparin infusion).

7. **Frequency:** As the patients are relatively unstable daily evaluation is required, we may consider daily/alternate day dialysis for optimal fluid and acid-base management.
8. **Parenteral nutrition:** Patients may require parenteral nutrition, it is advisable to ask the treating COVID unit prior to initiation of dialysis, so that our UF targets can be optimized by increasing the duration of dialysis.
9. **Drug dosing post HD:** Please check on the antibiotic and other drugs, the patient is receiving, and append them post-dialysis by confirming from the update (software/website).

**8. PPE IN MAIN DIALYSIS HALL (UNSUSPECTED PATIENTS)**

Staff	Dialysis scrubs	Gloves	Cap	Mask	Visor/ Goggle	Gown	Shoe cover
HD staff in main hall	✓	✓	✓	N-95	✓	✓	✓
Screening officer	✓	✓	✓	N-95	✓	✓	✓

- Gown is reusable, to be dipped in hypochlorite 1% for 20 mts and then sent for laundry
- Visor frame can either be cleaned with ecoshield / alcohol based disinfectant or dipped in 1% hypochlorite and then let it dry. OHP sheet to be discarded and a new OHP sheet to be fixed in frame

**PPE IN ISOLATION ROOM FOR SUSPECTED PATIENTS AND IN COVID ICU**

Staff	Dialysis scrubs	Gloves (double)	Coverall/Hazmat suit	Cap	Mask	Visor and goggles	Impervious gown	Shoe cover
HD technical/nursing officer/senior resident	✓	✓	✓	✓	N-95	✓	✓	✓
Sanitation attendant/hospital attendant	✓	✓	✓	✓	N-95	✓	✓	✓



## 9. DONNING & DOFFING

### DONNING

1. The HCW must change into surgical scrubs in the changing room after eating/drinking/using washroom.
2. Keep personal belongings (phone, wallet, etc.) in a locker.
3. Remove your personal spectacles and keep in locker in case you wish to don the goggles.
4. Continues to wear your own pair of shoes and cover with a disposable shoe cover.
5. Lock the locker and keep the key with you in the pocket of your scrubs.

### Checklist in the donning area

1. Trained observer / "Buddy"
2. The first thing HCW is going to do: **inspect PPE** to make sure that all components (correct size) are present and laid out in proper order.
3. Trolley with all components of PPE
  - a. Disposable cap
  - b. Leg covers
  - c. Full body Hazmat suit/ Tyvek suit/ waterproof apron that is large enough to allow free movement and is fluid resistant
  - d. Disposable long sleeve surgical gown
  - e. N95respirator
  - f. Medical/Surgical mask
  - g. Surgical hood/ cap that covers all the hair, ears, and neck
  - h. Inner gloves (appropriate size surgical gloves) and Outer gloves that have an extended cuff
  - i. Goggles
  - j. A face shield that provides additional protection to the face, including skin and eyes
4. One Chair
5. Hand sanitizer

### **PPE Donning steps:**

1. The observer (buddy) will check that there are no holes in your surgical scrub, and you are not wearing any personal items: no rings/watches/jewellery/chain/necklace/wrist bands; and your nails are trimmed, no beard, head hair is tidy and not falling on face or neck.
2. Perform Hand Hygiene (Wash with soap and water)
3. Put on the **first pair of gloves (inner gloves)** after ensuring that hands are dry.
4. Put on the Full body Hazmat suit / Tyvek suit / water-proof apron and make sure that the inner gloves are tucked under the sleeves of the suit. While zipping, do not take zip all the way to the top- leave 1-2 inch unzipped, so that your hand does not touch your skin accidentally while unzipping during doffing. The observer can assist with wearing the suit. Place a strip of micro-pore circumferentially to tape the end of the Hazmat suit/ Tyvek suit sleeve to the glove, taking care to fold the end of the micropore strip on itself, to make it easy to remove during doffing.

**(Hazmat suits are now available in HD unit, we have waterproof apron and some Tyvek suits also, proven positive patient will have to be shifted to Nehru Hospital extension and dialysis will be done there)**

5. Sit on the chair and put on the **leg covers** and pull them up to your mid-calf. Tie the laces, ensuring they are easy to remove shoelace knots. Ensure your hand does not touch the floor accidentally while wearing the leg covers.
6. Perform hand hygiene with alcohol-based hand rub, as there is a chance that your hands can touch the floor accidentally.
7. Next, put on **N95 respirator**: Hold the open end of mask with straps facing towards face. The front portion of the mask should be in the cupped hand. Put the bottom strap first overhead and keep it below ears at back of neck. Top strap goes along the back of the head towards the crown of the head and check to make sure that there's a seal (**Seal check**: Expiring and inspiring against firmly pressed mask over face to assess leak. While inhaling the mask

- should move with respiration, while exhaling there should not be any air leak).
8. The next step is different depending on whether you are wearing goggles or face shield. If you wear spectacles and wish to continue wearing them, skip wearing the goggles, instead use face shield.
    - a. If you wish to remove the spectacles, you can remove it and wear the goggles. Do not wear the goggles over your pair of spectacles.
    - b. If you are wearing goggles: Put on the **goggles** over eyes and secure it to the head using headband. The goggles should cover the eyes and snugly fit over the face; the upper part of the N 95 respirator should be covered by the lower part of the goggles. The face shield should cover the front and sides of face, eyes, and should cross the chin.
    - c. If you plan to use face shield: there is nothing you need to do now, just go to the next step.
  9. Put on the **surgical hood** and pull it down to cover head, hair, neck, ears, forehead.
  10. If you had planned to use the face shield, now put on the **face shield**. Adjust the strap to fit your head shape. The face shield should cover the front and sides of face, eyes, and should cross the chin.
    - a. If you had already worn your goggles, go to the next step. **Do not wear face shield on top of goggles.**
  11. Put on the **disposable long sleeves terilenon permeable surgical gown** on top of the full body suit. Ensure the wrist band of the gown entirely covers and extends beyond the sleeves of the suit. The last item to be put on is the **second pair of gloves (outer gloves)** and make sure that the cuffs of the outer gloves are covering the sleeves of the second gown and staying tight.
  12. Now HCW will turn around so that observer can inspect and go through range-of-motion assessment, to make sure that HCW can move freely and comfortably. The observer is also going to make sure that all areas of the body are covered and there are no holes or tears.
  13. Now, before going to see a patient, HCW will disinfect his gloves with alcohol handrub.

**NOTE: ONE CAN PUT SIMPLE MEDICAL/SURGICAL MASK OVER AND ABOVE N95 RESPIRATOR.**

## **PPE DOFFING STEPS**

The PPE are potential source of infection to HCWs. Doffing is equally or more important than donning as **it is a high-risk activity** and to be done at the designated area with enough time (Don't rush for the doffing).

1. **Ensure presence of trainer/buddy.** The trained observer needs to wear full body gown, surgical mask, face shield, gloves, and shoe cover. The trained observer will help and guide HCW in safely doffing of the PPE step by step and discard it in appropriate biomedical waste bin. The trained observer will stand at a distance of 2 meters from the HCW.
2. **Switch on the exhaust fan and switch off ceiling fan/s** (including ceiling fans of adjacent rooms).
  - a. Before entering Doffing room from patient area, the HCW must be observed by the trained observer. HCW **first turns** around, and observer visually **inspects PPE** to see if it has visible contamination, cuts, or tears. And while doing this, observer should be in the doffing room at a safe distance (2 meters) from him/her. If alright, shouts "Everything looks fine". If there are any obvious signs of contamination, the HCW self-disinfects with disinfectant.
3. HCW performs **hand hygiene for disinfecting using** alcohol-based hand rub.
4. Remove **outer glove using "Glove in Glove" technique.** Peel off the outer glove of one hand touching only outer surface by thumb and index finger and keep the removed glove in the other hand. Now remove the second outer glove inserting one or two fingers inside it (not touching outer part) and discard both outer gloves in the **designated yellow BMW bag that will go for microwave/incineration.**
5. **Inspect inner gloves for any tear. If no tear is present perform hand hygiene using** alcohol-based hand rub. If a tear is identified, remove the inner gloves following same steps as removing the outer gloves and wear a new pair of gloves before proceeding to next step. Notice that HCW must perform hand hygiene after each step of removing PPE.

6. **Remove and discard outer disposable surgical gown:** after untying the knot (observer can also untie if knot is on back), pull the gown forward and away from the body to remove it from the top and roll from inside out and put in **yellow BMW bag that will go for microwave/incineration**. HCW performs **hand hygiene** using alcohol-based hand rub.
7. This step differs between those who are wearing a face shield versus goggles.
  - a. If wearing face shield: Remove **face shield** by bending forward. Avoid touching front surface of the face shield while removing. Hold it at the interface between the visor and the rear strap from both sides. Pull it over your head taking care that it falls away from your face. Put it in the plain **plastic bag that will go for ETO sterilisation**.
  - b. If wearing goggles: do not touch the goggles at this stage. They will be removed later. Proceed to next step.
8. Perform **hand hygiene** using alcohol-based handrub.
9. Remove **surgical hood:** Lean forward and grab top of the hood using one hand only and pull it forward over your head gently and gently place it in **autoclavable BMW bags**.
10. Perform **hand hygiene** using alcohol-based handrub.
11. HCWs wearing the leg cover will remove it before removing the Hazmat suit/ Tyvek suit/ waterproof apron.
  - a. **If you are wearing leg covers:** Now, sit down on the **Dirty chair** and carefully remove the **leg covers** touching only the inner aspect, and not touching its external surface or floor and fold or roll it in a bundle and put it in **autoclavable BMW bags**.
12. Perform **hand hygiene** using alcohol-based handrub.
13. Remove **full body Hazmat suit:** Unlock the buttons if any. If you are wearing a gum boot, you will have to pull the leg sleeves out of the gum boot first. Now, trace the zipper from bottom up using one finger, hold and pull it down using two fingers only to unzip completely (Preferably using mirror so that you will not touch your skin in neck area). You can take help of an assistant to remove it off your shoulders. Pull gown away from the neck and shoulders taking care that

you touch only the inside of the shoulders.

14. Remove the gown from inside out in the order of top body → the sleeves → hips → legs. Once your shoulders are free, remove it yourself if an assistant was helping you earlier.
15. Avoid sitting on the chair; do it only when you feel you cannot remove the Hazmat suit safely without risking a fall. Pick the suit from the floor and put it in the **autoclavable BMW bags**.
16. You will sit on the Clean chair now. Make sure both your feet still remain in the **Dirty area**.
  - a. **If you were wearing leg covers:** With your feet still in the **Dirty area**, carefully remove the **shoe covers one at a time, taking care that one leg does not touch the other leg while removing the shoe cover**.
  - b. Remove it while touching **outer surface** only, while leaving the covers outside the RED line and placing your feet with personal shoes inside the RED line. Place the shoe covers in the **yellow BMW bag that will go for microwave/incineration**.
17. As you remove them (shoe cover), make sure you place your feet in the clean area.
18. Perform **hand hygiene using** alcohol-based handrub.
19. Remove the **surgical cap** and discard in the biomedical disposable waste container.
20. Perform **hand hygiene** using alcohol-based handrub.
21. Remove the goggles and place them in the **large plastic bag that will go for ETO sterilisation**.
22. Perform **hand hygiene using** alcohol-based handrub.
23. Remove the **inner gloves** as before, using 'glove in glove' technique (**Beware! don't touch your face now**). Place the gloves in the **yellow BMW bags that will go for microwave/incineration**.
24. Perform **hand hygiene** on bare hands **using** alcohol-based handrub.
25. Wear a **new pair of gloves** (surgical glove / non-sterile latex glove)
26. Walk to the outside of the doffing area. HCWs who had worn leg covers

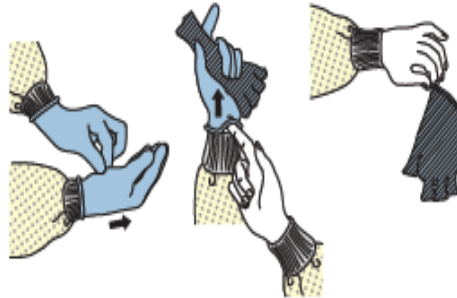
would be walking out with their personal shoes on.

27. Remove **N95 respirator** (*The N95 respirator shall be removed just outside the doffing area to minimize exposure to aerosols inside the doffing area*)—Ensure that you don't touch the front exposed surface of the mask. Remove it by leaning forward, keep face down, grasp first bottom strap and pull it off your head. Then grasp the top strap and pull it off your head in a slow and steady pace (to not generate aerosols) without touching the outer surface of mask. Ensure that mask stays away from your body at all times. Perform **hand hygiene using alcohol-based handrub** (alcohol handrub from another bottle from uncontaminated area poured by the observer).
28. **Disinfect your shoes or OT slippers**, taking care that you don't have contact with body parts. It is very important to disinfect the **soles** of the shoes/slippers as well. Use gauze soaked in 70% iso-propyl alcohol.
29. **Remove the final pair of gloves** as before using 'glove in glove' technique. Discard it in the **yellow BMW bag that will go for microwave/incineration**.
30. Perform **hand hygiene using alcohol-based hand rub** which is given by the observer
31. Final **inspection on surgical scrubs** (front and back) to see if there are any visible contamination, cuts, or tears is to be done by the observer.
32. Wear a surgical/medical mask.
33. Exit the doffing area after instructing the proper disposal of the biomedical waste generated.
34. Enter the shower room, remove your shoes and surgical scrub, take a shower and change to new clothes

## DOFFING

### 1. GLOVES

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



### 2. GOGGLES OR FACE SHIELD

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



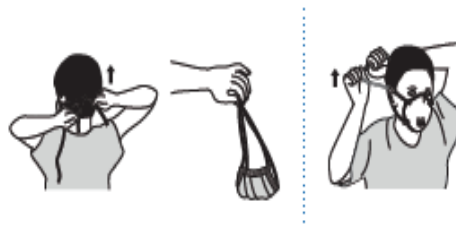
### 3. GOWN

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

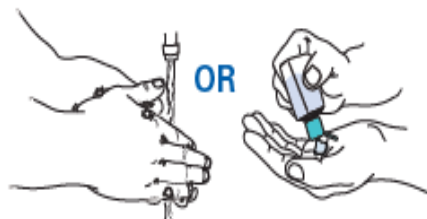


### 4. MASK OR RESPIRATOR

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



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





## 1. GOWN AND GLOVES

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



## 2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container

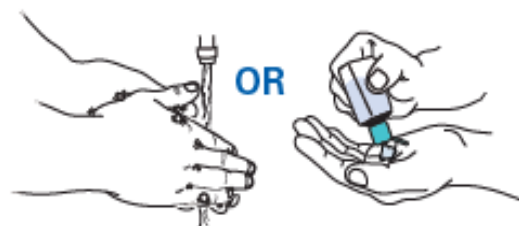


## 3. MASK OR RESPIRATOR

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



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



## 10. OTHER INFORMATION

### Infectious Disease Team Contact Numbers

1. Dr. Vikas Suri: 7087009683
2. Dr. A. Bhalla: 9417023973
3. Dr. Ritin Mohindra: 9818700713
4. Dr. Neeraj Singla: 9646121641

### Definitions:

#### Suspected Case of COVID-19:

1. A patient with acute respiratory illness (fever and at least one sign/symptom of respiratory disease (e.g., cough, shortness of breath), **AND** with no other etiology that fully explains the clinical presentation **AND** a history of travel to or residence in a country/area reporting high local transmission of COVID-19 disease during the 14 days prior to symptom onset.

**OR**

2. A patient/Health care worker with any acute respiratory illness **AND** having been in contact with a confirmed or probable COVID-19 case in the last 14 days prior to the onset of symptoms.

### Contact:

A person either:

1. Providing direct care without proper personal protective equipment (PPE) for COVID-19 patients, or
2. Staying in the same close environment of a COVID-19 patient (including workplace, classroom, household, gatherings), or
3. Traveling together in proximity (1 meter) with a symptomatic person who later tested positive for COVID-19.

## **References and acknowledgements**

1. Ministry of Health and Family Welfare, Government of India  
(<https://www.mohfw.gov.in/#site-advisories>)
2. Centers for Disease Control and Prevention, Atlanta, USA  
(<https://www.cdc.gov/coronavirus/2019-ncov/index.html>)

## **Controversies that need to be addresses in future**

1. Re-use of N-95 mask
2. Testing policies for dialysis patients and HCWs
3. Criteria and duration of quarantine for HCWs

## **For suggestions and queries, please contact**

Professor H S Kohli

Department of Nephrology

PGIMER, Chandigarh, India 160012

Email: [kohlihs2009@gmail.com](mailto:kohlihs2009@gmail.com)

Telephone No: 91-172-2756731

## **Disclaimer**

This document has been prepared by the Department of Nephrology at Postgraduate Institute for Medical Education and Research, Chandigarh, India for practical guidance and use in COVID-19 pandemic. As there are limited data to guide clinical decisions, resources are scarce and circumstances/resources vary in different regions/work areas, this document should be used keeping in mind these limitations. The contents and advice are subject to change without any notice.

## **Version**

V 2.0 dated April 30, 2020