

# Standard Operative Procedures of Imaging Departments amid Coronavirus Disease 2019 Pandemic

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## ABSTRACT

Radiology preparedness to fight the pandemic coronavirus disease 2019 (COVID-19) is a set of policies and procedures directly applicable to imaging departments designed to achieve sufficient capacity for continued operation during a health-care emergency of unprecedented proportions as it is evident from exponential rise in the cases worldwide and to provide support the care of patients with COVID-19. This standard operative procedure will also be helpful in maintaining the radiologic diagnostic and interventional services to the health system.

**Key words:** Coronavirus disease 2019, donning, doffing, protocols

## INTRODUCTION

Coronavirus disease 2019 (COVID-19) is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), previously known as 2019 novel coronavirus (2019-nCoV), a strain of coronavirus.<sup>[1,2]</sup> The first cases were seen in Wuhan, China, in December 2019 and now has spread across the globe and the WHO has officially recognized it as a pandemic on March 11, 2020.<sup>[1]</sup> India being the world's second most populous country, with more than 1.3 billion people is also affected by COVID-19 though infection rate in India remains low relative to population size but India has become the next global hotspot for virus cases.<sup>[3,4]</sup> The non-specific imaging findings are most commonly of atypical or organizing pneumonia, often with a bilateral, peripheral, and basal predominant distribution.<sup>[1,5]</sup> As uncertainty around the spread of COVID-19 continues, diagnostic imaging professionals are being called upon to scan an increasing number of patients who might have the viral infection.<sup>[1,6]</sup> This warrant radiology department preparedness is a set of standard operative procedures (SOPs) for various

imaging modalities keeping in view enormous population of the country like India with limited resources directly with a aim to achieve sufficient capacity for continued operation during a health-care emergency which may assume unprecedented proportions, to support the care of patients with COVID-19, and to maintain radiologic diagnostic and interventional support for the entirety of the hospital and health system.<sup>[1,2]</sup> The steps for radiology preparedness for COVID-19 will vary between institutions and clinics.<sup>[1]</sup>

We at tertiary care institute in the sub-Himalayan region in a rural set-up of India have developed a set of SOP in conjunction with infection control experts of the institute for the department of radiodiagnosis which can provide information to similar setup in the country and across the globe.

## DUTY ROSTER OF THE STAFF

Every staff member should be competent with standard infection control practices and use of appropriate personal

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protection equipment. The priority should be to ensure continuous and consistent practice to avoid staff fatigue or complacency that can otherwise easily result in lapses in infection control for which different roster of duties is made at all levels of staff with few health care worker (HCW) exposed at a time.

## SCREENING DESK

To screening desk at the departmental entrance which is manned by security personnel and/or departmental orderly having following protocol to follow.<sup>[1,7-10]</sup>

1. Limited access to department, only patient in case of mobile patient, single attendant with patient in case of sick patient
2. Patient and attendant should be covering his/her mouth and nose preferably with both mask and handkerchief
3. Sanitize the hands of patient with few drops of alcohol-based sanitizer/spirit
4. Patient and attendant to be instructed to leave the department immediately after radiological investigation and collect the report from the security desk after stipulated time as per instruction of the concerned imaging health personnel
5. Files of the patients which are a potential surface contaminant should have limited access in the department unless required/instructed.

## DONNING (PUTTING ON) AND DOFFING (TAKING OFF) OF PERSONNEL PROTECTIVE EQUIPMENT (PPE)

*Donning* and *doffing* *PPE* such as gloves, gown, mask/respirator (N95 mask), and goggles/face are explained appropriately in the illustrations [Figures 1 and 2] provided by the center of disease control and prevention (CDC), America.<sup>[10,11]</sup>

## USE OF RADIOGRAPHY AND CHEST COMPUTED TOMOGRAPHY (CT)

Imaging is reserved for only those cases where it will have an impact in the patient management and is clinically indicated or to evaluate for some unrelated emergency indications, in cases where an alternative diagnosis is being ruled out or being considered for acute symptom which is worsening. At present scenario in which rapid and accurate reverse transcription polymerase chain reaction (RT-PCR) testing, there is no need for immediate CT imaging. If symptom worsens and it is thought to be secondary to COVID-19, then too imaging

would not change management, as current treatment consist of supportive care only. The imaging should be performed at sites with less foot traffic and has fewer critically ill patients in that area to avoid secondary exposure to patient and staff. Portable imaging is being performed (both portable X-rays and portable ultrasonography [USG]) to meet out and lessen equipment, room, and hallway decontamination requirements.<sup>[1,12,13]</sup>

## SAFE SOP TO CONDUCT X-RAY IN COVID-19

We designate three radiographers R1, R2, and R3. As it is important for the radiographers conducting X-ray to prevent himself from the COVID-19 virus and also prevent gross contamination, so it is important to adopt safe technique.<sup>[1,12,14]</sup> One mobile X-ray machine should be designated and kept exclusively for COVID-19 patients and the machine should be covered with hospitals gowns, etc., and the tube covered with plastic with window/hole in plastic cover made for light passage and collimation.<sup>[13]</sup> We should also identify one cassette which should be used exclusively for conducting X-ray in isolation ward of COVID-19 patients through mobile X-ray machine.<sup>[12]</sup> The cassette should be covered with folded side opposite to tube side and fastened well with cello tape or sticking medical tape. The R1 takes this cassette to isolation ward, who will pass this cassette to another trained R2 to conduct X-ray. After conduction of X-ray, the cassette is taken to the entrance door of isolation ward and removes the cover, the waiting R1 takes the cassette without touching the cover but again covers the received cassette with another cover, the R3 in the department receives the cassette in the department and cleans with sterillium or other designated disinfectant from all sides and processed for clinical reading.<sup>[1,12,14]</sup> The same cassette is now kept separate and ready for next COVID-19 patient.<sup>[1,12]</sup>

## SAFE SOP TO CONDUCT CT IN COVID-19

Indications for conducting CT thorax in COVID-19 patient are as follows:<sup>[5,15]</sup>

- A suspected COVID-19 patient with typical symptom but with negative RT-PCR for confirmation of alternate diagnosis
- Confirmed COVID-19 patient with worsening of symptoms.

Ensure that before the patient arrives, the disinfectant/cleansing team informed, the CT room and waiting area are empty, no patient, attendant, or staff should be present there and the CT table covered with plastic cover and all HCW from radiographer to consultant wearing PPE. Designate two radiographers R1 and R2 who will be responsible for shifting



**Figure 1:** Illustration of donning (putting on) of personnel protective equipment of center of disease control and prevention America

and scanning of the patient. The clinical department HCW to ensure smooth transformation of patient, the patient should be wearing a mask with metallic articles removed from the patient's body. On patient arrival, R1 will be in the CT room and help transfer the patient. The R2 will remain in the console room only throughout the procedure. After positioning the patient, the R1 will exit the scan room. The R2 will perform the CT examination and will inform the R1 on completion. The R1 will open the gantry room and transfer the patient to the clinical HCW while the R2 and 3<sup>rd</sup> year resident will remain in console room only. The reporting is to be done by senior resident cross-checked by consultant in reporting room. The R1

will wipe the CT table, gantry, door knobs, etc., doff the PPE in proper manner and wash hands thoroughly. Meanwhile, the R1 will inform the disinfectant/cleansing team disinfects the area. After imaging, the room downtime is typically between 30 min and 1 h for room decontamination and passive air exchange.

## SAFE SOP TO CONDUCT USG IN COVID-19

In an attempt curb any nosocomial viral transmission, we follow the American institute of ultrasound in medicine guidelines which published following precautions:<sup>[1,14-16]</sup>



**Figure 2:** Illustration of doffing (taking off) of personnel protective equipment of center of disease control and prevention America

1. Sonographers with specific health conditions such as hypertension and diabetes that make them vulnerable to COVID-19 should have limited patient contact
2. Sonographers to have knowledge and training in infection control and PPE
3. Sonographers to spread out appointment times to avoid crowding in the waiting room, space waiting room seats at least 2 m apart, and undergo the entrance protocol of the department
4. Limit the access to the visitors in the examination room with the patient, including BSc students, interns, and postgraduate students
5. Assume every patient has COVID-19 unless proved otherwise, and clean and disinfect the equipment and room at the end of every clinic as per instructions
6. Sonographer to practice hand hygiene before and after every patient encounter, contact with potentially infectious material, and before and after donning and doffing of PPE. Use latex-free disposable gloves during the ultrasound examination, and change them after every patient
7. Perform scan with one hand on the transducer and one on the keyboard and machine controls. This helps avert any cross-contamination due to aerosols and particulate

- matter that can accumulate to the crevices of the keyboard
8. If scanning a patient in isolation on COVID-19 patient, donning of PPE is to be done before entering the room
  9. Sonographers should properly clean and decontaminate any reusable personal protective equipment. Wear surgical facemasks when in close contact with patients, and put them on before entering the care area. If N95 respirators or higher are available, use them in place of a facemask. Wear reusable or disposable eye protection. Put on clean, non-sterile gloves before entering the examination room, dispose of them when leaving the room, and perform hand hygiene immediately. Wear a clean isolation gown. Reusable gowns should be held in a dedicated container, and disposable ones must be discarded after use. If gowns are in short supply, prioritize them for aerosol-generating procedures and high-contact patient care activities.

## INSTRUCTION TO THE HCW DOING ANY IMAGING PROCEDURES IN NON-COVID-19 PATIENTS OR NON-COVID-19 SUSPECTS.<sup>[1,5-17]</sup>

- a. N95/two triple layered masks and gloves to be worn by HCW who are handling patients during image acquisition (X-ray, CT, USG, magnetic resonance imaging [MRI], etc.)
- b. No reporting to be done on requisition form which can be a potential surface contaminant and avoid touching the form/file brought by the patient/attendant/resident and the report (USG, CT, and MRI) of the patient to be written on new reporting sheet of the department
- c. USG probes to be cleaned after every 2 h or after 4–5 patients in routine in case of non-COVID patients
- d. In case of suspected exposure, the team on duty can isolate himself or herself in the separate room and can wait for laboratory reports of the suspect patient and to follow the protocol as per protocols in case of positive report of the suspect
- e. Donning and doffing videos of PPE and conduction of X-ray of COVID-19 patient are available in the departmental official social media platform and can be watched repeatedly and learned as in the present scenario every individual cannot be trained in-person.

## IMPLEMENTATION OF “SOCIAL DISTANCING” INSTRUCTIONS FOR STAFF, PGS, AND FACULTY.<sup>[1,5]</sup>

Avoid gatherings among the staff on duty with aim to decrease foot traffic in radiology rooms and have remote consultations by video and telephone rather than in-person.

## CENTRAL COORDINATION OF MESSAGING<sup>[1]</sup>

There should be central coordination of messaging (SMS, WhatsApp, telegram, etc.) between the HCW of the department, so there is proper flow of information of the COVID-19 patient or the suspect exposure to the departmental personnel and post-exposure measures to be taken by the individual and other members.

## CONCLUSION

The prevalence of COVID-19 cases in our institution's catchment area has increased in recent time so we have developed radiology-specific SOPs for safe imaging practice of patients by USG, CT, and X-ray, positioning of staff as per temporal separation, and reducing risk of nosocomial spread. The SOPs may be helpful to the imaging departments of India and globe.

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