

## **RADIOLOGY SERVICES GUIDELINES IN THE MANAGEMENT OF SUSPECTED, PROBABLE AND CONFIRMED COVID-19 PATIENTS**

### **1. INTRODUCTION**

- 1.1 The Radiology Department and its mobile imaging units are sites of high patient contact and thus must engage in meticulous infection control practices to prevent the transmission of the infectious organisms within the hospital.
- 1.2 Radiology staff need to understand the various routes of infection transmission and implement transmission-based precautions when necessary to protect patients and other staff. Infection control steps that are relevant to the Radiology Department include exercising proper contact precautions, performing adequate environmental cleaning, and ensuring staff adherence to infection control policies through education and monitoring.
- 1.3 Wherever possible, the imaging for suspected, probable and confirmed COVID-19 patients should be done with mobile units at bedside or designated location. Given that the COVID-19 virus continues to circulate in the community, there is a demand in the utilization of special radiological examination especially CT scan.
- 1.4 The Radiology Department will need to reorganize a new workflow to accommodate to this new demand to support the management of suspected, probable, and confirmed COVID-19 patients.

### **2. INFECTION PREVENTION & CONTROL (IPC) MEASURES DURING RADIOLOGICAL PROCEDURES**

#### **2.1 To limit exposure of staff and patient to COVID-19 infection:**

- 2.1.1 Training on infection prevention and control including appropriate personal protective equipment (PPE).
- 2.1.2 Point of entry screening of patient for elective cases.
- 2.1.3 Monitoring the well-being of radiology staff.
- 2.1.4 Hybrid working team to ensure sustainable radiology operation.
- 2.1.5 Skeleton (minimum number) staff to work per modality.

## **2.2 Implementing SOP for suspected, probable or confirmed COVID-19 patient**

- 2.2.1 The hospital authorities to recommend the flow of the patient from the ward to the Radiology Department.
- 2.2.2 The security guard must be involved in managing the patient flow.
- 2.2.3 All requests for radiological examinations shall be pre-registered prior to receiving the case.
- 2.2.4 The primary team staff shall call and inform the radiology personnel of the exam to be performed.
- 2.2.5 Wherever possible, the exam shall be performed in a designated location.
- 2.2.6 General radiography and ultrasound shall be done at the bedside to minimize patient movement.
- 2.2.7 For special examinations (CT/MRI/Angio), the suspected, probable, or confirmed COVID-19 patient shall be scheduled at a later part of the day after completion of non-infectious cases.

## **2.3 Reducing potential transmission from suspected, probable or confirmed COVID-19 patient**

- 2.3.1 Wherever possible, entry to the Radiology Department is preferably through a separate access.
- 2.3.2 Patient shall only be sent to the Radiology Department upon receiving a call from radiology staff to minimize contact time in the department.
- 2.3.3 Patient should be taken back from the Radiology Department to the respective wards as soon as the examination is completed.
- 2.3.4 Suspected, probable or confirmed COVID-19 patients should wear a surgical mask during transport in and out of the Radiology Department.
- 2.3.5 The radiology personnel shall take all necessary infection control precautions in accordance with the Infection Control guideline. They should wear appropriate PPE depending on the status of the patients with either airborne or droplets precautions.

- 2.3.6 The Radiology personnel in charge of modality shall allow sufficient downtime for disinfection of equipment in between the cases.
- 2.3.7 Disinfection of CT scanner gantries, MRI gantries, angiography machines, ultrasound machine including probes, blood pressure cuffs, the image viewing station mouse and keyboards, and other tools after every contact with suspected, probable, or confirmed COVID-19 patients shall be carried out. The Radiology Department staff should contact vendors to identify the best disinfectant to be used for each piece of equipment.
- 2.3.8 The modalities used in the management of suspected, probable, or confirmed COVID-19 patients apart from general radiography depends on the availability of equipment at the local set up.
- 2.3.9 A multidisciplinary committee at the local level shall convene to outline the guidelines for radiology personnel to prevent the virus from spreading through human-to-human contact and from contact with departmental equipment.

### **3. SOP FOR PERFORMING RADIOLOGICAL PROCEDURES FOR SUSPECTED, PROBABLE AND CONFIRMED COVID-19 PATIENTS**

#### **3.1 Mobile X-Ray**

- Request is made either manually or online.
- The ward staff shall call and inform the imaging personnel of the examination to be performed.
- An appropriate time is determined for the examination to be carried out.

##### **3.1.1 Pre-examination Preparation**

###### **a. Registration**

- All request for radiological exam shall be pre-registered prior to receiving the patient.

###### **b. The Radiographer**

- The radiographers must abide to the precautions outlined by the Infection Control Guidelines on the necessary steps to limit COVID-19 transmission (it is recommended to have a core number of radiographers trained for this exercise).

- c. Lead gowns
  - To clean on both sides (front and back).
  - To be worn before the Radiographers wear their PPE.
- d. Mobile x-ray Machine
  - To clean the mobile x-ray machine especially its wheels.
- e. X-Ray cassette / detector
  - Clean on both sides (front and back).
  - Cover the cassette with two layers of disposable plastic bags.
- f. Anatomical Markers
  - Clean on both sides.
  - To place the anatomical marker onto the first/inner plastic layer.
- g. Donning of PPE
  - According to the type of precaution (as per recommended by ANNEX 8 Guidelines on IPC Measures in Managing Suspected, Probable or Confirmed COVID-19).
  - Donning at the designated area.

### 3.1.2 Performing the examination

The radiographer shall be assisted by a ward staff:

- To open the door/s if the patient is in a room.
- To position the patient for the x-ray examination.

### 3.1.3 Post examination

a. The radiographer shall be assisted by a ward staff:

- To remove the cassette/detector from under the patient.
- To remove the cassette/detector from the contaminated plastic bags (outer/second layer).
- To dispose the contaminated plastic bags into the yellow clinical waste bin.
- To open the exit door/s if the patient is in a room.

- b. Remove the outer layer gloves.
- c. Place cassette/detector at mobile machine or trolley.
  - i. Disinfect the mobile X-ray machine
    - To be done by the radiographers as per recommendation before doffing.
    - Performed at a designated area.
    - To wipe the mobile x-ray machine with disinfectant wipes or as per manufacturer's recommendation.
    - For wheels, to either roll over the sticky mat, use disinfectant spray or an alcohol-soaked cloth.
  - ii. Doffing of PPE.
  - iii. Remove the anatomical marker and disinfect anatomical marker.
  - iv. Remove the inner/first layer plastic cassette/detector cover.
  - v. Wipe the cassette/detector.
  - vi. Process the image.

### **3.2 Mobile Ultrasound**

- 3.2.1 The hospital authorities should assign or acquire one machine for mobile ultrasound examination purposes.
- 3.2.2 Pre-procedure machine preparation
  - a. Clean the ultrasound machine before and after the procedure.
  - b. It is advisable to especially cover the monitors, keyboard and/or touch screen with a transparent plastic sheet.
  - c. Cover the ultrasound probe.
- 3.2.3 Performing examination
  - a. Donning of PPE in pairs before performing the examination.
  - b. Print images (if required) at clean area.

### 3.2.4 Post Procedure

- a. Remove the probe cover, keyboard cover, monitor cover, outer layer apron and then outer layer glove (in this sequence).
- b. For wheels, to either roll over the sticky mat, use disinfectant spray or an alcohol-soaked cloth.
- c. Doffing of PPE at designated area.

## 3.3 Special Examinations (CT/MRI)

### 3.3.1 Pre-procedure

- a. Receive order of examination either online or manual.
- b. Cases shall be scheduled at a later part of the day preferably after completion of elective list except in emergency cases.
- c. Wherever possible, use a separate access route to the department.
- d. The case shall be pre-registered before being called.
- e. Accepting Radiology doctor to inform Radiographer in Charge.
- f. The patient shall only be sent to the examination after being called by the radiology personnel to minimize contact time in Radiology Department.
- g. The Radiographer in charge to inform the following:
  - i. Ward (time of procedure and accompanying personnel)
  - ii. Security guard to clear and mark the designated pathway
  - iii. Hospital concession company for terminal cleaning
- h. Provide good ventilation (i.e. open doors and windows) if the examination room is not under negative pressure.
- i. Accompanying staff should wear appropriate PPE (as per ANNEX 8 on IPC Measures in Managing Suspected, Probable or Confirmed COVID-19).
- j. Radiology preparation
  - i. Staff: Two Radiographers (one in clean and one in contaminated area), one Medical Officer, and one Radiologist.
  - ii. Remove non-essential equipment from the examination room.

iii. To cover the contact surfaces of equipment in the examination room with a plastic cover or sheet (contact surfaces includes gantry control panel, monitor, contrast injector and examination couch).

k. To load IV contrast media into injector before patient's arrival (if needed).

l. Radiographer in clean area to call ward to send patient.

m. Patient to use designated route/lift to radiology department.

n. Check and verify patient preparation / consent.

o. Recheck blood results, last meal, allergy etc.

p. Check patient's particulars and consent given if appropriate.

### 3.3.2 Performing procedure

a. To perform as per protocol.

b. If IV contrast is required, the radiology doctor must check IV-line patency and wear the appropriate PPE (as per ANNEX 8 Guidelines on IPC Measures in Managing Suspected, Probable or Confirmed COVID-19).

c. Accompanying staff to assist in patient transfer.

### 3.3.3. Post Procedure

a. To monitor patient in angio suite for complications and manage if present, prior to transfer back to the ward.

b. Radiographer in clean area to inform security guard that the patient is returning to the ward.

c. If the case requires contrast injection, the radiographer in contaminated area will remove the injector line while wearing full PPE.

d. Accompanying staff to assist in transferring the patient.

- e. Radiographer in contaminated area to remove the equipment covers and to clean the machines.
- f. Doffing at the designated area.
- g. Hospital cleaner to perform terminal cleaning of the room.

### **3.4 Special Examinations (Angiography)**

#### **3.4.1 Pre-procedure**

- a. Receive order of examination either online or manual.
- b. Cases shall be scheduled at a later part of day preferably after completion of elective list except in emergency cases.
- c. Wherever possible, use a separate access route to the department.
- d. The case shall be pre-registered before being called.
- e. The accepting Radiology doctor to inform the Radiographer in Charge.
- f. The patient shall only be sent to the examination after being called by the radiology personnel to minimize contact time in Radiology Department.
- g. Radiographer in charge to inform the following:
  - i. Ward (time of procedure and accompanying personnel)
  - ii. Security guard to clear and mark the designated pathway
  - iii. Hospital Support Service Concessionaire for terminal cleaning
- h. Provide good ventilation (i.e. open doors and windows) if the examination room is not under negative pressure.
- i. The accompanying staff should wear appropriate PPE (as per ANNEX 8 Guidelines on IPC Measures in Managing Suspected, Probable or Confirmed COVID-19).



### 3.4.2 Radiology preparation:

- a. Staff: Two Radiographers (one in clean and one in contaminated area), one Medical Officer or Fellow, two nurses (one to assist and one as runner), one Interventional Radiologist and the Anesthesia team (for ventilation / sedation/GA cases).
- b. PPE for interventional radiology team performing ventilated suspected, probable, or confirmed COVID-19 patient to follow infection control measures/ PPE for healthcare workers when performing aerosol generating procedures as per Annex 8.
- c. Remove non-essential equipment from the examination room.
- d. To cover the contact surfaces of equipment in the examination room with plastic cover or sheet (contact surfaces includes table or remote-control panel, monitor, contrast injector and examination couch).
- e. To load IV contrast media into injector before patient's arrival (if needed).
- f. Radiographer in clean area to call ward to send patient. Patient to use designated route/lift to the Radiology Department.
- g. Check and verify patient preparation / consent
  - i. Recheck blood results, last meal, allergy etc.
  - ii. Check patient's particulars and consent.

### 3.4.3 Performing procedure

- a. To perform as per protocol.
- b. Accompanying staff to assist in the patient transfer.

### 3.4.4 Post Procedure

- a. To monitor patient in angio suite for complications and manage if present, prior to transfer back to the ward.
- b. Radiographer in clean area to inform security guard that the patient is returning to the ward.
- c. If the case requires contrast injection, the radiographer in contaminated area will remove the injector line while wearing full PPE.

- d. Accompanying staff to assist in transferring the patient.
- e. Radiographer in contaminated area to remove the equipment covers and to clean the machine/s.
- f. Doffing at the designated area.
- g. Hospital cleaner to perform terminal cleaning of the room.

**\*\* Hand hygiene with alcohol rub must be performed before and after each step during doffing post procedure.**

#### **4. WORKFLOW OF SENDING COVID-19 PATIENT TO THE RADIOLOGY DEPARTMENT**

- 4.1 Prepare patient and examination room.
- 4.2 Patient shall only be sent to Radiology Department upon receiving a call from radiology staff to minimize contact time in Radiology Department (if possible, to delay after office hours to minimize contact with non-essential staff).
- 4.3 Alert the person in charge of the floor's security.
- 4.4 Provide good ventilation (i.e. open doors and windows) if the examination room is not under negative pressure.
- 4.5 The workflow of the process of sending the COVID-19 patient to the Radiology Department is shown in Figure 1.

#### **5. SETTING OF RADIOLOGY EXAMINATION ROOM AND STAFF POSITIONING**

- 5.1 Schematic of CT suite in the setting for suspected, probable, and confirmed COVID-19 patient's examination is shown in Figure 2.
- 5.2 Figure 3 shows the process and staff distribution in the CT scanner and console room during CT examination of suspected, probable, and confirmed COVID-19 patients.

## WORKFLOW OF SENDING COVID-19 PATIENT TO RADIOLOGY DEPARTMENT

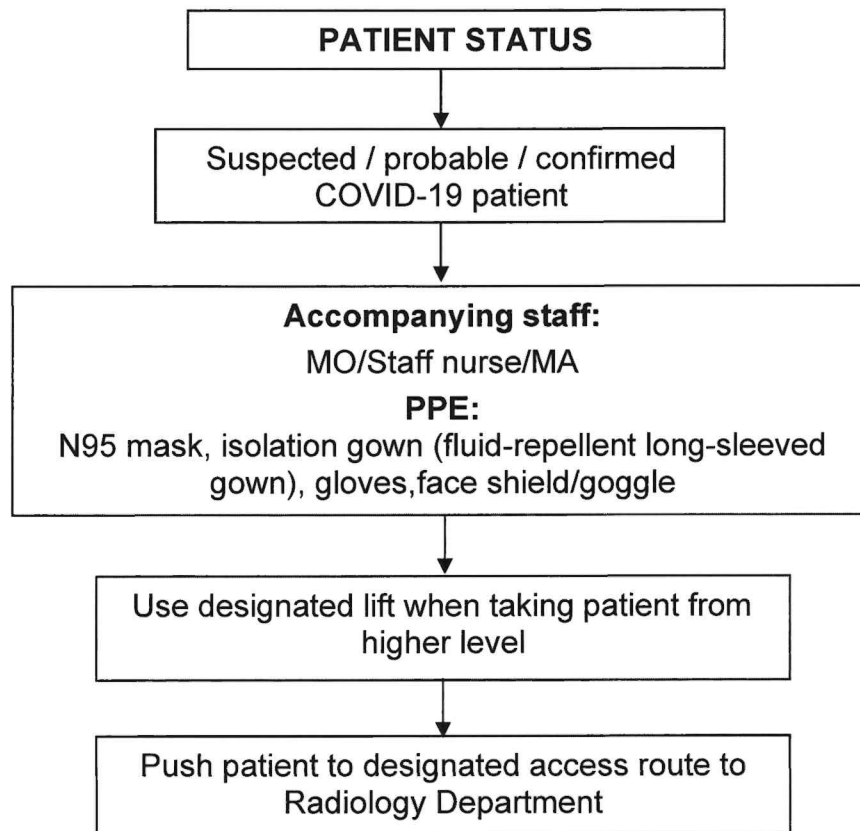


Figure 1: Workflow of Sending COVID-19 Patient to Radiology Department

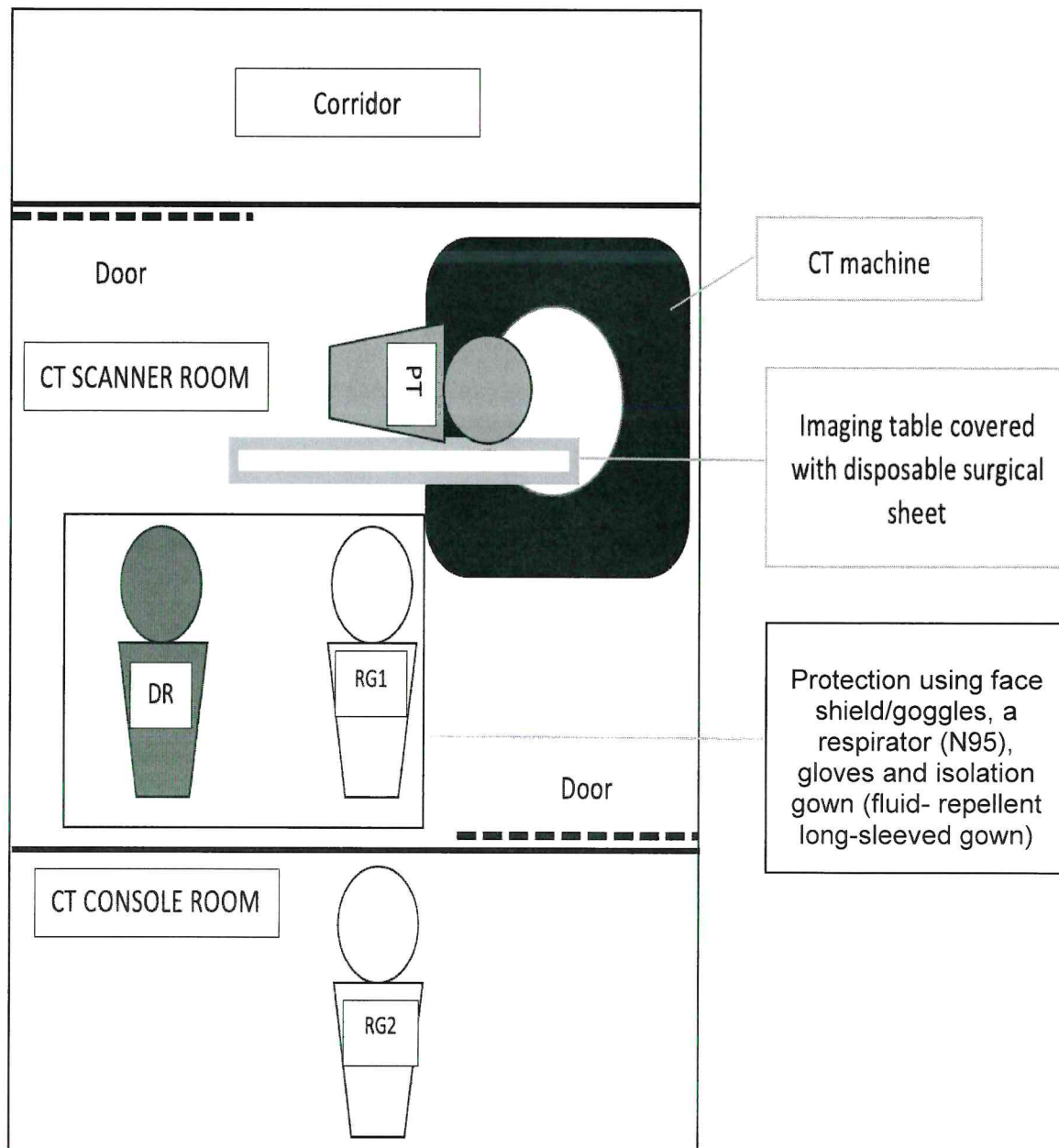


Figure 2: Schematic of CT suite in the setting for suspected, probable, and confirmed COVID-19 patient's examination

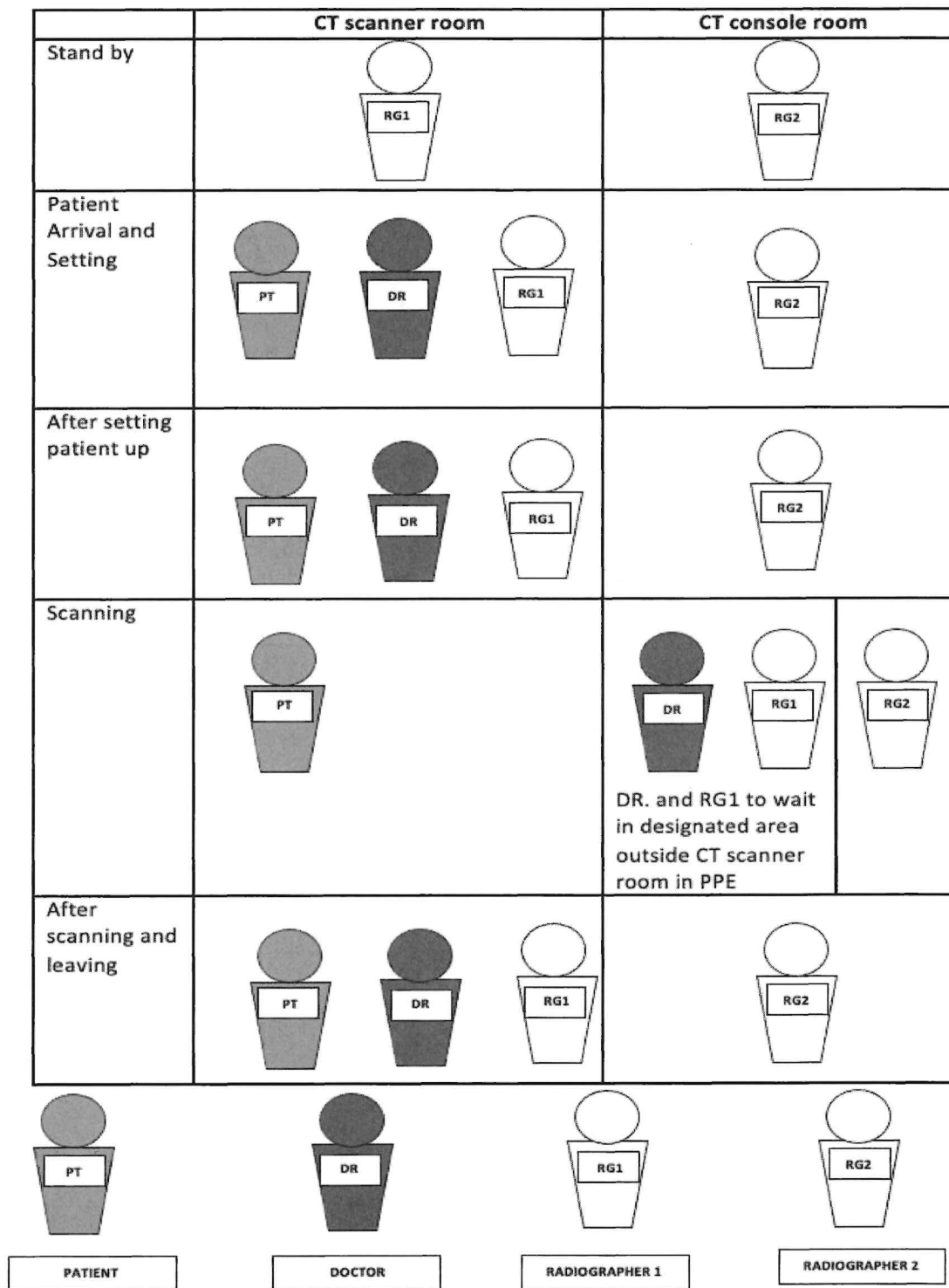


Figure 3: Process and staff distribution in the CT scan and console room during CT examination of suspected, probable, and confirmed COVID-19 patients.

## 6. RECOMMENDED PPE FOR ATTENDING CLEANING PERSONNEL AND RADIOLOGY STAFF DURING THE PROCEDURE AND POST PROCEDURE

<b>PPE FOR THE ATTENDING RADIOLOGY STAFF IN RADIOLOGY DEPARTMENT</b>		
Suspected, probable, or confirmed COVID-19	Staff handling patient in examination room	N95, face shield /goggle, isolation gown, gloves,
	Staff handling control panel Outside examination room	Surgical mask
	Staff outside examination room/ Counter	Surgical mask

### END OF PROCEDURE

Send patient back to ward and call Hospital Support Service Concessionaire  
Terminal cleaning by dedicated cleaner  
1-hour downtime for passive air exchange

### PPE FOR ATTENDING *CLEANING PERSONNEL AND RADIOLOGY STAFF* POST PROCEDURE IN EXAMINATION ROOM

Suspected, probable, or confirmed COVID-19	1. Hospital Support Service Concessionaire - Terminal cleaning of wall and floor	N95, face shield/goggle, isolation gown, gloves and closed shoes
	2. Radiographer – Disinfect equipment	

Radiographer to clean the equipment in the Examination Room, monitors and keyboard in control room (frequently touched surfaces). Machine/equipment shall be cleaned using alcohol wipes, while for the monitor/ ultrasound probe, to use non-alcohol wipes

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