



GUIDE TO PREPARING THE RADIOLOGY DEPARTMENT FOR COVID-19 PATIENTS

Dr Steven Wong, Sengkang General Hospital, Singapore

College of Radiologists, Singapore and Singapore Radiological Society

INTRODUCTION

As COVID-19 virus is highly contagious, even in asymptomatic patients/persons, early and thorough preparation is essential for all Radiology Departments. Whatever plans, strategies and workflows that you have made and rolled out, be prepared to review and revise them regularly. Flexibility is key in this context.

Your main aim should be to maintain business continuity, ensure staff and patient safety and reduce equipment downtime.

As much as possible, consider the portable option rather than have the COVID-19+ve patients come down to the Radiology Department.

This is a non-exhaustive guide to help with that.

PREPARATION

Designate which machines will be used for the COVID-19 positive patients. We call them the 'dirty' machine as opposed to 'clean' machine for non COVID-19 patients.

The 'Dirty' machines ideally should be isolated from the rest of the department. If that option is not possible, consider temporal separation where the machine becomes 'dirty' for part of the day and then undergoes thorough 'terminal' cleaning with equipment-safe alcohol cleaners, after which the room is left to air and dry out for 45-60 minutes.

Plan a 'Dirty' route from the source department, eg from Emergency, ICU, HDU, Isolation Wards. The route should be one that requires shortest time for patient movement and least chances of encountering other hospital/department staff or patients.

Designate a separate/dedicated entrance to the Radiology Dept for the COVID-19 patients. Try to restrict this entrance to those cases during its use. If possible, two separate entrances would be ideal, one for entry of the COVID-19 patient and the other for return to ward/source department, to avoid cross contamination.

Prepare the various equipment/modality rooms. Remove all non-essential items from the rooms, like extra shields, paddings, stands, etc. Cover all at-risk surfaces or equipment with plastic sheets or cling film if you want. These can be quickly disposed of after the procedure and then a new set applied. We put our



Xray cassettes into clear plastic bags and then dispose of the plastic bags after each case whilst also wiping the cassettes with dedicated alcohol wipes.

In the General Radiography room – ensure that minimal surfaces are contacted by the COVID-19 patient and ward staff and portering staff. The Xray cassettes (for CR units) or detector plates (for DR units) should be wrapped with plastic sheets or cling film, which are then disposed into biohazard bags. The Xray unit and room should then undergo full terminal cleaning after each and every COVID-19+ve patient.

In the Ultrasound room – ensure that minimal surfaces are contacted by the COVID-19 patient, ward staff and portering staff. Transfer the patient to a pre-prepared scanning trolley rather than scan on the patient's bed/trolley to avoid contact with the patient's surroundings. The ultrasound probe should be in a plastic sleeve. The ultrasound scanner's user interface controls and keyboard should be covered with a plastic sheet. The ultrasound scanner, trolley and room should then undergo full terminal cleaning after each and every COVID-19+ve patient. The ultrasonographer or ultrasound radiologist should be dressed in the appropriate PPE.

In the CT scanner room - ensure that minimal surfaces are contacted by the COVID-19 patient, ward staff and portering staff. Transfer of the patient to the CT scanner bed should be done with as few staff as possible. Try to have two CT radiographers/techs handling the case. The "Clean" CT radiographer should remain at the terminal and not enter the CT scanner room. The "Dirty/Contact" radiographer is responsible for patient positioning, lines adjustment etc, and do not touch any other surfaces. The entire CT scanner, trolley and room should then undergo full terminal cleaning after each and every COVID-19+ve patient.

In the MR scanner room - ensure that minimal surfaces are contacted by the COVID-19 patient, ward staff and portering staff. Transfer of the patient to the MR scanner bed should be done with as few staff as possible. Try to have two MR radiographers/techs handling the case. The "Clean" MR radiographer should remain at the terminal and not enter the MR scanner room. The "Dirty/Contact" MR radiographer is responsible for patient positioning, lines adjustment etc, and do not touch any other surfaces. The entire MR scanner, trolley and room should then undergo full terminal cleaning after each and every COVID-19+ve patient.

In the fluoroscopy room/endoscopy room – ensure that all surfaces are cleaned thoroughly afterwards.

In the Interventional Radiology Suites, - ensure that minimal surfaces are contacted by the COVID-19 patient, ward staff or portering staff. Transfer to the procedure bed should be done by as few staff as possible. Consider having a "Dirty/Contact" nurse and radiographer in the room and a "Clean" team outside at the control area. All those in the room should wear full PPE, including a PAPR (Positive Air Pressure Respirator) unit.

In the Nuclear Medicine (NM) PET-CT/SPECT-CT scanner room - ensure that minimal surfaces are contacted by the COVID-19 patient, ward staff and portering staff. Transfer of the patient to the NM scanner bed should be done with as few staff as possible. Try to have two NM radiographers/techs handling the case. The "Clean" NM radiographer should remain at the terminal and not enter the NM



scanner room. The “Dirty/Contact” NM radiographer is responsible for patient positioning, lines adjustment etc, and do not touch any other surfaces. The entire NM scanner, trolley and room should then undergo full terminal cleaning after each and every COVID-19+ve patient. For NM myocardial perfusion tests, staff should wear appropriate PPE when tending to the patient on the treadmill as the patient may be breathing faster and potentially aerosolizing vapour.

STAFF AND PPE

PPE has to be strictly rationed due to the supply shortages. We locked up our stock of masks, gowns, goggles and visors as well as PAPR securely.

Each section is given a supply of masks, wipes and other PPE in proportion to their need and also potential requirement/use.

Have clear guidelines on which staff or type of work/tasks requires which PPE. Below is a general guideline we follow: –

N95 masks – Staff in contact with COVID-19 suspect or confirmed positive patients, including all radiographers who do portables studies, working in the fever or isolation areas of ED/HDU, etc. All IR staff (Radiologists, Nurses and Radiographers) performing IR procedures on the COVID-19 suspect or confirmed patients. Remember those cleaning the ultrasound probes and in OT with the Portable Fluoroscopy units.

General Surgical masks – Tied type masks - Counter staff like clerks, all radiologists, radiographers and nurses, who contact all other patients in designated “clinical areas”. We define “clinical areas” as places where patients can pass through, be in or have procedures in. The Radiology Reporting Rooms are not considered “clinical areas”.

General Surgical masks – looped type masks – for use by general in-patients and their caregivers (if you have sufficient supply). Department staff can use this if they are moving around the department and not encountering patients. We ask the staff to keep their masks in ziplock bags when not using. One side of the ziplock bag should be marked to ensure that the outside of the mask faces that side all the time. Dispose of the mask and Ziploc bag after each shift or once dirty.

Gowns – water-proof/resistance gowns – for all staff coming into contact with COVID-19+ve patients only if you have limited supply. This include hair-coverings caps and shoe-cases.

Goggles and Visors - for all staff coming into contact with COVID-19+ve patients.

Try to have as few staff manage a case as possible. This is to reduce chance of cross contamination etc, which can cause manpower shortages.

All staff will need to know how to wear the various PPEs and how to remove and dispose or clean and reuse (for visors or goggles). Training should had been done during peacetime and refreshers done at the beginning of the shift.



Remember the sequence for donning of the PPEs and the reverse of the sequence for removal of the PPEs. We have posters of the sequence pasted on the walls in the different rooms and corridors. Staff are reminded to observe each other during donning and removal, to ensure no one makes an error.

PATIENTS

Top priority is to keep strict separation of COVID-19+ve or suspect patients from other inpatients/outpatients coming for procedures or scans.

In the early days, you may still be able to do elective cases, when your COVID-19 workload hasn't increased significantly. Separate modality room time into outpatient or inpatients either by room (geographical separation) or time/sessions (temporal separation). Example, CT Scanner 1 is used for outpatient scans in the morning but switches to inpatient scans in the afternoon and evening before being cleaned and rest for the next day. If you have multiple CT/MR/US/NM scanners, the task is easier as some units are used only for outpatients vs inpatients.

Reduce number of accompanying persons for the patients. We allow one accompanying person only, whether it's a family member or a caregiver. Both patient and accompanying person must be screened for temperature and contact/travel history and made to enter contact details on a form, which is then signed and dated for contact tracing needs.

RADIOLOGY MATTERS

Try to avoid having the COVID-19 patients come to the Radiology Department as much as possible.

Do portable X-Rays and Ultrasound scans as much as possible. Do consider carefully before agreeing to do the Ultrasound scan. Point-of-care ultrasound scans by the clinicians should be sent into PACS where possible.

Try to avoid doing CT scans as much as possible also as generally diagnosis of COVID-19 is via viral serology kits. In Singapore, we have performed less than 20 CT Thorax scans in all institutions combined, relying mainly on CXRs for disease status. But we anticipate the number of scans to increase.

All CXRs are reported promptly by a Radiologist or a trainee, depending on manpower availability.

IR Procedures, like US guided line insertions or drainage catheter insertions, are generally performed in the wards/HDU/ICU with staff in full PPE, including wearing PAPR.

Department HODs should seek to keep all staff informed of any developments as regards COVID-19 situation. An informed member of staff is less likely to become a danger as compared to someone who hasn't been trained or briefed properly.



Separation of Radiologists into mixed multi-subspecialty teams and then further split to designated and isolated reporting rooms/areas is essential to maintain business continuity. This is covered in another paper.

CONCLUSION

This short guide aims to help start basic preparations for handling COVID-19 patients. Obviously, you will revise and refine these guidelines according to your situation and needs.

At all times, ensure staff safety in order to maintain business continuity.

This version was compiled on 26 March 2020.

Dr Steven Wong MBChB, MMed, FAMS

Senior Consultant Radiologist, Sengkang General Hospital

Council, College of Radiologists, Singapore.

Executive Committee, Singapore Radiological Society.