

Adaptation of Workflow during COVID-19 Pandemic: A Malaysian Radiology Department's Experience

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Abstract

The rising demand of chest imaging during the COVID-19 pandemic has necessitated adaptations to be made to the workflow in radiology departments, particularly in regard to personal protective equipment (PPE) guidelines and operations protocol. The guidelines were implemented to reduce the risk of disease transmission to frontline radiology personnel. With the rising number of COVID cases in the community, suspected COVID patients may present to our hospital's Emergency Department (ED) even though it is not a COVID-designated hospital. Patients who present to ED are stratified as Severe Acute Respiratory Infection (SARI) cases if they exhibit respiratory symptoms, and non-SARI for those without respiratory symptoms. Imaging examinations performed for SARI patients must adhere to the new workflow. Radiographers and doctors

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performing Computed Tomography (CT), ultrasound and mobile radiography who come in contact with SARI patients must don full PPE. Prior to mobilization of patients, the routes must be cleared, and the cleaning team will standby for terminal cleaning. For portable examinations, donning and doffing of PPE is done in the department. All appliances must be covered prior to examination and sanitized after. Guidelines for usage of common areas such as pantry and prayer room are also employed to avoid crowding and to maintain adequate physical distancing. Adherence to the new workflow and guidelines is imperative to prevent workplace transmission from patients or other healthcare workers.

Keywords: COVID-19, adaptation, workflow, radiology

1. Introduction

The COVID-19 pandemic caused by the SARS-CoV-2 virus has spread swiftly throughout the world since its emergence in Wuhan, China in November 2019, with more than 61 million cases reported worldwide. As of 30 October 2020, a total of 64,485 COVID-19 cases have been reported in Malaysia, with 357 deaths (Ministry of Health Malaysia, n.d.-a). According to the World Health Organization (WHO), COVID-19 spreads through respiratory droplets between people who are in close contact to one another (World Health Organisation, n.d.).

Active COVID-19 cases in Malaysia are managed in designated hospitals and in hybrid hospitals, where there is a mix of COVID and non-COVID cases. However, the Ministry of Health Malaysia has come up with a guideline for screening and triaging of patients at the Emergency Department (ED) of all hospitals by separating the walk-in patients with respiratory symptoms and without respiratory symptoms. Patients with respiratory symptoms are categorized as Severe Acute Respiratory Infection (SARI) while patients without respiratory symptoms are categorised as non-SARI. This is to protect the healthcare workers and other patients from being exposed to COVID-19.

Radiology plays a vital role in the diagnosis and management of suspected and confirmed COVID-19 cases. We describe the modifications made in our Radiology Department workflow to tackle the challenges faced during this pandemic, specifically regarding infection control practices, staff safety and wellbeing, and ensuring smooth and timely service.

2. Results

General Rules for Radiology Personnel

All radiology personnel in charge of registration at the main counter will need to wear a facemask and face shield at all times. Only two staff members are allowed to be at the registration counter at any given time.

All staff who are in contact with patients, either while performing radiography, ultrasound, fluoroscopy, angiography, CT scan or MRI must don the correct Personal Protective Equipment (PPE) i.e. face mask, face shield, gloves and plastic apron. Gloves and plastic aprons must be changed between patients.

For confirmed SARI patients, staff must don full PPE without an N95 facemask. Full PPE with N95 face mask is required to be donned while attending intubated SARI patients.

Every staff must have their own reusable face shield that must be worn when attending patients. These face shields are not to be shared with other personnel.

The following are steps to clean the face shields:

- Proper hand hygiene prior to cleaning the face shield.
- Wear disposable gloves and clean the inner and outer layers of the face shield using a damp tissue or cloth and detergent.
- Wipe the face shield with disinfectant wipes.
- Rinse the face shield with clean water.
- Dry and keep the face shield on a safe and clean surface.
- Remove the disposable gloves and repeat hand hygiene using soap and water.
- Personal face shields should not be stored together with other people’s in the same place
- A face shield must not be used if the shield is blurred, contaminated with the patient's blood or body fluid, or if the headband is loose.

Rules at Common Areas

Elective patients waiting for ultrasound, CT scan or MRI appointments will be seated in an alternate seating pattern at the waiting bay. This is to ensure adequate physical distancing between them.

In terms of common areas used by staff, the general policy is to avoid crowding in confined spaces. The staff pantry will have three tables placed one meter apart. Only three people are allowed to dine in at the same time with one person occupying each table.

At any given time, only two people are allowed in the female prayer room and one person in the male prayer room. For conferences, a maximum number of 13 people are allowed in the conference room including the presenter.

Mobilization of Patients from Emergency Department

All patients with respiratory symptoms presenting to the emergency department are to be assessed by a medical officer, and then categorised as Severe Acute Respiratory Infection (SARI) or non-SARI case. A “Purple Code” announcement is made by the hospital operator prior to mobilization of SARI patients; either to the ward, Radiology Department, Intensive Care Unit (ICU) or Forensic Department. This is to ensure that the routes are cleared of the public and other hospital staff.

CT Scan for SARI Patients

Once a CT scan request for a SARI patient is granted, the pathway from the main door to CT room is cleared and the Radicare cleaning team is alerted for terminal cleaning. A “Purple code” announcement is made prior to mobilization of patients to the Radiology Department. Two radiographers will don full PPE with three layers of gloves. The first radiographer is in charge of

positioning the patient on the CT gantry whilst minimizing contact, as shown in Figure 1. Gloves are removed in layers and rubbed with hand sanitizer before touching the CT machine and injector. The first radiographer and the accompanying staff will wait in the CT scan changing room until the scanning is complete.

The second radiographer is stationed at the workstation in the control room. Once scanning is completed, the patient is escorted back through the designated pathway. The first radiographer will change their gloves and sanitize the CT gantry and workstation. Both radiographers will doff the PPE in the changing room and shower. Lastly, terminal cleaning is carried out in the CT examination room, changing room and along the designated pathway.



Figure 1: A radiographer in full PPE is positioning a SARI patient for CT scan

Portable Radiograph for SARI Patients

All radiographs for SARI patients are done at the SARI ward or at the SARI cubicle in the red zone of the Emergency Department by using a portable x-ray machine. One radiographer with full PPE will perform the imaging, as shown in Figure 2. The cassettes are covered with a biohazard plastic bag prior to the examination. Before returning to the department, the cassette and portable x-ray machine including the wires and wheels are sanitized. Doffing of the PPE is done in the Radiology Department.



Figure 2: A radiographer wearing full PPE preparing for portable radiograph

Ultrasound for SARI Patients

Similar to portable radiographs, all ultrasounds for SARI patients are to be performed at the bedside at the SARI ward or at the SARI cubicle in the red zone. When an ultrasound request for a SARI patient is granted by the radiology medical officer, the mobile ultrasound machine is prepared, and the patient’s details are registered. The medical officer donning full PPE will do the procedure at the bedside. The probes will be covered with probe cover. Sanitisation of the mobile ultrasound machine including the probes, wires and wheels are done prior to returning to the department.

3. Discussion

As of 18 December 2020, a total of 1,771 confirmed COVID-19 cases were reported among healthcare workers (HCW) in Malaysia (Director-General of Health Malaysia, 2020). A third of these cases were community-acquired while 31.9% was due to transmission from other healthcare workers. A total of 152 cases were from close contact with unrecognised COVID-19 patients (Director-General of Health Malaysia, 2020). The SARS-CoV-2 virus can be transmitted via direct contact with an infected patient. It may also be transmitted when near an infected person through respiratory droplets containing the virus, or via airborne transmission of smaller droplets. Smaller infective droplets can be suspended in the air over significant distance and time compared to respiratory droplets, particularly in confined spaces (“COVID-19 transmission – up in the air”, 2020). Based on these modes of transmission, strict standard operating procedures (SOPs) must be implemented to prevent workplace transmission – whether from other healthcare workers or from patients.

Use of appropriate personal protective equipment (PPE) has been proven to prevent transmission to frontline healthcare workers in Wuhan, China (Liu et al., 2019). Aside from ensuring adequate PPE is in constant supply, healthcare workers must also be trained in correct usage of PPE and infection control to improve safety (Karlsson & Fraenkel, 2020). According to the Ministry of Health

Malaysia's guidelines, rational use of PPE is dependent on the setting e.g. Emergency Department and activity e.g. triaging, and is based on risk stratification of patient care, for example, if they foresee dealing with "blood, body fluids, secretions and non-intact skin" (Wang et al., 2020). Nevertheless, all HCW must use surgical masks when they are in clinical areas and in "prolonged contact with co-workers" (Ministry of Health, n.d.-b).

The Ministry of Health Malaysia has provided a comprehensive guideline for carrying out radiological examinations on "suspected, probable and confirmed" COVID-19 cases (Ministry of Health, n.d.-c). The workflow modification in our hospital adheres to the SOP where applicable. Adherence to guidelines is vital to minimise the risk of infection to personnel. General measures such as the practice of physical distancing of at least one meter at the registration counter, common room and pantry, as well as prayer room are also listed in the Ministry of Health's guideline (Ministry of Health, n.d.-d).

4. Conclusion

The COVID-19 pandemic resulted in unprecedented measures being incorporated in our daily lives, including in the workplace. In order to minimize the risk of transmission of COVID-19 to patients and staff, radiology departments must ensure adequate personal protective equipment supply. Strict adherence to protocols and guidelines will enable smooth and timely service. Finally, usual safeguards that have been advocated by the Ministry of Health since the start of this pandemic such as avoiding crowds, confined places and close conversation must always be observed.

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