Abstract

There is a sudden upsurge in the literature over the last fortnight on strategies to be followed by imaging services during this SARS-CoV-2 global pandemic. This compilation of strategies, experiences, and precautions is intended to support nuclear medicine departments, as they make decisions regarding patient care. These guidelines are a good resource to tackle the current crisis, however, situations such as these may occur again, and long-term readiness measures need to be discussed and implemented.

Introduction

Since December 2019, a novel coronavirus disease named COVID-19 broke out in Wuhan, Hubei province, China, and then spread throughout the country.[1] Gradually, there was a spurt of cases in other South East Asian countries, followed by Europe, and subsequently, COVID-19 reached the United States and its neighboring countries. Finally, on March 11, 2020, the World Health Organization had to declare it as “pandemic,” a situation where a disease is spreading in multiple countries around the world at the same time.[2] The first case in India was reported on January 30, 2020, and as of April 06, 2020, the Ministry of Health and Family Welfare has confirmed a total of 4,067 cases, 292 recoveries (including 1 migration), and 109 deaths in the country.[3] The infection rate of COVID-19 in India is reported to be 1.7, significantly lower than in the worst affected countries. As the government continues to update its machinery, we, as a diagnostic specialty, should realign ourselves with the right knowledge and systems, so that we are geared to deal with the crisis of this magnitude.

There is clear evidence of human-to-human transmission of coronavirus. It is thought to be transmitted mainly through respiratory droplets when people cough, sneeze, or exhale. SARS-CoV-2 also gets transmitted by touching, by direct touch and through contaminated surfaces or, objects and then touching their own mouth, nose, or possibly their eyes. Health-care-associated infection by SARS-CoV-2 virus has been documented among health-care workers in many countries.[4] Given the long duration of exposure during scanning and the patient isolation for tracer localization, nuclear medicine personnel are at a significantly high risk as compared to other modalities. Nuclear Medicine in India is practiced in three different formats – at government/state-run hospitals, in private hospitals, and in stand-alone centers, popularly known as “diagnostic centers.” The approach to any emergency-like situation in these diverse set-ups is determined by the availability of workforce and finances. It is important that we address the concerns and challenges faced by each of them. Harmandeep and Mittal[5] have addressed the immediate measures that need to be taken to ensure safe working environment. However, there is an unmet need to draw a long-term road map today, which shall address all possible concerns, across all the set-ups. The points to follow will be based on the following principles – continuity of essential services, well-coordinated implementation of priority action at every level, clear and accurate internal and external communication, swift adaptation to increased demands, effective use of scarce resources, and safe environment for health workers.
Personal Protective Equipment Kits and Other Protective Gears

Personal protective equipment (PPE) are protective gears designed to safeguard the health of workers by minimizing the exposure to a biological agent. Components of PPE are goggles, face shield, mask, gloves, coverall/gowns (with or without aprons), headcover, and shoe cover. In addition, gloves, masks (N-95 or other triple-layer), and shoe covers should be made available. Hospital-based set-ups are often well equipped with protective gears, however, stand-alone centers should either stock these or have a list of vendors who supply these; in fact, an agreement (or memorandum of understanding) with any of the vendors for future use would be advisable. Furthermore, whenever possible, the cost of these can be recovered from patients, as liability of the risk to health personnel lies equally with the patient.

PPE and other protective equipment should be rationally used. Personnel, who are at maximum risk of exposure, should be given the first priority to use PPE.

Furthermore, a regular training and audit of proper disposal of PPE and other equipment should be carried out, with help from the Hospital Infection Control Committee and Central Sterile Supply Department.

Duty Restructuring and Workforce Utilization

Let's look at how we can effectively use the available workforce, keeping in mind the principle of social distancing. First and foremost, detailed medical background of all personnel should be available with the hospital management or head of respective departments. Identification of “at-risk” workforce is important, who need to be discharged from hospital or departmental duties with immediate effect, until normalcy is restored. Principle of “doubling up” will have to be followed, where every person will have to perform two or more duties, thus reducing the number of people in the department. For instance, the technologist, in addition to dispensing isotope, can also position patients; a physician can manage appointments, take history, and report scans. This will allow effective rotation of workforce, reducing the risk of transmission and also the burden on resources such as PPE and masks. For diagnostic centers, staggering of appointments will serve the purpose, so that at a given time, not more than two patients are present, and a single person can actually manage the duties in a department. The rest of the workforce can do the same on other days, thereby allowing effective distancing. Thus, it is necessary that, during normal circumstances, entire staff should be trained to perform duties, which are beyond their scope as a contingency measure, to step up in times of emergencies. Physicians, both residents and consultants, should get acquainted with radiopharmaceutical dispensation, scan acquisition, and other similar tasks. There should be regular training of entire staff in infection control protocols in general and for specific situations; this training needs periodic revision. In cases of lockdown, when no transport systems are functioning, hospitals and centers should allocate rooms, with basic amenities and supplies, where personnel can stay for temporary period.

Use of Technology

The currently available technology allows “offsite” history taking and scan reporting. Hence, it is necessary that such options should be explored at the time of starting the department; for existing set-up, license for online platform should be procured. The setting up of remote-access (off-site) reporting system with home-workstations incurs additional cost, however, is worth every penny, as in conditions similar to what we are facing today, when a physician cannot commute and reach the department, Online platforms facilitate reporting of scans, and if necessary, patient interaction. High-speed Wi-Fi system, mobile service boosters, and if possible, home workstations should be invested in to make ourselves ready for such scenarios.

Epidemic Inventory

Every department should have a separate shelf assigned to devices and consumables, which shall be used during emergency situations such as epidemics. This shall include temperature monitors for screening patients and relatives at entrance, disposable plastic sheets for scanner room, and hand sanitizers, to name a few. Stationary items such as pens and pencils should be stocked, with a policy of single-day use and disposal, as it is a potential source of contamination and spread. As is seen today, there is a severe shortfall in supply of these items, and hence, prior maintenance of an inventory is recommended. There should be a logbook detailing the dates of indent, expiry, and service of these items, and regular maintenance or replacement of expired items should be done.

Effective Communication and Leadership

There should be a definite hierarchy model in place by which the flow of communication can be efficiently established, thus avoiding the spread of rumors and miscommunication. A single point of communication, either a senior faculty or department head, should be assigned to gather necessary information from the authorities, which should be dispersed to the subordinates periodically. Predecided criteria for partial or complete shutdown of services should be in place, and decisions with regard to these should be prompt. Online meetings to understand the problems and challenges should be held periodically. For diagnostic centers, the physician or the proprietor should take the lead. There should be a clear policy about which procedures are not to be performed. External communication with the authorities such as Board of Radiation and Isotope Technology, Atomic Energy Regulatory Board, and private vendors...
should be established. The purpose would be to understand the schedule of supply of radiopharmaceuticals, to inform about the need to function with limited workforce and similar issues. There should be close communication with other departments within city limits for resolving issues and even facilitating patient movement in case of technical issues. The National Society should understand the ground reality from the general body members and draft a policy document and recommendations addressing various issues, which impact the functioning of nuclear medicine services. There should be a subcommittee within the society, which shall draft these recommendations.

**Surge Capacity Audit**

Surge capacity is the ability of a health service to expand beyond its normal capacity to meet an increased demand for clinical care. We are observing during the current epidemic, that imaging is often used as a surrogate for reaching the diagnosis, either in the absence of testing facilities or when the available diagnostic test result does not go hand in hand with the clinical diagnosis. This can lead to increased referral for imaging services, for which we should keep ourselves prepared. This is most likely to be encountered by government/state-run hospitals. Strong inventory backup and readiness of workforce to handle the rising numbers is the key. Training modules and drills targeted to address these issues should be arranged and conducted by experts in the field. There should be a training and implementation module in place, which would prevent confusion in such scenarios.

**Financial Provisions**

Crisis situations often lead to drying up of financial resources, which affects the private set-up more than institutional facility. There should be a separate provision made in the annual departmental budget under the head of “emergency fund,” which will be utilized only during these situations. Staff remunerations and cost of emergency-related paraphernalia should be calculated, and necessary funds should be assigned. Hospitals and stand-alone centers should also explore the possibility of insurance policies, which address these situations, thereby reducing the financial strains.

All the above aspects can only be addressed if there is a standard operating procedure (SOP) in place, which is prepared by nuclear medicine team. The SOP needs periodic revisions and audit. Effective chain of communication should be immediately put in place, so that subordinates get acquainted with the systems. Drills and training modules should be carried out for sensitizing the staff to such situations.

Overall, the crisis that we are facing has resulted in a lot of brainstorming and cropping up of solutions, which has generated immediate remedies. However, long-term strategies and logical approach is the need of time, which needs to be gradually implemented, to get the nuclear medicine facilities in India and across the globe pandemic ready.

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**References**

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