ORIGINAL ARTICLE

RADIOLOGY DEPARTMENT PREPAREDNESS FOR COVID-19 IN PAKISTAN: NATIONAL AUDIT BY RADIOLOGICAL SOCIETY OF PAKISTAN

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PJR July - September 2020; 30(3): 171-177

STATEMENT:

This is national audit of radiology department preparedness (care in general hospitals) and is initiated by the Radiological Society of Pakistan (RSP) led by a consortium of RSP and radiologists from different hospitals of Pakistan. Aim of Radiological Society of Pakistan is to promote quality improvement in radiology preparedness for COVID-19 and to assess difference made by intervention of RSP. It is the third audit to look at the level of radiology preparedness within the country. The initial audit cycles were carried out in Khyber Pakhtunkhwa and Interior Sindh. The second cycle covered radiology departments in major hospitals of all five zones.
First cycle (KPK, interior Sindh): March 2020
Second cycle(Punjab, KPK, Sindh, Balochistan, Gilgit, Muzaffarabad): May - June 2020

ABSTRACT

OBJECTIVE: Audit to assess radiology department preparedness for COVID-19 in hospitals of Pakistan by Radiological Society of Pakistan. **METHODOLOGY:** This is a prospective cross sectional observational study. A questionnaire was devised that measured the knowledge and preparedness of contacted 154 radiologists and a total of 131 departments from different regions of Pakistan regarding infection control as well as staff protection from 19th May 2020 to 20th June 2020. The recommendations for radiology preparedness for COVID-19 were developed based on data from recently published material from China, USA and NHS. The major components of questionnaire included queries on imaging during COVID-19 pandemic, workforce preservation, personal protective equipment, disinfection guidelines and role of RSP in providing PPE and guidelines to radiology departments all over Pakistan. The department was considered prepared if it had; 1) Designated imaging equipment for COVID-19. 2) Disinfection and transfer route planning. 3) Workforce preservation. 4) Adequate PPE for staff. Data was entered in Microsoft excel worksheet and analyzed for adherence with standard infection control CDC measures. **RESULTS:** Out of the 131 radiology departments contacted, 41% were designated COVID-19 centers, 65% were tertiary care hospitals, 26.7% DHQ hospitals and 26% were smaller tehsil level THQs. 69% centers were government hospitals and rest were private setups. Most of the responders were from Punjab followed by KPK and least by Balochistan. 28% of the contacted departments had designated separate imaging equipment for COVID-19 and suspected cases, 72% had implemented workforce preservation measures, like alternate duty shifts, teleradiology and sending on leave high risk and >50 years old staff, 88.5% had

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Submitted 8 August 2020, Accepted 21 August 2020

implemented disinfection measures with help from guidelines provided from RSP and almost 60% had adequate PPE for staff with help from RSP, self efforts and hospital administration. 42% of the centers had arranged a formal training for handling of COVID-19 patients and self protection measures. 94.6% of the radiologists responded that current efforts of RSP had significantly impacted on their practice during COVID-19 impacted. **CONCLUSION:** Our audit results conclude that RSP had a significant impact on 94.6% of the radiology departments in implementing preparedness during COVID-19 pandemic by providing guidelines on disinfection, staff protection and PPE. 88.5% centers had implemented disinfection guidelines, 72% made sure to preserve workforce and 60% had adequate PPE for staff.

Keywords: Corona Virus(COVID-19), Radiology, Preparedness, Disinfection, Personal protective Equipment (PPE)

Introduction

The unprecedented Corona virus disease (COVID-19) outbreak all over the world has already claimed 716,000 deaths. The Pandemic of COVID-19 has hit hard on the public as well as on our professional belief in the essential quality of clinical care, one of the causes being a number of public failures. We can no longer think about effectiveness of care as an isolated professional matter. Requirement of time is appropriate clinical governance and algorithmic organizational approach for quality that integrates the perspectives of staff, patients and their carers, and those charged with managing our health service. But real commitment is needed from everyone involved if governance is to fulfill its promise.

The Coronavirus Disease 2019 (COVID-19) pandemic began in December 2019 in Wuhan, China. The outbreak is due to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection.[1] Approximately 19.2 million people have been infected worldwide.[2] Although infection rates are said to be controlled in China through severe public health measures, Italy, USA, Spain and Iran have seen exponential increases in the number of infected individuals with count in Pakistan crossing 200,000 cases till July 2020. Other than China, Italy, and Iran, most countries including Pakistan have had approximately 2 months to prepare their responses to the COVID-19 pandemic led by public health authorities by government in coordination with provincial government and hospitals. Given the extent of the ongoing pandemic, it seems possible that additional travelers exposed to Corona virus and their contact with individuals along their travel route, home, families, hotels and transport are suspected cases. This necessitates the widespread implementation of screening procedures at all medical facilities, particularly those in large cities with international airport access. Screening out positive COVID cases through fever clinic and triage facilities outside hospitals is helpful in symptomatic patients. In March 2020, in KPK a confirmed case who had resided in a community, after which the community was isolated, upon testing >70% asymptomatic persons have tested positive and afterwards similar scenarios were observed all over the country. COVID-19 spreads among humans through direct contact with body fluids from an infected individual or through exposure to objects that have been contaminated with such fluids or secretions from a patient with disease. Problem with COVID-19 is that the spread occurs irrespective of the fact that patients are symptomatic or not. There are no licensed vaccines or immune-mediated treatments approved for humans yet. This brings more challenge and burden for the health providers.

A nationwide coordinated response has been generated all over Pakistan, which is challenging due to the small number of specialized treatment sites. Recently, additional tertiary-care institutions have been preparing staff and facilities to handle COVID-19 patients. Due to the nature of the emergency in China, chest CT findings (eg, peripheral ground-glass infiltrates and/or organizing pneumonia) temporarily became part of official diagnostic criteria of COVID-19 as a surrogate for viral nucleic acid testing. With improved disease understanding, at present, the focus of most radiology departments outside of China has shifted from diagnostic capability to preparedness. At present, there is a major emphasis on Corona virus disease preparedness training at medical facilities throughout the world. Failure to have proper procedures in place can be a major reason for infection of medical personnel and visiting population in hospitals. Medical imaging does not only provide

diagnosis with extent of disease, but patient assessment in the emergency department and treatment isolation care unit is likely to require imaging services. The purpose of this audit was to overview relevant aspects of COVID disease and preparedness relevant to the radiologic community in different centers of all zones of Pakistan.

Radiological Society of Pakistan (RSP) is established organization for improvement of radiology services in Pakistan. Every member of RSP seeks to improve the quality of radiology services. RSP has designed a guidelines policy document and the concept of this audit was to assess the radiology preparedness in different hospitals of Pakistan, collaboratively and systematically following the framework in current RSP policy statements.

Methodology

A total of 131 radiology departments were contacted and 154 radiologists filled a questionnaire, which was prepared for radiology preparedness for COVID-19 based on data from published material from China, USA and NHS. The questionnaire was devised that measured the knowledge and preparedness of radiology departments from different regions of Punjab, KPK, Sindh, Balochistan and Gligit Baltistan and Muzaffarabad regarding infection control as well as staff protection. The major components of questionnaire included imaging in CVID-19, workforce preservation, guidelines on disinfection and role of RSP in providing personal protective equipment and guidelines all over Pakistan. The questionnaire was sent to different regions via social media, emails and text messages. The filled data was entered in Microsoft Xcel worksheet and analyzed for adherence with standard infection control CDC measures.

The department was considered prepared if it had; 1) Designated imaging equipment for COVID-19. 2) Disinfection and transfer route planning. 3) Workforce preservation. 4) Adequate PPE for staff.

Results

Out of the 131 radiology departments contacted, 41% were designated COVID, 65% were tertiary care hospitals, 26.7% DHQ hospitals and 26% were smaller tehsil level THQs. 69% centers were government hospitals and rest were private setups. Most of the responders were from Punjab followed by KPK and least by Balochistan. 28% of the departments had designated separate imaging equipment for COVID-19

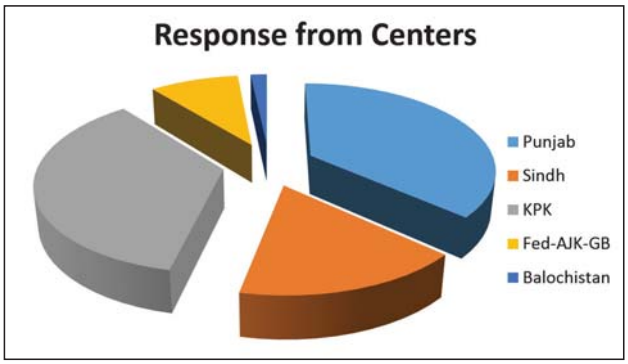

Figure 1: Pie chart showing response received from different zones of Pakistan

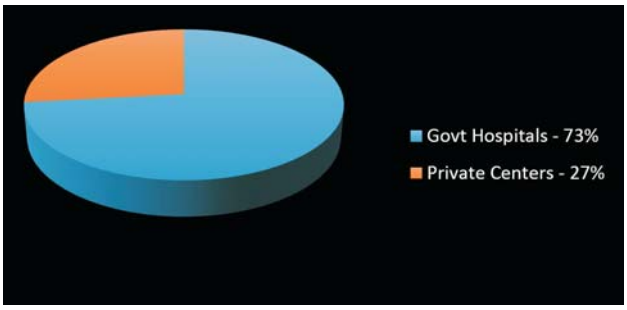

Figure 2: Most of the centers contacted were government Hospitals ranging from small tehsil level hospitals to large tertiary care hospitals.

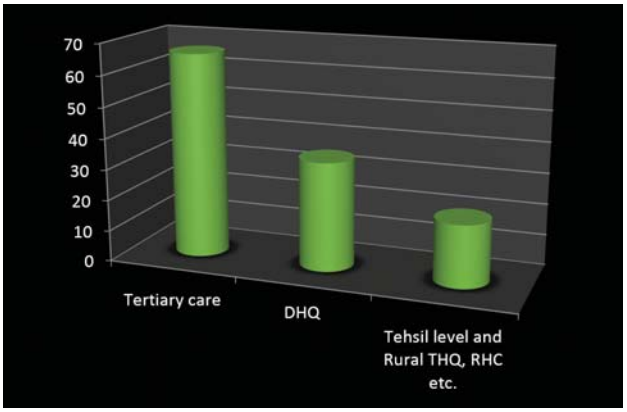

Figure 3: Most of the centers contacted were tertiary care hospitals

cases, 72% had implemented workforce preservation measures, like alternate duty shifts, teleradiology etc, 88.5% had implemented disinfection measures, some with help from guidelines provided by RSP and almost 60% had adequate PPE for staff with help from donors, RSP, self efforts and hospital administration. 42% of the centers had arranged a formal training for handling of COVID-19 patients and self protection measures. Majority of the contacted departments

(n=83) were using X ray as primary imaging for COVID-19. 18% centers were using CT scan for triage purpose. 94.6% of the radiologists responded that current efforts of RSP had significantly impacted on their practice during COVID-19 impacted (Figures).

Imaging for COVID-19 pneumonia:

Majority of the contacted departments (n=83) were using X ray as primary imaging for COVID-19, 20% centers using both X ray and CT scans and only 4 centers were using CT scan, all of which were private centers. 18% centers were using CT scan for triage purpose.

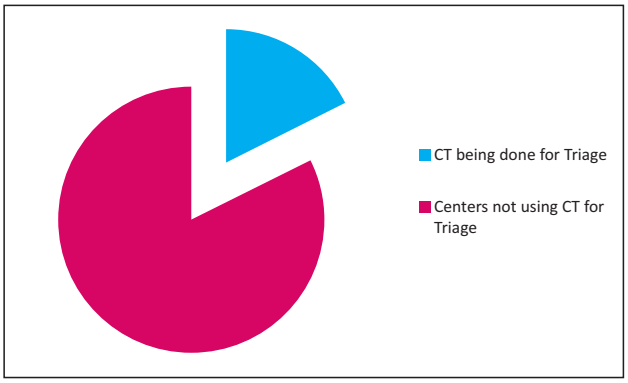

Figure 4: Showing 17% centers using CT scan for triage of patients.

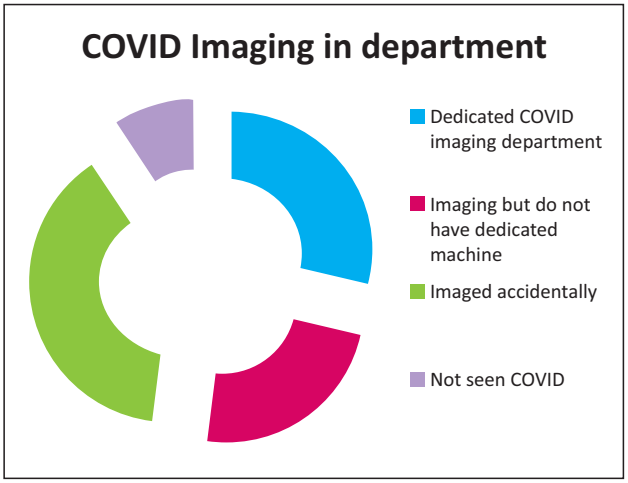

Figure 5: Most of the centers had imaged COVID-19 patients accidentally and came to know about the diagnosis after the procedure; only 28%of the centers had dedicated a separate CT or X ray machine for COVID-19 patients.

Workforce Preservation:

Restricted and reduced patients policy was seen implemented during COVID-19 Pandemic in 72% of the contacted departments.

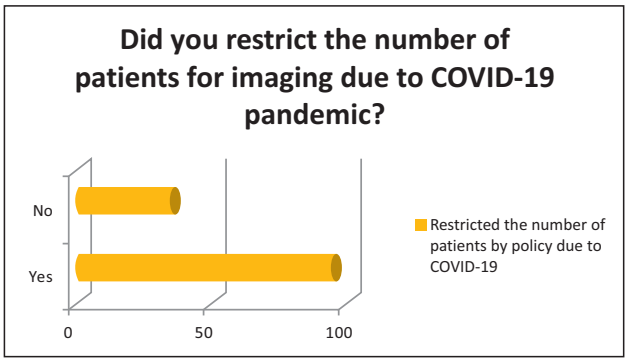

Figure 6: Showing radiology departments restricting the number of patients for imaging during COVID-19 pandemic

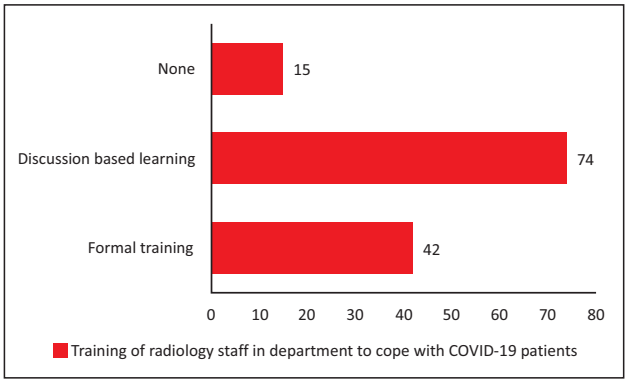

Figure 7: Most of the radiology departments in Pakistan had a discussion based learning sessions for staff.

Irrespective of the closure of OPD services, most of the contacted centers were still imaging the routine follow up cases, like prenatal ultrasound visits, abdominal pain related CT scans and ultrasounds etc. Majority of the centers reserved their workforce by dividing duties into groups, alternating in weeks or days depending on the staff number. 18% of the centers did not apply specific staff reduction rota and and their staff coming daily with full exposure for possibility of COVID-19. Precautionary measures

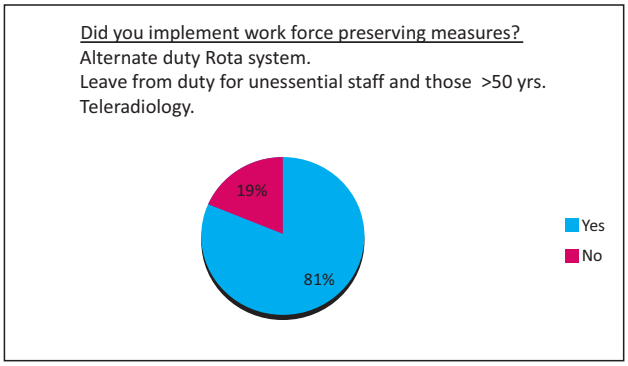

Figure 8: Workforce preserving measures to protect staff

were being taken by all the staff in the contacted centers. However, provision of PPE was very limited by the administration of most of the contacted hospitals.

Impact of RSP efforts:

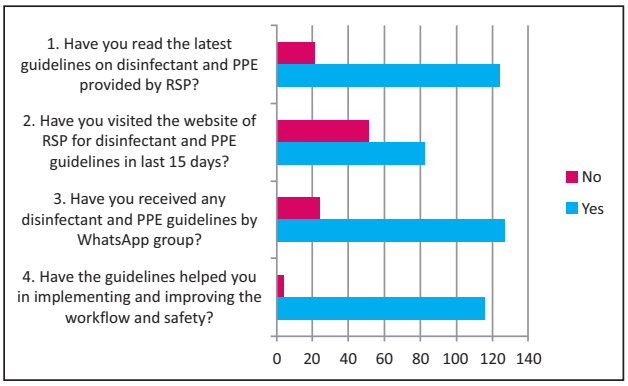

Figure 9: RSP guidelines on disinfection, imaging and precautions during COVID-19 pandemic

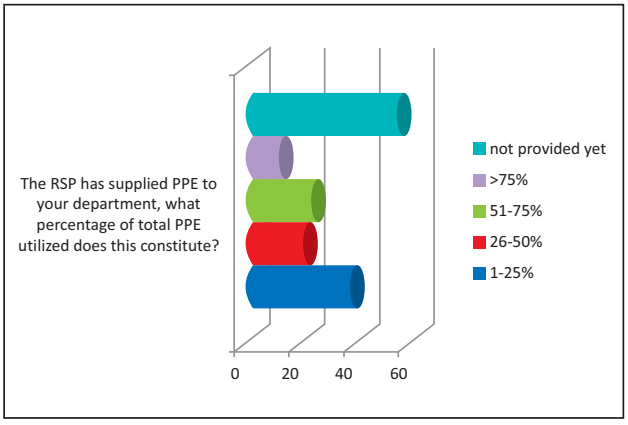

Figure 10: PPE supply to radiology departments across Pakistan

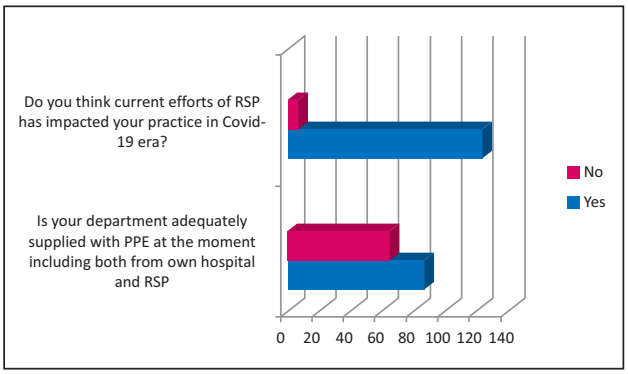

Figure 11: Impact of RSP efforts in providing PPE and guidelines

Discussion

Natural disasters can have a significant public health impact if infection prevention and control strategies are not implemented rapidly and appropriately.[3] At present, there is a major emphasis on Corona virus disease preparedness training at medical facilities throughout the world. Failure to have proper procedures in place can be a major reason for infection of medical personnel and visiting population in hospitals. A recently published article from RSNA states radiology preparedness following a set of policies and procedures directly applicable to imaging departments. These were designed to achieve sufficient capacity for continued operation during the pandemic, to support COVID-19 patient care and to maintain radiologic diagnostic as well as interventional support. But considering developing country Pakistan, there are varying infection control policies (both nationally and regionally) and steps for radiology preparedness for COVID-19 vary between institutions depending upon resources.

The Radiological Society of Pakistan (RSP) has assembled a team of radiologists who are active in coordination, development, and implementation of radiology preparedness policies for COVID-19. Their policies have been developed in conjunction with top infection control experts as well as locoregional circumstances. 131 centers were contacted by the RSP team and each focal person from their department were asked to answer a questionnaire as well as to describe their department s top priorities for COVID-19 prepared-ness. RSP hopes that radiologists from all over Pakistan would take action on current preparedness activities suggested by RSP. The Radiology depart-ment is considered prepared for COVID-19, if it has following measures: 1) Protection of radiology staff by Workforce preservation and adequate PPE for staff. 2) Protection of Equipment and Designated imaging equipment for COVID-19. 3) Disinfection of equipment and room.

Protection of Radiology Staff:

Protecting radiology personnel from the hazard posed by a confirmed or suspected patient of COVID-19 involves several layers of safety controls. 72% of the contacted departments had implemented workforce

preservation measures like either telereporting, placing staff on alternate duty shifts, sending home elderly, high risk or > 50 year old staff etc. Administrative controls in a department should be to reduce staff exposure to COVID-19, planning for scanning of COVID-19 case, limiting the number of visitors and attendees entering the radiology department, limiting imaging to bedside modalities to avoid patient transport, careful scanning to identify possible cases and communication among hospital staff once a possible case is identified.

PPE is a central feature for protection of staff from infectious particles.[4] 60% of the contacted radiology departments of Pakistan had adequate PPE and even demanded more. As a rule, PPE for health care personnel who will be in the same room as a patient suspected of having or confirmed to have COVID must leave no skin or clothing uncovered. Hospital infection control personnel is integral to training other health staff in the use of PPE. Preprocedural training of radiology personnel is necessary to learn procedures to wear and take off PPE. Of all the contacted radiology departments of Pakistan, 42% of the centers had arranged a formal training for handling of COVID-19 patients and self protection measures.

A designated imaging machine like CT scanner and X ray machine is necessary if possible. 28% of centers in our study had designated a separate imaging machine for confirmed or suspected COVID-19 cases. Literature review suggests that experience at several institutions in the United States during the Ebola outbreak response supported the use of a portable radiography unit placed inside the patient room to obtain digital radiographs. Ideally a portable X ray unit is dedicated to the isolation area to reduce cross-contamination risk, although a unit could be decontaminated as described in the RSP guidelines.

Protection and Decontamination of Radiology Equipment:

Radiology equipment has uneven edges, gaps, buttons, unsealed margins (near moving parts and gantries), and hinges that need to be decontaminated. Moreover, the heterogeneity of the components of the imaging devices (eg, metal, plastic, and fiberglass) may make disinfection of equipment complex. Due to these factors, disinfection techniques beyond surface cleaning, such as vapor or ultraviolet light are required as adjunctive measures to decontaminate equipment. These considerations, combined with the very high cost and high patient throughput of most imaging equipment, suggest the need for careful review in the use of imaging equipment before being used for patients who have suspected or confirmed COVID. Majority of the contacted institutions are using wipes saturated with alcohol solution, sprays of high level disinfectant like saturated solution of bleach, depending on manufacturer guidelines, to clean surfaces and equipment used. Pillows should have impermeable disposable covering, which should be discarded after use. When imaging is needed, point-of-care imaging in the isolation room is used as indicated earlier. If imaging within the radiology department is deemed to be crucial, planning considerations for the procedure may include clinical criteria, issues of patient transportation, isolation of the patient within the imaging suite, and decontamination of the imaging equipment and suite.

RSP remains responsible for the safety of its colleagues, staff along with families and above all patients, in these unprecedented times. We are determined to win this war against Covid-19. We strongly recommend compliance with our Government s and WHO s directives despite the fact they would differ in some respects from the proposed statement(s) of RSP based on our continuous efforts to stay abreast with this rapidly evolving situation. In a resource-constrained environment, imaging is indicated for medical triage of patients with suspected COVID-19 who present with moderate-severe clinical features and a high pre-test probability of disease.

Conclusion

Our audit results conclude that RSP had a significant impact on 94.6% of the radiology departments in implementing preparedness during COVID-19 pandemic by providing guidelines on disinfection, staff protection and PPE. 88.5% had implemented disinfection guidelines, 72% made sure to preserve workforce and 60% had adequate PPE for staff.

Acknowledgment: We would like to thank all the radiologists and radiology staff of Pakistan for their help in data collection.

Conflict of Interest: None

Recommendation:
Visit RSP website:
https://www.radiologypakistan.org.pk/covid-19/ for:

COVID-19 ALERT Radiology
Radiology department guidelines during COVID-19 pandemic
Personal protective equipment
Infection control
PPE and infection control videos and audios
Radiographers guide
Ultrasound guidelines

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