



The Impact of COVID -19 on the Radiology Department’s Staff and Students

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ABSTRACT

In December 2019, a pneumonia outbreak caused by a novel coronavirus (COVID-19) began in Wuhan, China. This highly contagious virus quickly spread worldwide, resulting in a significant increase in deaths. Symptoms associated with COVID-19 pneumonia include fever, fatigue, dry cough, and difficulty breathing. This review focuses on the impact of the COVID-19 pandemic on radiology technologists, trainees, and students at Al-Wahda Hospital in Derna City, Libya. The purpose of the survey was to assess how the pandemic affected the experiences and well-being of individuals working, training, and studying in the radiology department. Data was collected through distributed questionnaires, with 50 participants providing their responses. The results indicated that the radiology department struggled to meet the heightened demand for imaging services during the pandemic. Fortunately, this study conducted in Derna aims to enhance the understanding of the needs of Libyan radiology departments during crises and disasters. This knowledge is intended to improve the work protocols necessary for effectively managing emergencies. Three years after this study, hospitals in Derna City are now addressing the aftermath of the Daniel Storm disaster, prompting the initiation of a related study.

1. INTRODUCTION

A new coronavirus, known as '2019-nCoV', '2019 novel coronavirus', or 'COVID-19', was identified by the World Health Organization (WHO) as the cause of the pneumonia outbreak that began in December 2019 near Wuhan City in Hubei Province, China. COVID-19 is a pathogenic virus, and while phylogenetic analysis using the available complete genome sequences has been conducted, the intermediate host(s) remain unidentified.

Early investigations into the cases that emerged in Wuhan included ecological sampling at the Huanan Wholesale Seafood Market and other local markets. These investigations detailed the various wildlife species available at the Huanan market and tracked the outcomes of those animals after the market's closure. The COVID-19 pandemic has significantly impacted radiography services worldwide. The ongoing restructuring of service delivery continues to affect patient management, making it essential to assess the experiences of the radiology workforce in order to ensure effective service provision during and after the pandemic. Implementing safety protocols for radiology staff handling patients with confirmed or suspected COVID-19 is crucial in preventing the further spread of the virus among patients and healthcare workers. Coronaviruses primarily cause gastrointestinal and respiratory infections and are classified into four main categories: Gamma-coronavirus, Delta-coronavirus, Beta-coronavirus, and Alpha-coronavirus. The first two types mainly infect birds, while the latter two predominantly affect mammals. Six human coronaviruses have been formally identified, including HCoV-HKU1, HCoV-OC43, MERS-CoV, and SARS-CoV. SARS-CoV is classified as a Beta-coronavirus, while HCoV-229E and HCoV-NL63 fall under the Alpha-coronavirus category. The global focus on coronaviruses increased significantly during the 2003 SARS outbreak and, more recently, due to the COVID-19 pandemic. SARS-CoV and MERS-CoV are known for their high pathogenicity, transmitting from bats to palm civets or dromedary camels and then to humans. COVID-19 spreads mainly through respiratory droplets and close contact between infected and susceptible individuals. Although airborne transmission has not been conclusively established and is not considered a major transmission route based on current evidence, it may occur during specific aerosol-generating medical procedures. Some clinical studies have noted the active presence of the virus. By mid-April 2020, numerous laboratory-confirmed cases had emerged, with 77.8% of cases occurring in individuals aged 30 to 69 years. Concerns surrounding the novel coronavirus remain significant. While it seems to have originated in animals, identifying the specific animals and sources involved, as well as understanding transmission routes, incubation periods, the characteristics of vulnerable populations, and survival rates, is essential. Despite ongoing research, the clinical understanding of COVID-19—including age-related factors, animal origins, incubation periods, outbreak patterns, viral behaviors, pathogenesis, autopsy findings, and responses to antiviral treatments in severe cases—remains limited.

Education and training in radiology are critically important due to medical imaging's vital role in effective clinical practice. The emphasis in medical training has shifted towards essential radiology concepts, including image interpretation skills, appropriate ordering of radiological tests, safe use of ionizing radiation, and exposure to interventional radiology. Advancements in radiology, driven by the digital revolution, have positively influenced education and training in the field. However, with the onset of the COVID-19 pandemic, many training institutions and hospitals reduced non-urgent outpatient appointments, which led to fewer clinical case reviews, consultations, and on-site training sessions. Several medical schools and research institutions completely suspended in-person academic activities. Consequently, medical educators faced challenges in delivering the radiology curriculum while ensuring safe and effective teaching. To address the limitations caused by decreased clinical exposure, online teaching platforms largely replaced traditional lectures, and radiology educators employed interactive methods through e-learning. Techniques such as live case reviews, journal clubs, simulation-based training, clinical interactions, and the development of protocols for radiology exams helped mitigate the effects of reduced clinical interaction. This article aims to highlight how the COVID-19 pandemic has impacted imaging departments by analyzing service delivery and the experiences of the workforce. Although most countries have ceased reporting COVID-19 cases, and the Coronavirus Tracker is no longer being updated, the disease has affected over 7 million individuals worldwide, resulting in more than 7,010,681 deaths. Healthcare facilities globally have adapted to the pandemic by changing service delivery methods and reallocating resources to increase capacity. Despite the relatively short duration of the pandemic, its effects have significant implications for radiology departments around the world.

2. METHOD

In This Quantitative Research, the type of research used is descriptive research with a phenomenological approach (Sekaran, 2006). A questionnaire designed to capture the impact of COVID-19 on radiology trainers, technologists and students was sent to all workers, students and trainees in the city of Derna. Trainees were questioned about changes that had occurred over a period starting at the beginning of the COVID-19 pandemic. All survey responses (n=50) were anonymized and the results were subsequently analyzed.

QUESTIONNAIRE DESIGN

The questionnaire was designed to capture the impact of the pandemic on radiology trainers, technologists, and students. To ensure that the survey was robust, it was piloted internally before distributing the final version. A copy of the questionnaire was distributed to all 50 radiology workers currently within the region and the completion of this survey was entirely voluntary. An informed consent was signed and filled out in addition to the questionnaire for every participant. Trainees were questioned about changes that had occurred over a period starting at the beginning of the COVID-19 pandemic in Libya (March 2020), up to the time of survey completion (Oct 2022). This timing was perfect as by this time many radiology specialist trainers were well integrated into medical notes, and radiology departmental workflow changes in response to COVID-19 were well established.

3. ETHIC APPROVAL

For research to be considered ethical, The Ethical principles were followed as stated in Belmont Report (Gronowski et al, 2019). An informed consent was signed, and a questionnaire was filled for every participant in the project.

4. RESULT

Statistical Analysis

Data collection and analysis were conducted using IBM SPSS version 20.0. Descriptive statistics were presented as counts and percentages to summarize the collected data. To assess the impact of the COVID-19 lockdown on the academic performance of technologists, trainers, and students in the Radiology Department, a Likert scale was utilized. The responses were assigned numerical values as follows: greatly affected = 5, considerably affected = 4, moderately affected = 3, slightly affected = 2, and not affected = 1.

Demographic Characteristics of Participants

A total of fifty individuals participated in the study, resulting in a response rate of 99%. Among the respondents, 30 (60%) were male, and 20 (40%) were female (see Table 1). Participants' ages ranged from 20 to 50 years, with an average age of 24.10 years (SD = 5.93). Approximately 60% of the participants were in the 20 to 30-year age group, while 20% were between 30 and 40 years, and the remaining 20% were aged 40 to 50 years (see Figure 1). The largest group consisted of technologists, accounting for 70% (n = 35) of the respondents, followed by students at about 16% (n = 8). Additionally, 12% (n = 6) were trainers, and 2% (n = 1) were professionals in the field (see Figure 2).

Table 1: Sociodemographic characteristics of participants.

Variables	Number	Male	Female
Total Number	50	30	20
Technologists	35	23	12
Trainer	6	4	2
Students	8	2	6
Others	1		0

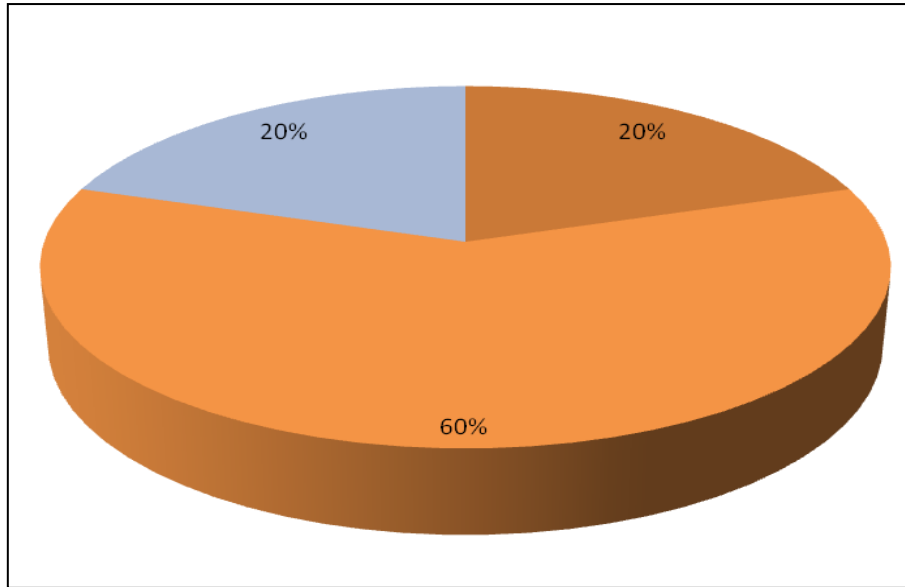


Figure 1: Age distribution of participants.

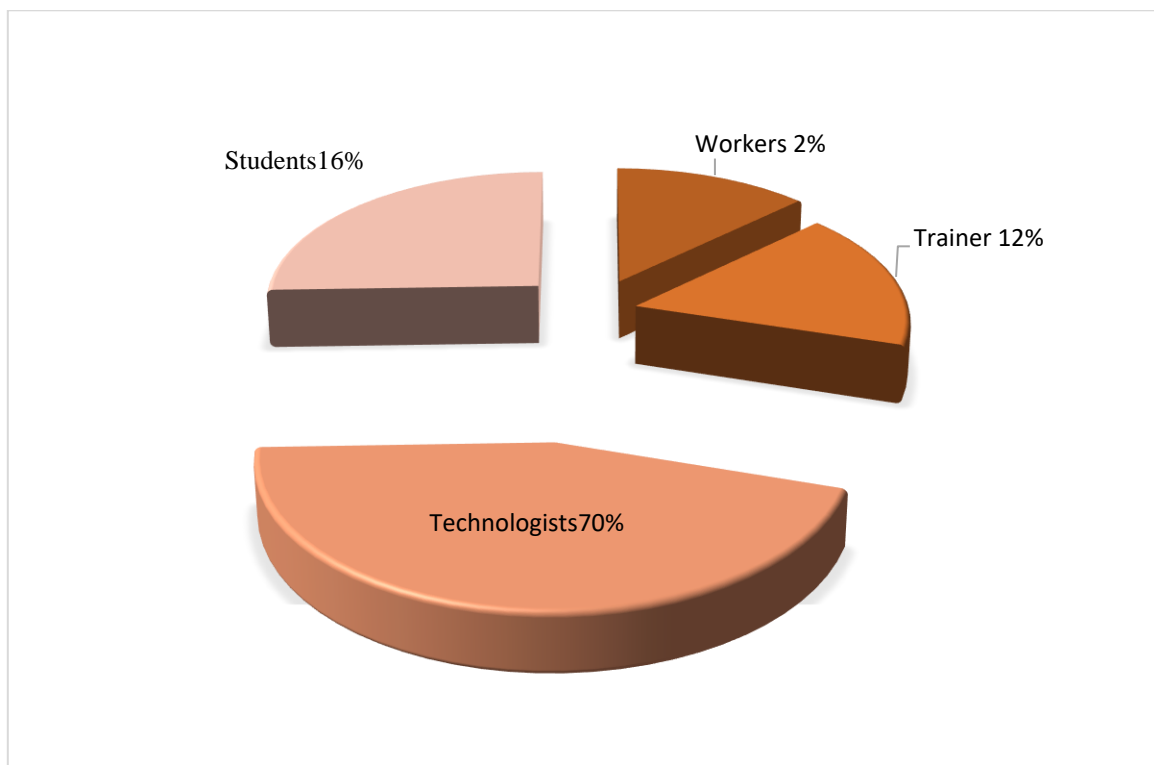


Figure 2: Distribution of duties among the participants. The impact of the pandemic on the workload

Among of all participants, the majority of them were keep working 52% (n=26), some contributors prefer reducing working hours 22% (n=11). On the other hand, few contributors choose working for emergency 6% (n=3) and 20% (n=10) participants decide stop working during the pandemic (Figure 3).

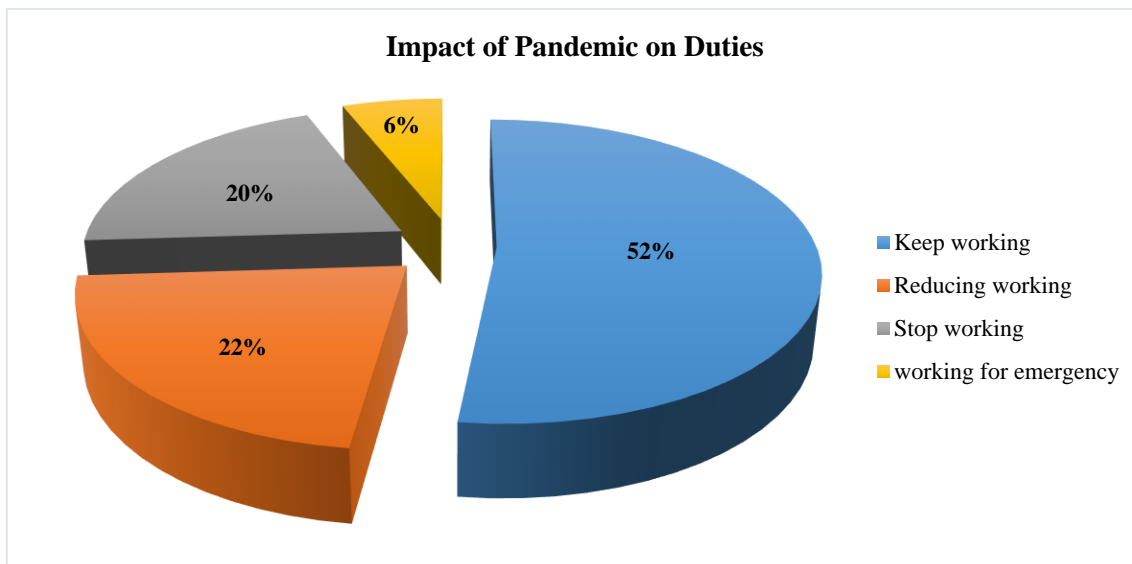


Figure 3: The impact of the pandemic among the participants.

All of all, even though there is an equality among technologists, trainers and students regarding reducing working hours, The highest effected group by the pandemic which stop working was the technologists compared with the trainee group (Figure 4).

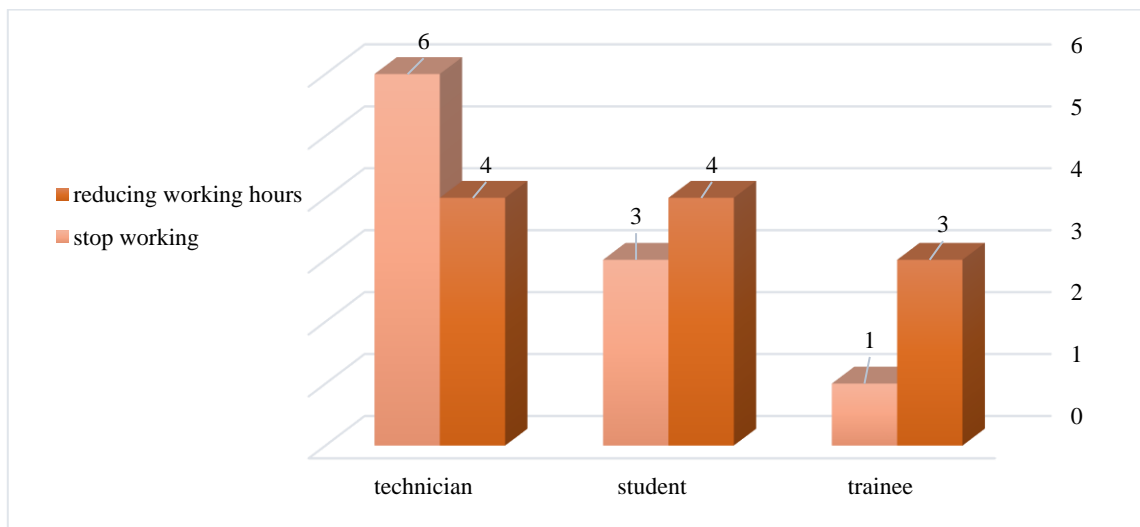


Figure 4: The most affected categories during the pandemic among the participants.

5. DISCUSSION

The present study surveyed trainers from radiology departments to assess the impact of the COVID-19 pandemic on their training and well-being (Veerasuri et al., 2020). To the authors' knowledge, this is the first survey evaluating the experiences and well-being of radiology trainers in Libya during this pandemic.

Participants' demographic characteristics indicated that the majority were in the younger age group of 20 to 30 years (60%). Additionally, there was gender equality among the respondents, with most of them being technologists (70%). This may be attributed to their responsibilities and their extensive knowledge about COVID-19 gained from social media (Buckley & MacMahon, 2021). Early in the pandemic, it became evident that social distancing requirements prevented face-to-face clinical conferences and classroom-based radiology education from continuing (Chu et al., 2020). As a result, 52% of the contributors continued to work in conventional settings, while 22% engaged in infection control programs, which were well-received by most trainers and practicing radiologists.

In response to staff demands for remote work and reduced in-hospital presence, many hospitals expedited the implementation of tele-radiology solutions (Hussain & Islam, 2020). Nosocomial outbreaks among clinical teams jeopardized service sustainability due to staff absences caused by illness or self-isolation.

The need to maintain effective physical distancing, ensure safe patient flows, and thoroughly decontaminate equipment in overcrowded, cramped, and poorly ventilated radiology departments resulted in significantly reduced patient and staff throughput (Abbas et al., 2021). This may explain why only 6% of the participants intended to work in emergencies, while 20% ceased working during the pandemic.

Undoubtedly, the pandemic has significantly affected technologists, many of whom stopped working due to heightened panic over high global mortality rates (Alkan & Cilengiroglu, 2022). The COVID-19 pandemic has led to major changes in the working patterns of most healthcare professionals, requiring departments to be responsive, adaptable, and innovative (Erjalía & Syakurah, 2021). The global crisis alone has caused stress and anxiety worldwide. In radiology, there have been substantial changes to workloads and working patterns, forcing some to return to clinical medicine without adequate time for mental or physical preparation (Gibney et al., 2021). These alterations in work dynamics will undoubtedly impact well-being, as it is noteworthy that in some hospitals, not only radiology trainees but also consultant radiologists were redeployed (Alkan & Cilengiroglu, 2022). The present study surveyed trainers from radiology departments to assess the impact of the COVID-19 pandemic on their training and well-being (Veerasuri et al., 2020). To the authors' knowledge, this is the first survey evaluating the experiences and well-being of radiology trainers in Libya during this pandemic.

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6. CONCLUSION

The onset of the COVID-19 pandemic profoundly affected training and healthcare systems. The insights gained from this experience should enhance our preparedness for future waves of COVID-19 or similar pandemics.

At the start, containment strategies adhered to established protocols, which included isolating infected individuals, maintaining physical distance between patients and staff, and using personal protective equipment (PPE) such as masks, gloves, gowns, and eye protection. Hospitals with prior experience in managing coronavirus outbreaks were generally more effective in controlling infections due to their established procedures. In contrast, regions encountering their first coronavirus outbreak experienced significantly higher rates of infection and mortality among healthcare workers.

Ensuring a sufficient supply of PPE and conducting regular training on its proper use are essential, as these measures have consistently proven effective in reducing cross-infections. During the recovery phase of healthcare systems, radiologists must prioritize safe patient care. Overcrowding in departments and unrealistic patient scheduling could lead to further outbreaks, not only of COVID-19 but also of other hospital-acquired infections.

While COVID-19 has understandably dominated discussions, radiology departments must also address other microbial threats that pose risks to patients and staff. The morbidity, mortality, and costs associated with hospital-acquired infections have significantly increased in recent years. This complex issue arises from multiple factors, including the rise of multidrug-resistant bacteria, a growing number of patients with weakened immune systems due to cytotoxic and immunomodulating treatments, and lapses in adherence to established infection control protocols.

Frequent reports of infection outbreaks linked to deficiencies in basic infection control highlight that infections can spread through contaminated equipment, shared computer keyboards, and, most critically, inadequate hand hygiene.

RECOMMENDATIONS

It is recommended to

1. Increase investment in staff training, acceptance of personal responsibility and rigorous enforcement of infection control policy.
2. Similar information should be gathered, which would enable planning for regional variations and supporting during such challenging times.

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