

Original Article

Challenges for Radio-technologists at Radiology Departments in Libya

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ABSTRACT

The radiology departments have enormous obstacles providing particular services to reach an acceptable level of patient satisfaction. There is several consideration regarding radiation-induced deterministic consequences on patients and medical professionals during radiology procedures. Among the various challenges posed are; the lack of quality assurance procedures, the use of incorrect techniques, and the improper or non-usage of radiation protective tools and increase workload are the main causes of deterministic injuries. The study aimed to assess and identify the critical problems and difficulties faced by radio technologists in specific Libyan hospitals. The study's target population was Libyan radiology technologists. A cross-sectional study was conducted. Where 95 questionnaires were distributed to the selected governmental hospitals and private clinics from March to May 2021. The collected data were analyzed using the Microsoft Word Excel program. According to the findings, the most frequent problems encountered by radiology technicians in hospitals are the absence of quality control tests (79 per cent), a lack of protective gear (57 per cent), working in an environment without adequate radiation protection (more than half), and a lack of A thermoluminescent dosimeter (TLD) devices (87 per cent). Our investigation of the radiology departments of Libyan hospitals revealed several issues and problems that have a detrimental impact on workflow and the quality of care and service delivery. The proper authorities should implement the necessary improvements.

Keywords: Radiography, Challenges at radiography departments, Radio-technologists, Quality control management, radiation protective tools, Patient safety.

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Introduction:

Radiological imaging is extremely valuable as a diagnostic tool, and during the last years, it represents one of the fastest-growing areas in Medicine (1) (2). This progress facilitates the detection and characterization of different human diseases. The radiography is a photographic process that can penetrate the body to image the anatomical structure using X ray energies. These energies are absorbed in different rates by different tissue densities and are particularly effective for imaging bone and dense departments must be diligent in ensuring that all the equipment used is in good condition and of high quality. Radiology departments face tremendous challenges to meet specific service requirements and reach an acceptable level of patient satisfaction. One of the main problems observed in the field is the poor or even lacking knowledge regarding to what ionizing radiation is, on the part of both the service staff and patients (4).

Material and methods

Study design: A cross-section study was chosen as the most appropriate design to meet the study objectives. Thus, the sample size was lower than the targeted.

Study population: Radio-technologists from some government and some private clinics, In this study Government hospitals were Zawia educational, national oncology institute Sabratha, suq aljomah clinic Sabratha, combined clinic AL Ealalqah, AL Zahra, Tripoli Central, burns and plastic

tissues.(3) A radiology service comprise methods relying on both ionizing and non-ionizing radiations, covering conventional radiology, fluoroscopy, nuclear medicine, computed tomography, mammography, interventional radiology, bone densitometry, ultrasonography and magnetic resonance imaging, among others(1) . The role of ergonomics in radiology is to ensure that working conditions are optimized to avoid injury and fatigue. Quality assurance

surgery hospitals., private clinics were Al-Ishraq Clinic, Nawat Al-Mustaqbal Clinic, Nesma Medical Hospital, Alnoran hospital, Alleeby Alajnabi Clinic, and Alkhalil Clinic.

Sample size: Data was collected from ninety-five radio technologists working in both government and private sectors.

Study instrument: The research was carried out using a questionnaire developed by the researchers and revised by supervisors. The questionnaire consists of twenty-four questions.

Data collection: Data was collected in the period from 1 March until the end of May 2021. The results were analyzed using Microsoft word excel program. We will also show some positives and negatives points those might have an impact on the results of the questionnaire

Results

A total 95 of radio-technologists responded to the survey, of which 59% (56/95) were

Males and 41% (39/95) females as shown in (figure 1).

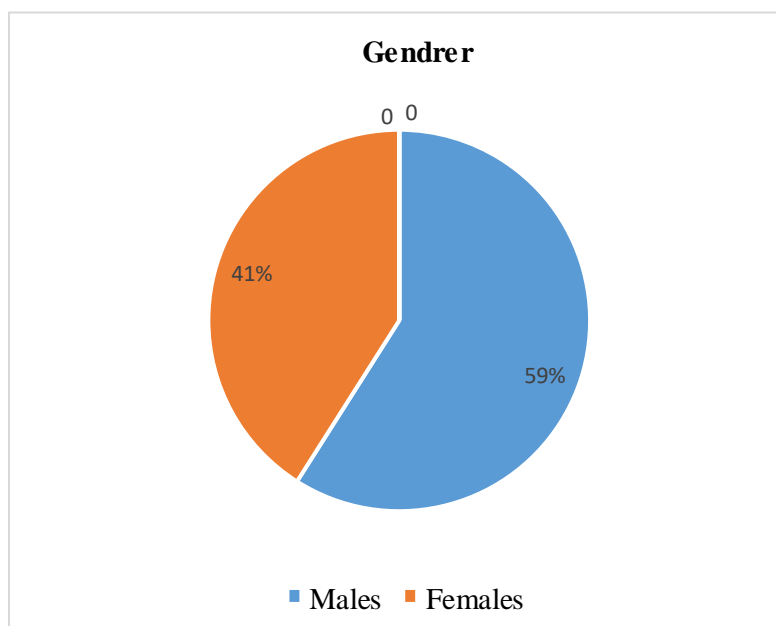


Figure 1. Shows distribution of participants according to the gender.

In this study, 11 % (10/95) of the radio-technologists were trained under junior and senior supervision. Among this

including 24% of intermediate diploma graduates, 29% of high diploma graduates, and 47% of bachelor's graduates (Figure 2).

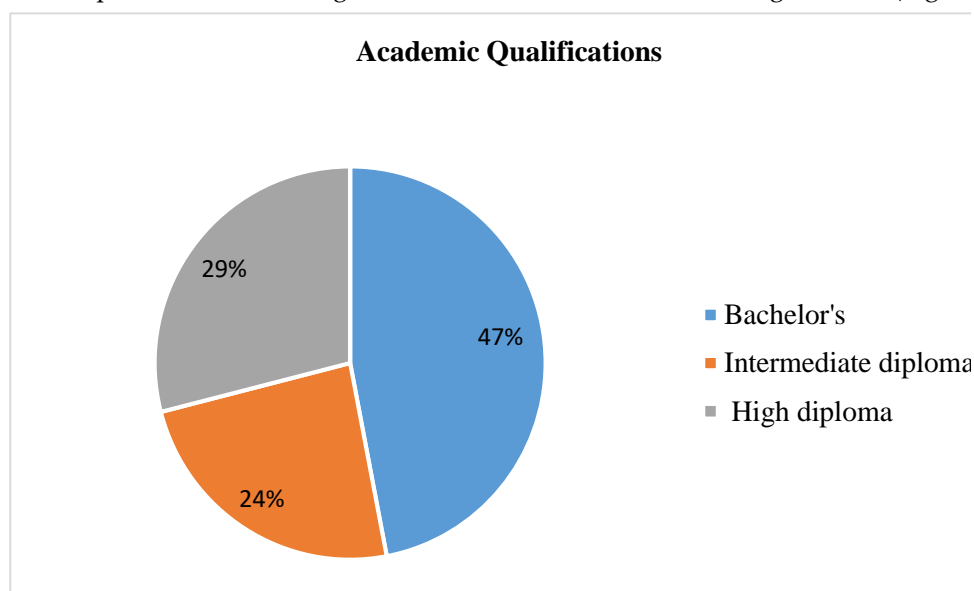


Figure 2. Academic qualifications of participants.

In terms of number of years of experience, 34% of the participants have work 1-5 year of experience, while only 3% have a work

experience of 30-35 years. More details about of experience are shown in (Figure 3).

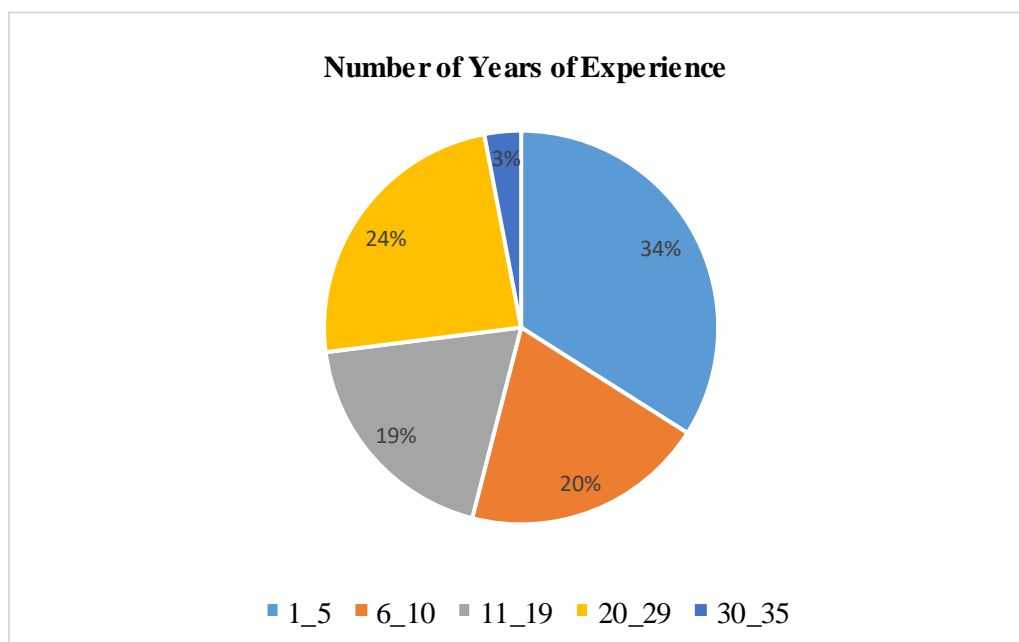


Figure 3. Number of years of experience of participants.

Table 1. Results of the Radio-technologists Questionnaire.

Question	Answers		
	Yes	No	Sometimes
1. Are department amenities available?	38%	62%	
2. Is the department managed by one of the technicians specialized in the field of radiology or a doctor?	73%	27%	
3. Have you ever been ill-treated by patients or those accompanying the patients?	59%	41%	
4. Are you the one who is doing all radiological procedures that may increase your work load without protection?	60%	26%	14%
5. Have you ever used worn out devices?	54%	46%	
6. Is the nursing staff available in the department permanently?	32%	39%	29%
7. Do you work in a room that has radiation protection specifications?	51%	49%	
8. Do you feel tired and exhausted after a period of work?	49%	34%	17%
9. Is the periodic inspection renewed on the TLD device that measures the amount of radiation exposure?	13%	87%	
10. If the answer of the previous question, answer was (yes) - is the percentage measured by the competent authorities and do they inform you of with the result.	8%	92%	
11. Is there a regular medical health reviews of periodic and examination to check out the complication of radiation	8%	87%	5%
12. Do you suffer from any diseases as a result of your work with radiation?	9%	91%	
13. Do you suffer from long-term health effects e.g. fertility and childbearing?	3%	97%	

14. Do you have protective equipment?	43%	57%	
15. Does your department provide you a healthy lunch?	33%	67%	
16. Are radiological devices checked regularly?	6%	62%	32%
17. Are those units examined annually by a qualified medical physicist?	5%	71%	24%
18. Are quality control tests regularly carried out and well documented?	12%	79%	9%
19. Are imaging materials and tools available, such as contrast materials, film and medication?	49%	10%	41%
20. does anesthesia was performed for patient with uncontrolled movement	49%	37%	14%
21. Are radiology departments well equipped to deal with adverse reactions from contrast materials?	33%	67%	

The results of questionnaires related to participants were presented in Table 1. The results showed that the majority of participants (62%) reported the lack of amenities in the department, such as sitting room, chairs and bathroom. About 73% of radio-technologists reported that radiology technicians are responsible for managing the departments.

The finding indicated that 59% of participants were subjected to bad behavior from patients and their companions. Also 60% of the participants were doing all the radiology procedures, starting from receiving the patient to delivering the results of the procedure, which unfortunately increase workload without protection. While 54 % of participants reported using old and unusable devices. Although, 39% of participants reported that nursing staff were not regularly present in the department, and 29% answered sometimes nursing staff were present at the department. About 49% of participant has reported that they did not work in a room that had radiation protection specifications.

Our data have also showed that 49% of the participants exhibited work related problems such as headaches, eye, and lower back pain, and 17% reported that they sometimes feel tired and exhausted. Around 87% of participant's report that a periodic examination of the TLD device that measures the amount of radiation

exposure is not renewed. Furthermore, 8% (n=12) radiology technicians out of 95 reported that they renew their TLD devices and the authority inform them with percentage of exposures to radiation. Were the majority 87 % of respondents reported that that the TLD device was completely unavailable.

The medical examination for the technicians was not regular and 87% of the participants do not have medical follow-up to exclude any of ionizing radiation Side effects. The findings showed that 9% of participants suffer from illnesses because of their radiology work. The work-related disease we detected in 9% of the participants (e.g. thyroid tumor, skin problems, pain in the joints, hair loss, and poor vision).

The prolonged exposure to radiation had effect on some people, since 3% of participants have problems related to fertility and childbearing. Nearly, 57% of participant's told us they did not have protective equipment, such as a lead coat and leaded eyeglasses. While about 67% of participants said that, they do not eat a healthy meal in the department while they were working. Also 62% of participants reported that radiology devices are not checked continuously, while 32% mentioned that radiology devices are sometimes checked.

Almost 71 % of the participant's reported that qualified medical physicist did not inspect the radiology units, while 24 % reported the opposite.

About 79% of the participant's reported that quality control tests are not carried out and their results are recorded in a special register, and 9% of the radiology technicians reported that quality control tests are sometimes carried out. Approximately 10% of participant's reported the lack of facilities and materials for imaging, such as films, medicines, contrast media, and others, and 41% of participant's reported the availability of imaging capabilities and materials are sometimes available.

in this study, 37% of the participant's reported that anesthesia is not performed in patients with uncontrolled movement, such as Alzheimer's and children's cases, and 14% of the participant's reported that anesthesia is applied to patients in cases where it is necessary sometimes. Up to 67% of participant's claim that radiology departments are not well prepared for an emergency and any adverse effect, which might be happened during administration of contrast agent inadequately to handle. Table 1 provides additional information.

Discussion

This study aimed to assess problems and difficulties in radiology departments to compare them with many other studies. In this study most of the participants have clarified many of the difficulties they face off, which negatively affect the workflow within the department.

A large proportion (87%) of the radio-technologists participating in this study showed that the periodic examination of the TLD was not renewed, and stated that the TLD was not available at all. Where radiation risks cannot be assessed and corrective measures taken. This finding is consistent with that obtained in a study

conducted in ten hospitals in South Eastern Nigeria in 2010(5)(6). Whereas, a TLD device is available in only four of 10 hospitals (40%) and in two hospitals, radiological monitoring does not cover all working photographers (7)(8). In addition, in study conducted in the Kingdom of Saudi Arabia in 2013(10), which reported, actual utilization rate of radiation dosimeters is 57.7 % and 68.9% (7). Moreover, another study was conducted in Pakistan in 2008 showed that only 7% regularly utilized a radiation dose badge to monitor the exposure (11). On the contrary, Mojiri et al., Reported that application of TLD device (70%) and periodic examination (63%) among the participants (12). We therefore note that all radio-technologists are at risk of radiation and therefore must be monitored.

The level of performing quality control tests and recording the results in a private registry was very low among the participants in this study. It is clear that (79%) of radio-technologists participating in this study reported not performing quality control tests and recording the results. This finding is in agreement with other study conducted in three capital cities of North East India on 2016, in which about 70% of the facilities did not carry out periodic quality assurance testing of their x-ray equipment or surveys of radiation leakage around the x-ray room (13). And in another study conducted in Iran in 2009, is to consider the quality control of nine radiological devices in nine hospitals, it was concluded from this study that six out of the nine devices have not the required standards for voltage accuracy and required fixing (14). Adhikari et al., in a study conducted in different hospitals in Nepal, reported that was no quality, control program in any of the surveyed hospitals (15).

About 49% of participating radio-technologists reported that they did not work in a room with radiation protection

specifications. This result is close to the results demonstrated in a study conducted in nine government hospitals in Gaza governorates in 2016, the results indicate that the fluoroscopy and CT scan rooms were not efficiently lead lined and the radiation protection is not well organized. The measured values of radiation dose rate at different locations in basic X-ray and mammography rooms are found within a permissible limit for occupational staff and public. However, the recommended distance between the X-ray machine and control panel have not been achieved in some rooms (16). While Bari et al., in a study conducted in seven hospitals in Duhok governorate in 2015, reported that it was observed that most hospital barriers (doors and walls) were not suitable for the criteria except for two hospitals (17). Therefore, there is a desperate need for rules, regulations and radiation protection act in the field of radiation in medical field.

(57%) of the participants in this study did not have protective equipment, such as a lead coat, thyroid shields and lead glasses. This finding is consistent with that obtained in a study conducted in Kingdom of Saudi Arabia, in which most participants have lead aprons and thyroid shields in place, but only about 50% have lead glasses and lead shields, actual utilization rate of radiation dosimeters is 57.7% and 68.9%, respectively (7). Similarly, in a study conducted in the Gaza, Palestine in 2016, the participants reported that 35.2% of personal radiation protection devices are available (18). On the contrary, Lynskey et al., reported that have lead apron (99%), thyroid shield (94%), leaded eyeglasses (54%) (19).

Although the majority of participants 86 out of 95 (91%) do not suffer from any health problems as a result of their work with radiology, there was a percentage of 9 out of 95 (9%) that is not considered simple compared to the number of participants who reported the presence of satisfactory

effects as a result of their work represented in, according to them were a tumor in the thyroid gland, pain in the joints, hair loss, poor vision, skin problems, and water in the eyes. and 3% have problems related to fertility and childbearing. A study was conducted in the Italy in 2006, show that Low back pain was the most commonly reported symptom (59.6%), followed by shoulder (21.2%), neck (19.7%) (20). While a study conducted in a teaching hospital in Northern Nigeria in 2016, showed that 17 (15.5%) and 11 (10.0%) of 110 participants had anemia and leukopenia respectively (21). Moreover, in study by Vano et al., that reported 21% of nurses and technicians had radiation-associated posterior lens changes (22). While a study in the United States in 2002, reported higher risk for breast cancer among radiologic technologists first employed prior to 1940, compared to those first employed in 1960 or later (23). A Similar study by Cioffi et al. was reported that According to the values of thyroid hormones, hypothyroidism was considered in 11 exposed workers (9.2%) and it is interesting that this condition is significantly associated with exposure to ionizing radiation (24). However, there are few studies on the association of ionizing radiation with pathological effects, so it is necessary to conduct more studies to confirm this association on a larger number of workers.

A large proportion (87%) of the participants in this study did not undergo any regular medical examinations to see if there were any detrimental effects of ionizing radiation. This result is close to that obtained in a study conducted in three hospitals in Kermanshah, Iran in 2015, where (43.8%) only of radiographers reported that they had regular medical examinations (25). Similarly, in a study conducted by Ali et al., reported that 47 (42.7%) of participants never done periodical examination (26). Apparently, not only hospital authorities, but also heads of departments ignore radiation protection

principles for the patients and radiographers.

While (73%) of the participants in this study reported that the department is managed by a technician. The department is supposed to be managed by a radiologist with high experience and competence that enables him to manage the department. In addition, the general supervision of the department must be carried out by a specialized radio-technologist who is well trained and qualified in this field, because he is more familiar with the department's requirements and needs.

According to our observations during our field visits to the hospitals involved in the study, the radiology departments run by the radiologist and the radio-supervisor technologists have fewer issues than those run by the radiology technician. In addition to the field visit, we observed that some of the study participants lacked credibility and intentionally provided false information, which complicated conducting an accurate assessment of these issues.

We have in this study also observed a lack of and flaws in numerous areas, such as the lack of radiation protection equipment for technicians, the fact that there is only one photocopy room for each X-ray, CT scan, and MRI test compared to the number of cases, which causes overcrowding in the department, the absence of a waiting area that is appropriate for patients and their companions, the existence of some

radiology machine malfunctions, the inefficiency of some doctors when writing the request and inducing the test, and As a result, the patient was made to repeat the image and some technicians with intermediate degrees in this area were ineffective. However, these things are required for flawless work.

Conclusion

The field of radiology is rapidly developing due to technological advancement and the globalization of healthcare. This continuous development significantly affects the quality of care and service delivery. This investigation aims to assess the challenges and difficulties faced by radiology departments in Libyan hospitals.

This study revealed many challenges such as the lack of protective equipment and imaging materials, the lack of quality control tests, exposure to bad behaviour by patients and their companions, the lack of nursing staff, and other problems that negatively affect the workflow. Physicians and professional organizations must display initiative, and oversee and treat challenging conditions effectively. The limitation of this study was questionnaire was distributed for about three months, excluding holidays, but it received a low response rate. To confirm this association in more hospitals, more research is required as there are not many studies on this topic.

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