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Factors influencing the development and implementation of radiology technologist specialist role in image interpretation in Sudan

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Highlights

- There are doubts about the readiness to implement the role of radiology technologist in Sudan.
- Sudan needs a change in image interpretation by the radiographers.
- Training affects the radiology technologist specialist's role in image interpretation.

ABSTRACT

Introduction: This study investigates the factors influencing the development and implementation of radiology technologist specialists' role in image interpretation in Sudan, a role that has yet to be widely explored.

Methods: A cross-sectional study was conducted by recruiting ten radiology college deans in Sudan. Data were collected via an online questionnaire and analyzed using descriptive statistics.

Results: Half of the deans were doubtful about Sudan's readiness to implement the role of radiology technologist specialists in image interpretation. The majority (60%) believed researchers had strongly pushed the issue over the past decade. The key factors affecting the implementation included education and training (100%), recognition (30%), technical issues (30%), people-related factors (20%), management changes (30%), government involvement (30%), costs (10%), and timings (20%).

Conclusion: The study highlights the need for a shift in image interpretation by radiographers in Sudan. Training and education are critical to this shift, along with systemic changes such as government involvement and improved recognition of the role. Future studies should focus on further assessing readiness and developing actionable strategies for implementation.

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Introduction

Radiographers are trained health professionals responsible for producing high-quality medical images for physicians and radiologists. These images are useful in diagnosing and treating various injuries and diseases, so radiographers are considered a requisite member within a healthcare setting. The main duty of a radiology technologist is to apply several imaging procedures to assist medical specialists in diagnosing and monitoring the injury and illness of affected individuals. The imaging procedures may include X-rays, computed tomography, ultrasound, Magnetic resonance imaging, and mammography. In Sudan, education related to radiography dates back to 1932 and 1995. These years hold significant importance in history as there was a significant change in the curriculum by awarding bachelor's degrees to the students rather than just a diploma certificate(1-3).

In northeastern Africa, Sudan is the first country to introduce bachelor's, master's, and PhD degrees to achieve excellence in medical imaging technology. The past two decades have observed significant and major changes in the delivery of health care services after the development of radiographers. For instance, a workshop entitled 'Inter Profession Advisory Taskforce – IPAT' was organized by the Australian Institute of Radiography (AIR) to guide the advanced clinical role of registered radiographers. The meeting was conducted with representatives from the Royal Australian and New Zealand College of Radiologists (RANZCR), which resulted in the presentation of 13 recommendations for radiographers(3).

On the contrary, the Radiographer Advanced Practice Model has been introduced by the United States and the United Kingdom, which increases the capability of technology radiologists to face challenges related to decreased number of radiologists and support increased demands (4). Previous studies have depicted that the growing demands of the healthcare industry are likely to be met by the National Health Service in the United Kingdom (5-7). The legislation allowing approved and certified radiographers to report on selected images was introduced by the government of the United Kingdom a decade ago. Implementing this legislation has reduced workload, which has improved service delivery and cost savings in healthcare settings. However, the studies have yet to report the factors that affect the role of radiology technologists in image interpretation in Sudan. Therefore, the present study aims to investigate the factors that affect the development and implementation of radiology technologist specialists' role in interpreting radiological images in Sudan.

Material and Methods

Study Design and Setting

The study, conducted between July 2017 and September 2022, employed a cross-sectional quantitative design to provide deep insight into the factors that affect the role of Sudanese radiographers in image interpretation.

Study Population and Sample

The target population for this study was the present and former deans of radiology colleges in Sudan, with a total of 15 deans. However, ten deans participated in the study, with a response rate of 67%.

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Ethical Consideration

The study requires no ethical approval as its main aim is to investigate the current practices of service evaluation within the Sudanese healthcare setting. However, the respondents were assured that the information gathered through the survey would be kept anonymous and their privacy would be protected.

Data Collection

The data for this study was collected using a questionnaire distributed to the respondents through an online survey, Google Forms. The questionnaire was created using Survey Monkey, and its link was sent personally to the deans. The online-distributed survey was simple and clear, clearly defining the target population to avoid bias in conducting the study. The qualified radiology teaching staff members revised and modified the questionnaire to avoid bias or ambiguity. The survey resulted from response feedback; the data were collected from direct interviews for some of them, and the others replied to the questionnaire through an online survey using Google Forms. The questionnaire effectively reflected and described the broader nature of Sudanese radiographers responsible for image interpretations.

Data Analysis

The data gathered from the participants through an online questionnaire was entered into Excel and then opened in IBM-SPSS version 16.0 to generate descriptive statistics.

Results

A total of 10 deans of radiology colleges in Sudan participated in the study. Most respondents (60%) were currently positioned in the post of dean, whereas 40% were former deans (Table 1). Almost all of the respondents (90%) stated they wanted a change in image interpretation by the radiographers in Sudan. However, 50% of the deans were doubtful about Sudan's readiness to implement the role of radiology technologist specialists in image interpretation (Table 1).

Table 1: Demographic Profile of the Respondents

Item	Measure	Frequency	Percentage
Leadership Position	Current Dean	6	60%
	Former Dean	4	40%
Do you think we need a change in image interpretation by the radiographers in Sudan?	Yes	9	90%
	No	1	10%
Is Sudan ready to implement the role of a radiology technologist specialist in image interpretation?	Yes	5	50%
	No	5	50%

Table 2 shows the significant changes needed to implement the radiology technologist specialist role in image interpretation. Most respondents (40%) stated that public and foreign universities need to implement this change, whereas 10% stated that public and private universities need to implement this change. The information related to awareness about the

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implementation of the radiology technologist specialist's role in image interpretation has been illustrated in Table 3. Most respondents (60%) stated that researchers had strongly pushed this issue over the past decade. The perspectives of healthcare stakeholders included the obstacles faced by radiologists (60%), concerns (40%), career pathways (50%), better patient outcomes (70%), better teamwork (80%), and improved workflow (60%).

Table 2: Significant changes needed in the implementation of the radiology technologist specialist role in image interpretation

Item	Measure	Frequency	Percentage
Minimum certificate Required for radiographers	PGD	-	-
	MSc	8	80%
	PhD	2	20%
Change Justifications (multiple answers provided by the respondents)	Quality of healthcare	3	30%
	Development/New Pathways for Career	5	50%
	Reduced cost	5	50%
	Better health services	6	60%
	Government support	2	20%
	Radiologists' shortage	4	40%
	Leadership	1	10%
	Support from the National Council for medical and health professions	6	60%
Universities that need to implement this change	Public universities	4	40%
	Private Universities	1	10%
	Abroad universities	4	40%
	Public and private universities both	1	10%

Table 3: Awareness about the implementation of radiology technologist specialist role in image interpretation

Item	Measure	Frequency	Percentage
Have researchers most strongly pushed this issue over the past decade?	Yes	6	60%
	No	4	40%
Role of Judgment	Role of the National Council for Medical and Health Professions (NCMHP)	8	80%
	Ministry of Health	2	20%
Healthcare stakeholders'	Radiologists as obstacles	6	60%

Vol. 1 No3; October 2024 https://doi.org/10.31674/ijbb.2024.v01i03.003

perspectives (multiple answers provided by the respondents)	Radiographers' concerns	4	40%
	Career pathway for technologists	5	50%
	Better patient outcomes	7	70%
	Better teamwork	8	80%
	Improved workflow	6	60%
Radiologists considered the biggest impediment facing the development of the role of RTS in Sudan.	Agree	8	80%
	Disagree	20	20%
Time to introduce this role in Sudan	>5 years	4	40%
	Next year	-	-
	No plan	6	60%
Target areas (multiple answers provided by the respondents)	Emergency department	8	80%
	Rural and remote areas	7	70%
	Conventional radiography	6	60%
	Other	1	10%

Table 4 presents the factors that affect the implementation of the radiology technologist specialist's role in image interpretation. These factors included education/training (100%), recognition (30%), technical issues (30%), people-related issues (20%), management changes (30%), government role (30%), costs (10%), and timings (20%).

Table 4: Factors affecting the implementation of radiology technologist specialist role in image interpretation

Item	**Measure**	**Frequency**	**Percentage**
Factors affecting management of this big change in Sudan	Need strong leadership	7	70%
	Lack of leadership	2	20%
	Legal framework concerns	1	10%
Role of government (multiple answers provided by the respondents)	Limited involvement	2	20%
	No agenda	1	10%
	Communication problems	2	20%
	License to qualified radiographers in image interpretation	90	90%
	Education/Training	10	100%

Factors affecting the development and implementation of radiologic technologist specialist role in image interpretation in Sudan (multiple answers provided by the respondents)	Recognition	3	30%
	Technical issues	3	30%
	People related issues	2	20%
	Management changes	3	30%
	Government role	3	30%
	Costs	1	10%
	Timings	2	20%

Discussion

The results of the present study demonstrate that a significant number of Sudanese radiographers support the need for a change in image interpretation roles. This suggests a desire for progress in Sudan, though challenges such as the absence of formal authorization for radiographers to perform these tasks persist. Similar issues were identified in other regions, including the UAE, where a study by Abuzaid et al. (2021) found that radiographers are still restricted to traditional roles despite their willingness and ability to embrace advanced practice roles with the appropriate education and training (8-10).

The lack of formal recognition for radiographer image interpretation in Sudan echoes findings from other contexts. For instance, in the UK, radiographers have progressively assumed greater responsibilities in image interpretation (8-12). The introduction of advanced roles, such as those allowing radiographers to report on images, has significantly improved service delivery while relieving the workload of radiologists (8,13,14). This role expansion has been met with challenges, particularly concerning acceptance from radiologists, as highlighted in studies like Snaith et al. (2014) (4,15). In Sudan, the absence of structured postgraduate education and stakeholder resistance similarly limits the scope of practice for radiographers. A recent studies noted that formal postgraduate education and licensing frameworks are critical for successfully implementing advanced roles.

The current study also highlights the importance of education and training as key factors influencing the development of the radiographer specialist role in Sudan. These findings are consistent with literature from the regions, underscoring the necessity of continuous professional development for role advancement. A study of sonographers' role in advanced practice found that professionals who underwent formal training were better equipped to take (16-18) n advanced responsibilities, such as reporting sonograms and collaborating with physicians. A clear career progression framework in Sudan is needed to ensure the ability of radiographers to perform image interpretation independently, a challenge also observed in the broader Middle East.

Another critical issue is the need for regulatory support. For instance, the establishment of a regulatory framework has been identified as essential for advancing the role of radiographers. This observation aligns with the current study's findings that inadequate government involvement and weak management systems in Sudan hinder the implementation of expanded roles for radiographers. A regulatory body and clear licensing guidelines would be instrumental in facilitating this shift.

Another challenge identified in the current study is the scarcity of educational programs. Studies in other developing countries have similarly highlighted the shortage of specialized training programs for radiographers, which limits their ability to perform advanced tasks. In Sudan, radiographers face similar obstacles, where the limited availability of postgraduate

programs results in a lack of necessary skills for image interpretation. Addressing this issue through targeted education programs could greatly improve healthcare outcomes by enabling radiographers to take on more specialized tasks, as demonstrated in countries with well-established frameworks for radiographer role advancement.

Conclusion

In conclusion, this study underscores the need for significant systemic changes to advance the role of radiographers in Sudan. Education, training, and government support are critical for successful role development. Similar lessons can be drawn from other countries, such as the UK and UAE, where formal training and regulatory frameworks have been key to expanding radiographers' responsibilities in image interpretation. Future studies should explore strategies to overcome these barriers, including implementing postgraduate programs and establishing regulatory bodies to guide and support role advancement in Sudan.

Study limitations

The study was limited by its small sample size, as only radiology college deans were surveyed, and data collection occurred during a short vacation period. This may have restricted the diversity of perspectives. Additionally, the online questionnaire distribution may have led to rushed or incomplete responses due to the respondents' busy schedules. These factors may have affected the comprehensiveness of the data.

Recommendations

Future research should explore the practical steps required to expand the role of radiographers in image interpretation, focusing on the implementation of structured educational programs and regulatory support. Further studies should involve a broader range of stakeholders, including practicing radiographers and government officials, to gather more comprehensive data. Additionally, workshops and training initiatives should be introduced to ensure radiographers have the necessary skills to assume image interpretation responsibilities. A long-term goal should include creating a sustainable framework that integrates radiographers into the healthcare system as competent image interpreters, improving overall patient care in Sudan.

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Conflict of Interest

The authors declare no competing interests.

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Study Novelty

What is already known about the study?

It is well established that radiographers play a crucial role in the diagnostic imaging process, with some countries, particularly the UK, Canada, and Australia, already implementing advanced roles for radiographers, including image interpretation and reporting. These

developments have positively impacted healthcare delivery, such as reducing radiologist workloads and improving service efficiency. However, the role of radiographers in image interpretation remains underdeveloped in many lower-income countries, including Sudan, where radiographers are still primarily responsible for image acquisition. There is also a known gap in formal education and training programs in such countries, limiting the scope for role expansion.

Study Contribution/Value

This study highlights the barriers preventing the expansion of radiographers' roles in image interpretation in Sudan and identifies key factors such as education, recognition, and government support. It contributes valuable insights into the potential for role development, offering a foundation for future initiatives to improve healthcare services through enhanced radiographer involvement.

Practical Implications in the Field of Study

- Establishing structured education and training programs for radiographers in Sudan can enhance their ability to interpret images, improving healthcare outcomes.
- Government and regulatory support is essential to formalize the role of radiographers in image reporting, reducing radiologists' workloads and speeding up diagnoses.
- Implementing workshops and continuous professional development initiatives can equip radiographers with the necessary skills to take on advanced responsibilities in diagnostic imaging.

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