The changing concept of radiographer's role in UAE: An analysis of radiologists' opinions and acceptance

Abuzaid, M. M., Elshami, W., Kadhom, M., McConnell, J., & Mc Fadden, S. (2022). The changing concept of radiographer's role in UAE: An analysis of radiologists' opinions and acceptance. *Radiography*, *28*(4), 1042-1049. https://doi.org/10.1016/j.radi.2022.07.010

Published in:
Radiography

Publication Status:
Published (in print/issue): 01/11/2022

DOI:
10.1016/j.radi.2022.07.010

Document Version
Author Accepted version

Radiography

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--Manuscript Draft--

Manuscript Number:	RADIOGRAPHY-D-22-00039R4
Article Type:	Full Length Article
Keywords:	radiographer; Role development; Radiologist; education
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Dear Prof Jonathan Mc Nulty
Editor-in-Chief of Radiography Journal

Please find the enclosed manuscript based on our original research work entitled "The changing concept of radiographer's role in UAE: an analysis of radiologists' opinion and acceptance" for consideration for publication in Radiography.

This research relies on a previously published needs assessment of the issues that radiographers in the United Arab Emirates experience in moving beyond the role of technician and the learning requirements that will help them do so "https://doi.org/10.1016/j.radi.2020.05.014". The goal of this second study is to improve our awareness of the existing and future steps, plans, and potential for an Emirati-led profession, as well as the construction of a career structure that promotes positive role advancement.

On behalf of the authors, I hereby declare that this manuscript has not been published elsewhere and is not under consideration by another journal. As authors, we have all approved the paper and have agreed to seek submission (following appropriate review by your experts), to your journal for consideration of publication. We have no conflicts of interest to declare.

The choice of your journal, we believe, will provide us with the best audience for the subject matter and will, with your support, demonstrate how the UAE is attempting to achieve similar performance abilities and breadth of practice to that shown in a range of countries. We feel that the Radiography will reliably disseminate our conclusions, which are closely linked to an ongoing investigation.

We solicit your kind consideration for publication of our manuscript in your prestigious journal.

Sincerely yours,

Dr Mohamed Abuzaid (**Corresponding Author)**
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Dear Dr Andrew England
Associate Editor

Thank you very much for this thorough and helpful review, it is greatly appreciated.

- The language and English comments and corrected, Thank you
- The following senstense delete to revome confusion, the survey email directly to the radiologists, (The department managers acted as gatekeepers and disseminated the survey directly to the radiologists' email addresses)

Thank you

Title Page (with author details)

The changing concept of radiographer's role in UAE: an analysis of radiologists' opinion and acceptance

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Conflict of Interest

None

Funding

NA

Authors' contributions

All authors participated in the project development, data collection, and manuscript writing. All authors read and approved the final manuscript.

IRB statement

Study approved by institutional review board.

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Abstract

Introduction: The role of radiographers in the United Arab Emirates (UAE) is currently focused on image acquisition. However, many advances have been made in different countries in recent years whereby radiographers who receive appropriate education and training, can provide image interpretation/reports. When implemented, this role development has enabled a more cost effective and efficient service delivery whilst relieving the burden off radiologists, allowing them to concentrate on more complex imaging examinations. This role development is commonplace in many countries but not in the UAE.

Aim: This study aims to investigate the radiologists' opinions, perceptions, and willingness to accept the advanced practice role of reporting radiographers in the UAE and determine their level of support for implementing these roles.

Methods: Data was collected utilizing a mixed-methods study design that included a survey and focus group discussions (FGD). Study participants included radiologists who currently work in UAE public and private health organizations. The survey link was emailed directly to the radiologists, together with a covering letter and participants' information sheet outlining the study's aim. Participants indicated on the survey if they wanted to participate in FGD. Two online FGD were conducted using Zoom software (Zoom Video Communications Inc., San Jose, California, United States) and aimed to explore possible reasons for participant's opinions. Ethical approval was obtained from the Ministry of Health, and all methods were performed as per study protocol

Results: A total of 69 radiologists participated in the survey, 48 males and 21 females aged between 41-60 years and with between 11-16 years of experience. Most participants (n=54,78.2%) believe that radiographers should only perform advanced tasks in image interpretation after obtaining adequate training and under the supervision of a radiologist. According to 55% of radiologists, the development of the radiographer role could draw more UAE nationals to the field. Six participants were recruited to FGD and declared mixed opinions that emphasized the need to improve the radiographers knowledge and experience to enable role development.

Conclusion:

Radiologists' worries about radiographer engagement in image interpretation may be alleviated if they participate in education and training for new responsibilities. In addition, this could boost the confidence of radiologists and improve trust in radiographer competency and training.

Implications for practice:

Guidelines and work standards must be developed jointly by radiologists and radiographers to ensure the governance and acceptability of new radiographer reporting roles. Some radiologists perceive that radiographer reporting is possible in UAE when radiographers are trained to set guidelines and with supervision from radiologists. Change is taking place, and many radiologists express optimism for the future, though the rate of change will be determined by a willingness to change attitudes and perceptions.

The changing concept of the radiographer's role in the UAE: an analysis of radiologists' opinions and acceptance

Introduction

The role of diagnostic radiographers has been steadily developing over the last 40 years from image acquisition to placing more emphasis on image interpretation (1,2). United Kingdom (UK) clinical radiology workforce census data have identified an increasing demand for medical image interpretation and interventional radiology services in an environment of workforce shortages and spiralling costs. With an estimated £165 million spent on outsourcing of work from the UK in 2018 alone, a strong rationale for radiographer role development is clearly evident (3).

Radiographer role development is well recognised in the UK and was formally introduced as part of the 2003 Radiography Skills Mix report (4). Following that, advanced and consultant education and career frameworks, as well as an assistant practitioner tier, were formed in the UK to help boost the diagnostic imaging workforce (4).

When it comes to radiological services, there is now a global shortage of radiologists, which means that many images are unreported or take a long time to be reported (5,6). Research indicates that radiographers can detect abnormalities in radiographic images comparably to radiologists and better than other health professionals in the absence of a radiologist. However, evidence also shows that radiographers must receive extensive image interpretation and reporting education and training to produce reports with the highest accuracy, sensitivity and specificity (2,7,8).

Role development has improved service delivery at a lower cost with better utilisation of staff and services. This role development also enables role transformation by radiographers in speciality areas and increases job satisfaction. Unfortunately, role development has also met challenges, such as radiologists' unwillingness to delegate tasks, the reluctance of radiographers to accept the use of assistant practitioners, and the availability of educational programmes (9,10). Snaith et al. 2014 and Henderson et al. 2017 reiterated that one of the main longstanding barriers to role development for reporting radiographers is resistance from radiologists (11,12). They also cite other pressures as the cause, e.g. an inability to train radiologists and their subsequent inability to add input to radiographer education; this is despite the potential for radiographer development to decrease the pressure and workload demand on radiologists.

Currently, the radiographer's role in the United Arab Emirates (UAE) is focused on image acquisition only. However, a recent study identified that radiographers are willing to accept advanced practice roles after appropriate education and training (13,14). Current literature investigates radiologists' attitudes towards radiographer role extension globally. However, data are not available for the UAE. A dedicated study is necessary in the UAE to determine how radiographer role extension would be received and can be utilised to inform practice in similar communities, such as the Gulf States. Further knowledge and understanding of the requirements for radiographer role development are required in the UAE to plan future health care delivery by enhancing undergraduate and postgraduate radiographer educational pathways and support systems. The mutual advantages and disadvantages of role advancement can be investigated to identify whether radiologists support new radiographer roles that are already well established in

the UK (11,12). If advanced practice options are developed in the UAE, the profession may be more appealing to UAE natives, thereby enabling the retention of a locally educated workforce.

Aim

This study aims to investigate UAE radiologists' opinions, perceptions and willingness to accept the advanced radiographers' role in image interpretation and determine their level of support for implementing these roles.

Methods

Ethical approval to perform this investigation was obtained from the Ministry of Health and Prevention (MOHAP/REC-19/201). All methods and study protocols were performed as per the guidelines and regulations. A mixed-methods study design was used. In Phase 1, an electronic survey was distributed to radiologists working in the UAE with the aid of Google Forms©, and in Phase 2, focus group discussions (FGDs) were performed.

Phase 1: Electronic survey instrument and data collection

Radiologists working in the UAE were invited to participate in a survey, which was administered between January and April 2021. The survey consisted of three sections: (a) radiologists' demographic information, including age, gender, role, place of work, experience and qualifications. (b) radiologists' expectations of the radiographer's role: educational qualifications required for radiographers to achieve role advancement, advantages, obstacles and possible areas for development. (c) radiologists' opinions on whether radiographers can participate in advanced roles, e.g. image interpretation in different body areas and different imaging modalities.

The survey was piloted by three radiologists with 10–15 years of clinical experience to estimate the completion time, appropriateness and clarity of the questions. Feedback from the radiologists was used to reword three questions for better understanding. The results of the pilot study were not included in the main study.

The survey link was emailed directly to the radiologists, together with a covering letter and participants' information sheet outlining the study's aim. Participants were informed of their right to withdraw in the information sheet, and the online anonymous survey feature was enabled. Participation was entirely voluntary, and consent was inferred by the completion and submission of the survey.

Complete records of the number of practicing radiologists in the UAE are unavailable; a previous study stated that the number of radiologists in the Ministry of Health and Prevention (MOHAP) in the UAE was 41 in 2017 (15). In the current study, 69 participants from MOHAP and private hospitals agreed to participate.

Statistical analysis

Data analysis was conducted using the Statistical Package for Social Sciences (SPSS) Statistics for Windows, Version 25.0 (Armonk, NY: IBM Corp.), and graphs were created using Microsoft Excel 2016 (Microsoft Corporation, CA, USA). Descriptive statistics were completed for data from all three sections of the survey, obtaining the frequencies and percentages of the responses.

Fifteen questions directly evaluated the radiologists' support for the role expansion of radiographers. Scores of 0, 5 and 10 were assigned to these questions based on their supportiveness towards the role advancement of radiographers. A maximum of 10 was assigned to 'Yes', 5 to the neutral response of 'Maybe' and the minimum of '0' was assigned to 'No'.

Phase 2: Focus Group Discussions (FGDs)

Phase 2 had two online FGDs to explore possible reasons for the participants' opinions. All FGD participants finished the survey and agreed to join the discussion group. The FGDs were conducted using Zoom software (Zoom Video Communications Inc., San Jose, California, United States) and recruited six participants in total. Participants were informed that the discussions were recorded, consent was obtained and confidentiality was emphasised. A research assistant moderated and led the discussion and provided a summary at the end of the FGDs. The discussion employed open-ended questions, and each discussion included an opening, main questions, a summary and a debriefing with the moderator. The recorded discussion was transcribed verbatim and the moderator, with the researcher, confirmed the precision of the transcript. The discussion was analysed to identify themes and key phrases. Thematic development was achieved through the categorisation of frequently occurring words. The early topics and categories were evaluated, adjusted and developed by the research team until thematic content consensus was achieved. Content analysis was used to undertake the thematic analysis. Frequently occurring words were grouped into categories, and themes arose from the groupings (16).

The FGDs consisted of six radiologists who were certified to practice in the UAE, categorised as follows:

(a) Two administrators working as heads of radiology departments (A1 and A2) with 25 and 12 years of experience, respectively.

(b) Two educators working in education institutes (E1 and E2) with 15 and 5 years of experience, respectively.

(c) Two clinicians working purely in clinical radiology (C1 and C2) with 14 and 7 years of experience, respectively.

Results

Phase 1: electronic survey

3.1.1 Radiologists' demographic information

Sixty-nine responses were collected from both male and female radiologists from various private and government health providers (Table 1). Most of the respondents were males (n = 48, 69.6%), with 71% (n = 49) of all respondents belonging to the age group of 41–60 years old. Most were radiologists who performed a clinical role only (n = 42, 60.9%). Radiologists working in the government sector equated to 75.4% (n = 52), with 24.6% (n = 17) working in the private sector. Respondents mostly had 11–15 years' experience working at a consultant level (n = 21, 30.4%),

followed by 5–10 years' experience (n = 19, 26.2%) and less than 5 years' consultant experience (n = 18, 26.1%). The most common qualification of the respondents was a fellowship of the Royal College of Radiologists (n = 33, 47.8%) and most of the respondents obtained their qualifications from Arab or Middle Eastern countries (n = 31, 44.9%). The radiologist qualification varied between a fellowship (n = 33, 47.8%), a clinical Master's degree (n = 25, 36.2%) and a PhD or Doctor of Medicine (MD) (n = 11, 15.9%). Within the UAE, after completing a two-year full-time course and a three-year specialist clinical residency programme, radiologists with a clinical Master's degree are recognized as general diagnostic radiologists.

Table 1 Demographic information, education, highest qualification and roles

		Frequency (%)
Gender	Male	48 (69.6)
	Female	21 (30.4)
Age (years)	21–40	19 (27.5)
	41–60	49 (71.0)
	61 onwards	1 (1.4)
Role	Radiologist with clinical role only	42 (60.9)
	A radiologist with an additional management role	12 (17.4)
	A radiologist with an additional educational role	6 (8.7)
	A radiologist with clinical, management and educational role	9 (13.0)
Place of work	Government sector	52 (75.4)
	Private sector	17 (24.6)
Experience	Less than 5 years consultant experience	18 (26.1)
	5–10 years consultant experience	19 (26.2)
	11–15 years consultant experience	21 (30.4)
	More than 15 years consultant experience	12 (17.3)
Final qualification	Radiology Fellowship	33 (47.8)
	Clinical Master's degree	25 (36.2)
	Doctor of Medicine (MD)	11 (15.9)
Country where final degree was obtained	Arab or Middle East	31 (44.9)
	Other European country	15 (21.7)
	UK	12 (17.4)
	India	5 (72.0)
	North America	6 (8.6)

Radiologist's expectations of the radiographer's role

This section of the survey consisted of nine questions about the educational qualifications required for radiographers and their role advancement.

When the respondents were asked whether radiographers should proceed to postgraduate study that facilitates role advancement, 39.1% (n = 27) agreed, 56.5% (n = 39) of respondents stated 'maybe' and 4.3% (n = 3) thought it was 'not necessary'. Of those who agreed they should

progress, the most common choice of the postgraduate level required for radiographers was a master's degree (MSc) (n = 36, 52.2%).

When asked about suitable fields of postgraduate study for radiographers, radiologists suggested ultrasound (US) (65.2%), followed by magnetic resonance imaging (MRI) (56.5%) and radiographic education (52.2%). Of those surveyed, 34.8% agreed that radiographers should be able to complete their postgraduate studies in image interpretation. Totals exceeded 100%, as radiologists were able to provide more than one answer to the question (see Figure 1).

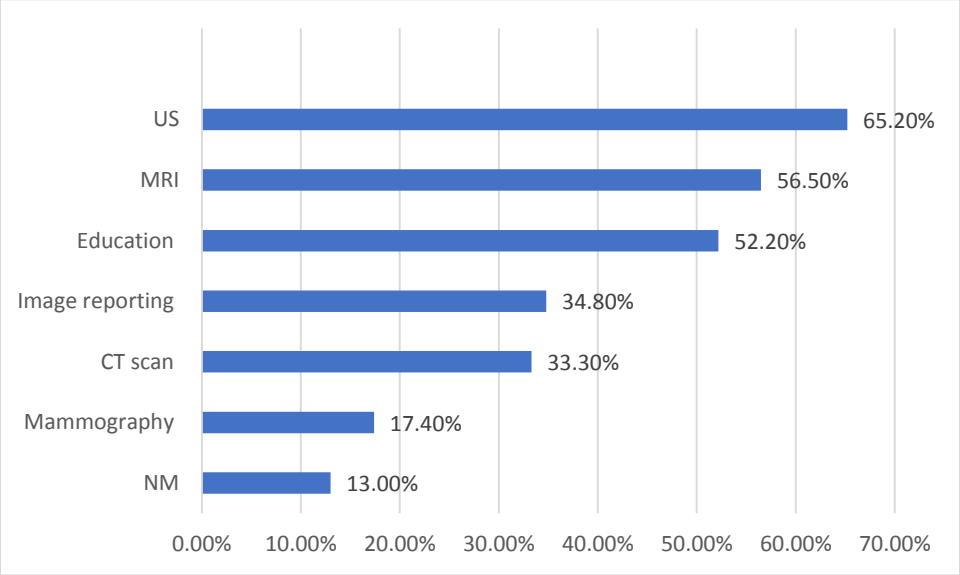

Figure 1: Radiologists' opinions about postgraduate areas for radiographers

A significant number of radiologists were aware of radiographer role advancement globally (n = 45, 65.2%). Furthermore, 60.9%, (n = 42) of respondents stated that currently there is 'No' role advancement in the UAE, with 30.4% (n = 21) of respondents stating that role advancement happens sometimes but informally. Most of the radiologists (n = 39, 56.5%) thought radiographer role advancement could attract more UAE nationals to the profession, as recruitment and retention is currently challenging.

When the respondents were asked if radiographers should participate in image interpretation, most of them (n = 54, 78.2%) agreed that they could, but only after further education and under radiologist supervision.

Radiologists' opinions on whether radiographers can participate in advanced roles

The radiologists were asked to identify if they felt there were any advantages or disadvantages in radiographer role advancement; again, most of the respondents chose 'Reduced radiologist workload' (n = 45, 65.2%) and 'Increased professional standing of radiographers' (n = 42, 60.9%). In contrast, a 'lack of clear medico-legal responsibilities' was a major concern for 82.6% (n = 57) of the radiologists regarding radiographer role advancement (Table 2).

Table 2 Radiologists' perceptions of the advantages of advanced practice among radiographers

		Frequency (%)
Advantages of role advancement	Increased professional standing of radiographers	42 (60.9)
	Aid to radiographer recruitment and retention	9 (13.0)
	Best use of human resources	21 (30.4)
	Reduced radiologist workload	45 (65.2)
	Reduce report waiting time targets	39 (56.5)
	Allow radiologists to concentrate on complicated cases	15 (21.7)
	Improve radiology department performance	27 (39.1)
Radiologists' concerns about role advancement	Lack of clear medico-legal responsibilities	57 (82.6)
	Effect on quality patient care	30 (43.5)
	Dilution of radiographers' own skills	18 (26.1)
	Loss of control of professional boundaries	15 (21.7)
	Lack of trust in radiographers' abilities	24 (34.8)
	Financial issues	18 (26.1)
Type of role advancement	Red dot scheme: "abnormality detection using red dot sticker"	30 (43.5)
	Initial commenting and reporting	39 (56.5)
	Reporting with radiologist approval	12 (17.4)
	None of the above	6 (8.7)
Whether AI was preferrable over radiographers performing advanced roles	Yes	15 (21.7)
	No	18 (26.1)
	Neutral	36 (52.2)

Initial commenting and reporting were the most agreed upon advanced role descriptions (n = 39, 56.5%). The 'red dot scheme' was identified as the initiating model (n = 30, 43.5%). When the radiologists were asked whether they would prefer a report from artificial intelligence (AI) assistance instead of a radiographer performing image interpretation, 52.2% (n = 36) of the respondents stated a neutral response and 26.1% (n = 18) of them answered "No".

The next 15 questions were based on different body areas and imaging modalities, where radiographers may perform image interpretation after proper education and training. Radiologists were asked to rate their choice of potential areas for role advancement for radiographers. The results are illustrated in Figure 2.

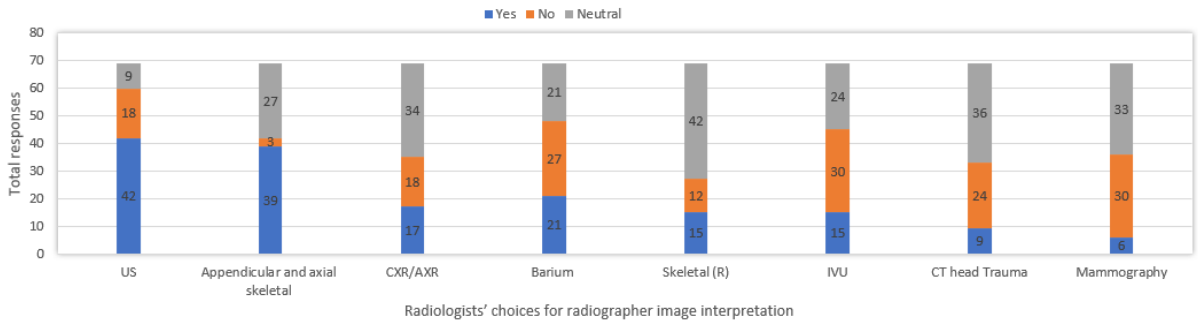

Figure 2: Radiologists' choices for radiographer image interpretation

Key: US = Ultrasound, CXR= Chest X-ray, AXR = Abdomen X-ray, CT = Computed Tomography

When asked about radiographers' participation in image interpretation, the respondents declared support in the fields of emergency skeletal plain radiography (n = 39, 56.5%) and chest emergency room (ER) cases (n = 30, 43.5%). The areas of intravenous urography (IVU) and breast imaging were given the least support for radiographers to interpret and report, with 43.5% (n = 30) of radiologists against it in both cases.

Support rendered to the role advancement of radiographers was scored in the range of 0–150. This meant 0-50 was least supportive, 51–100 was neutral and 101–150 was supportive. The score distribution is shown in Figure 3.

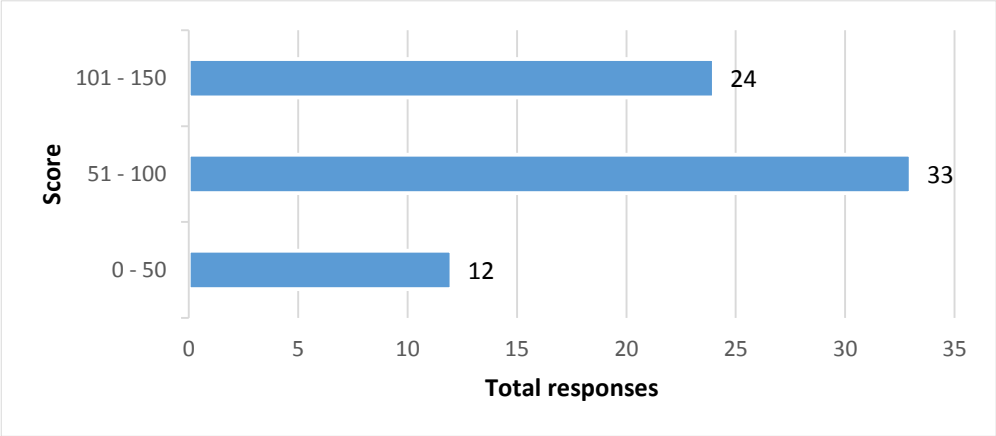

Figure 3. Score distribution for support of radiographer role advancement

A one-way ANOVA ($\alpha = 0.05$) was used to statistically analyse the variance in the scores obtained with the demographics (age and workplace) of the respondents, while two sample t-tests were conducted to analyse the equal means in the genders of the respondents. The means of the different groups in the genders ($p = 0.401$), ages ($p = 0.873$) and workplaces ($p = 0.932$) of the radiologists were equal. This negated the impact of gender, age, workplace being private or government and having a radiology subspeciality (or a lack thereof) on their opinions in support of the radiographers' advanced practice.

The role/level/grade held by the participants at work had a significant impact on their opinions on radiographers' practice advancement ($p = 0.0002$). The most supportive radiologists were those with additional management roles ($\mu = 103.75$) and those with additional educational responsibilities ($\mu = 100$). Radiologists with a purely clinical role ($\mu=70.19$) exhibited the least support.

The radiologists also displayed a difference in their opinions based on the number of years of consultant experience ($p = 0.0146$). Radiologists with less than five years of experience at the consultant level ($\mu = 100$) tended to be more supportive compared to radiologists with 5–10 years of experience at the consultant level ($\mu = 71.42$). In addition, the educational qualifications of the radiologists influenced their opinions ($p = 0.0211$). Radiologists with PhD qualifications ($\mu = 96.36$) were more supportive than those with Master's qualifications ($\mu = 69.4$).

Phase 2: Focus Group Discussions (FGDs) The discussions were divided into five pillars: (1) general opinion, (2) potential, (3) pros and cons, (4) obstacles and (5) resistance to role advancement (Table 3).

Table 3. Focus group discussion comments

	General Opinion	Potential	Pros and Cons	Obstacles	Refusal of role advancement
A1	CT and MRI reporting are too advanced; anatomy and pathology findings are too complicated for radiographers to report		The radiologist loses some of their duties towards other specialties, such as cardiac CT, diagnosed by the cardiologist.		- I do not respect any country or health care system that allows radiographers to report - It is better not to have radiology service if the healthcare system is unable to recruit a radiologist for image reporting
A2		Properly educated, trained, and experienced radiographers would be able to determine further investigation, contrast medium in CT	Radiologists will concentrate on the complicated cases	I think changing the work regulation and bylaws may be difficult and not be supported by the higher country's organization	
E1	Sonographers perform and fill the preliminary report, which the radiologist finally verifies	Job description, salary scheme and job grading need to be revised to involve radiographer role advancement tasks	Reduce the radiologist's workload and reporting time	Special education and a postgraduate degree are required to develop radiographer's role	
E2	Radiographers can start with general radiography reporting, such as extreme trauma cases	The radiographers know, but maybe they do not have the time to practice role advancement tasks	Radiographer participation in image reporting in rural areas where there are no or a shortage of radiologists may improve health care service	It may be difficult to integrate the role advancement education requirement within the current radiographers' curriculum	
C1	Radiographer experience and educational level are not reaching independent reporting		It may double work, as the radiologist is required to recheck the radiographer's reports	Image interpretation is a challenge even for a radiologist with long years of experience	If the radiographers want to practice image reporting, they should study medicine
C2		They need a radiologist's guidance and supervision	Medico-legal responsibility will be double on the radiologists		

A1: radiologist with 25 years' and administration experience (head of radiology department), A2: radiologist with 12 years' and administration experiences (head of radiology department), E1: radiologist with 15 years' experience in education, E2: radiologist with 5 years' experience in education, C1: radiologist with 14 years' clinical experience, C2: radiologist with 5 years' clinical experience

Discussion

The roles of healthcare professionals have changed over the years, with increased competition among different health disciplines to attract and retain staff. Radiographers have developed into fully autonomous advanced practitioners, but this role development has happened at different rates in different countries. Currently, there is no advanced practice recognised for radiographers in the UAE (10,13,23). From the results of this investigation, it is evident that radiologists within the UAE consider that there is potential for radiographers to receive advanced education so that advanced practice services may develop. However, there is less support from experienced clinical radiologists for radiographers to contribute to an image interpretation role, which will only exacerbate the current shortage of radiologists in the UAE (13,14). According to reports, the effect of the shortage of radiologists has reached a critical level, with some hospitals having only one radiologist on call 24 hours a day, seven days a week. Furthermore, as there are a limited number of female radiologists, this creates a challenge for services where women who prefer procedures to be performed by someone of their own gender may not attend, thus causing a gender accessibility imbalance in terms of healthcare delivery. To address this issue, the Dubai Health Authority has established a residency programme for radiologists (17).

The results of this work align with some leading ideas pertaining to the role of radiographers. Most participants (n = 54, 78%) agreed that radiographers can be involved in image interpretation after further education and under radiologist supervision. Furthermore, the more common advantages as perceived by the participants were that advanced practice contributes to reduced radiologist workload (n = 45, 65%), increases the professional standing of radiographers (n = 42, 61%) and reduces the waiting time for reports (n = 39, 57%). If qualified and trained radiographers take on roles that are traditionally performed by radiologists, e.g. reporting tasks or other roles, this would decrease their workload and enable them to concentrate on more complex procedures. Reporting radiographers could help reduce the reporting backlog and the number of unreported images and enhance patient safety through improved image acquisition quality (19).

Radiologists with additional management roles or additional educational responsibilities were likelier to be in support of radiographers' role development compared to their colleagues who had purely clinical roles (86%, 83% and 58%, respectively). It is suggested that radiologists with managerial roles have a practical view of meeting service targets. The advent of multi-professional education has brought about a more pragmatic view towards skill development for those involved in the field of education. These results reiterate the outcomes of a recent study conducted in Scotland, UK (18). The authors raises the position that, globally, radiographers need to be strongly organized. Consequently, the demand for advancing radiographers' roles can be elevated, making the radiographer's profession appealing for initial staff recruitment and future retention purposes as service requirements and professional responsibilities increase (11,20).

The results of this investigation also showed less support by experienced radiologists with a purely clinical role compared to radiologists with academic and administrative duties, in addition to

clinical work. This may be because radiologists with administrative and academic job responsibilities who are working towards academic promotion, mentoring, educating and leading the service have different professional drivers. As such, radiologists with a purely clinical focus concentrate on advancing their careers and meeting the demands of daily tasks.

Most respondents stated that there is no recognised role advancement in the UAE currently in practice, despite most being aware of the global developments in the professional profiles of radiographers. This could be due to the lack of scope in the UAE, where radiographers want to be trained and educated to take on an advanced role, such as a reporting radiographer, or are not given the training and opportunity to do so (13,14). This aligns with the absence of a strong professional organization that provides support through the representation of radiographers to senior decision makers and drives the professional research, development and education agenda. The results of the study showed that informal reporting by radiographers does occur in the form of verbal comments on images (5,21).

The rapid advance of AI in radiology will certainly impact the practice of both radiographers and radiologists. The results of this work suggest that radiologists were worried about radiographers advanced practice, as most respondents either preferred AI over radiographers' reporting (22%) or gave a neutral response (52%). Alternatively, a neutral response could mean that little consideration had been given to whichever approach is used to provide reporting, as long as it did not influence radiologist perceptions on providing a reporting service. AI could improve radiologists' work and performance, especially in image diagnosis, which leads to reduced reporting turnaround time and potentially increased diagnostic accuracy. A recent study in the UAE investigated radiologists' perspectives on AI adoption in radiology practice. This work found that radiologists were enthusiastic about AI deployment but lacked knowledge about systems and how they worked, which led to concern that AI could threaten and disrupt their careers (22). Hence, it is interesting to know that some would prefer AI over a radiographer performing the reporting role.

The FGD results of the study show that radiologists are receptive to initiating radiographer role development in general radiography through enhancing acquisition skills in some areas of practice via a Master's level education, but also with reporting beginning with plain radiographic images in the emergency department and advancing to CT and MRI after proper education and training. However, the study identified that radiologists would prefer that radiographers be involved in image reporting of emergency skeletal cases rather than CT in brain trauma, breast services and intravenous urography.

The FGD participants endorsed specialist education and a postgraduate degree to develop radiographers' roles, though only 39% of them opined that radiographers should pursue postgraduate studies. Radiologists with less than 5 years of experience at the consultant level and

respondents with PhD qualifications tended to be more supportive of role advancement. It is important to note that 15 + years' experience led to a strong negative position on radiographer role development. It may be that radiologists who are recently qualified have enhanced teamwork skills and are open to modifying roles compared to those who were trained when role boundaries were more demarcated. Individuals specializing with a PhD qualification appeared to understand the necessity of multi-professional education and role advancements.

The benefits perceived in radiographers' role advancement by radiologists are the changed work focus, enabling them to be involved in complex cases, reducing waiting times and costs, and enabling follow-up imaging to be performed within a shorter time frame when necessary. For those with a strong academic focus, this extra time availability could allow radiologists to participate in more 'cutting-edge' clinical research. Furthermore, an appropriately trained radiographer can be involved in reporting in centres/hospitals where there are no radiologists. The fear of an increased workload in reviewing radiographers' reporting is also identified by radiologists as a barrier. However, as international experience demonstrates, there has been a gradual educational self-sufficiency developed by radiographers that eventually reduces the need for radiologists' input as autonomous practice grows.

Changing the work regulations and bylaws in the UAE could be challenging, as the radiographers' job description, salary scheme and job grading must be subjected to change involving higher health authorities. However, with evidence of support in areas of practice from radiologist colleagues, the potential for initiating developments has increased owing to the delegatory governance and education aspects being met.

Limitations

The results of this study are applicable only to radiologists in the UAE. This study focused on radiographer reporting/image interpretation; further work could be performed to explore the full range of advanced roles performed by radiographers in different countries.

Conclusions

UAE radiologists' opinions on the advancement of radiographers' roles are varied. There is support for radiographer role development in the UAE that needs to be explored further. Further work should be performed to address radiologists' concerns about radiographer role development. Including radiologists in developing advanced curricula, courses and additional training while advising and mentoring radiographers in clinical practice can close these gaps. Audit mechanisms should be introduced to ensure the quality and accuracy of radiographer reporting going forward.

The ultimate goal of radiologists and radiographers is to ensure optimum patient care, clinical excellence and effective service delivery, which can be most successfully achieved working as a team. The dynamics of the radiologist-radiographer relationship in the UAE (and beyond) continues to develop, as radiography, within medical diagnostics, is a fundamental service in

healthcare. As diagnosis, treatment and illness surveillance in healthcare become more image-reliant, radiologists and radiographers need to continue to share the same synergistic and mutually beneficial partnership. By working as a collaborative team, radiographers and radiologists can provide services in the UAE that are required locally and enable a regional or national approach to be achieved. This is particularly important from a health accessibility perspective, where resources for complex services can only be provided by a highly specialised workforce.

References

1. Cowling C. A global overview of the changing roles of radiographers. Radiography. 2008;14(SUPPL. 1):28–32.
2. Milner RC, Snaith B. Are reporting radiographers fulfilling the role of advanced practitioner? Radiography. 2017;23(1):48–54.
3. Royal College of Radiologists. Clinical Radiology UK Workforce Census Report 2018. R Coll Radiol. 2018 April.
4. Woznitza N, Pittock L, Elliott J, Snaith B. Diagnostic radiographer advanced clinical practice in the United Kingdom – A national cross-sectional survey. BJR|Open. 2021;3(1):20210003.
5. Murphy A, Ekpo E, Steffens T, Neep MJ. Radiographic image interpretation by Australian radiographers: a systematic review. J Med Radiat Sci. 2019;66(4):269–83.
6. van de Venter R, ten Ham-Baloyi W. Image interpretation by radiographers in South Africa: A systematic review. Radiography. 2019;25(2):178–85.
7. Stevens BJ. A survey assessment of reporting radiographers' scope of practice in the West Midlands region of the United Kingdom. Radiography. 2019;25(3):214–9.
8. Thom SE. Does advanced practice in radiography benefit the healthcare system? A literature review. Radiography. 2018;24(1):84–9.
9. The Royal Australian and New Zealand College of Radiologists (RANZCR). RANZCR Submission to AHPRA Medical Radiation Practitioner Board Consultation on Professional capabilities for medical radiation practice. 2019.
10. McConnell J, Eyres R, and Nightingale J. Interpreting Trauma Radiographs. Blackwell's; 2005.
11. Forsyth LJ, Robertson EM. Radiologist perceptions of radiographer role development in Scotland. Radiography. 2007;13(1):51–5.
12. Henderson I, Mathers SA, McConnell J, Minnoch D. Advanced and extended scope practice of radiographers: The Scottish perspective. Radiography [Internet]. 2016;22(2):185–93. Available from: http://dx.doi.org/10.1016/j.radi.2015.12.002
13. Abuzaid MM, Hamad W, Elshami W, Tekin H, Ali W, Khayal S. Radiography advanced practice in the United Arab Emirates: The perceptions and readiness of mammographers. J Multidiscip Healthc. 2020;13:753–8.
14. Abuzaid MM, Elshami W, McConnell J, Baird M. Changing the model of radiography practice in the UAE: A snapshot of a profession in transition. Radiography. 2020;27(1):54–8.
15. Elshami W, Abuzaid M, Piersson AD, Mira O, AbdelHamid M, Zheng X, et al. Occupational dose and radiation protection practice in UAE: A retrospective cross-sectional cohort study (2002–2016). Radiat Prot Dosimetry. 2019;187(4):426–37.
16. Elshami W, Abdalla ME. Diagnostic radiography students' perceptions of formative peer assessment within a radiographic technique module. Radiography [Internet]. 2017;23(1):9–13. Available from: http://dx.doi.org/10.1016/j.radi.2016.06.001

17. Editorial N. The UAE will gain from filling need for specialists. www.thenationalnews.com. 2022 [cited 2022 Apr 14]. Available from: https://www.thenationalnews.com/opinion/the-uae-will-gain-from-filling-need-for-specialists-1.240690
18. Henderson I, Mathers SA, McConnell J. Advanced and extended scope practice of diagnostic radiographers in Scotland: Exploring strategic imaging service imperatives. Radiography. 2017;23(3):181–6.
19. Squibb K, Smith A, Dalton L, Bull RM. The 'radiographer–referrer game': image interpretation dynamics in rural practice. J Med Radiat Sci. 2016 May:17–22.
20. Henderson I, Mathers SA, McConnell J, Minnoch D. Advanced and extended scope practice of radiographers: The Scottish perspective. Radiography. 2016;22(2):185–93.
21. Hardy A, Poulos A, Emanuel N, Reed W. An investigation of advanced practice carried out by radiographers in New South Wales. Radiographer. 2010;57(3):29–33.
22. Abuzaid MM, Elshami W, Tekin H, Issa B. Assessment of the willingness of radiologists and radiographers to accept the integration of artificial intelligence into radiology practice. Acad Radiol [Internet]. 2022;29(1):87–94. Available from: https://doi.org/10.1016/j.acra.2020.09.014