Original Article

Opinions of Zambian Radiographers on Extending their Role in Interpretation and Reporting on General Radiographic Images: A Cross-Sectional Survey

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ABSTRACT

Background: There is a critical shortage of radiologists in Zambia to report on all imaging examinations. Radiologists have concentrated on specialised imaging examinations, thereby leaving the interpretation of general radiography examinations to the referring medical practitioners, whose competence in image interpretation is not at the same level as radiologists. This can lead to misdiagnosis and mismanagement of patients.

Objective: This study aimed at determining the opinions of Zambian radiographers on extending their role in the interpretation and reporting of general radiographic images.

Methodology: This study was conducted using a cross-sectional survey approach. Data were collected using an online questionnaire. Radiographers with a minimum of two years' work experience were invited to participate in the study. Both quantitative and qualitative data were collected. Descriptive statistics were used to analyse quantitative data, while thematic analysis was used for qualitative data.

Results: A total of 81 participants responded to the survey. A major finding showed that most radiographers (N=78, 95%) had a positive attitude towards image reporting because it improves the delivery of imaging services. Most of the radiographers were also willing to be trained at a postgraduate level (93%, N=76), and indicated the need to extend the scope of practice to include image reporting (N=78, 95%). The main challenges identified were inadequate advocacy and possible resistance from medical professions.

Conclusion: Radiographers are prepared to venture into image reporting. It is anticipated that this role extension can supplement radiologists in providing diagnostic reports and ensure that all patients have access to this service.

INTRODUCTION

Medical imaging plays a significant role in the diagnosis and treatment of diseases and injuries. In Zambia, it is estimated that approximately 70% of patients attending hospitals are referred for medical imaging examinations. [1] These imaging examinations include general radiography (plain film), contrast aided studies, ultrasonography (US), computed tomography (CT), magnetic resonance imaging (MRI), radionuclide imaging (RNI), mammography, and dual-energy X-ray absorptiometry (DEXA). However, general radiography remains the main imaging method used

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in the diagnosis of diseases and injuries and is found in all medical facilities offering imaging services in Zambia. There are two main imaging professionals involved in medical imaging: radiographers and radiologists. The traditional role of a radiographer is to produce images that are then reported on by a radiologist. In Zambia, there is an increase in demand for imaging services due to a high burden of communicable diseases, non-communicable diseases, and road traffic accidents. [2] This demand has not matched the number of radiologists in the country. [3,4] At the time of conducting the survey, there were nine (9) radiologists working in public hospitals against a population of 18 million. Most of the hospitals have no radiologist services. For this reason, most of the general radiography images are interpreted by referring medical practitioners who might have limited knowledge and skills in the imaging field. This critical shortage of radiologists hinders the objective of the Ministry of Health in providing quality healthcare services as close to the family as possible.

The shortage of radiologists has not been limited to Africa but to developed countries as well such as the United Kingdom (UK) and the United States of America (USA). [5-8] To overcome this challenge, some countries, such as the UK, USA, and Uganda, improved their imaging services by expanding the scope of practice of radiographers to allow them to be trained and report on general radiography images. [7-9] Some African countries, such as South Africa, Kenya, Ghana, and Nigeria are planning to allow radiographers to report on plain films. Research in these countries has been undertaken on this topical issue. [4, 6,7,10] However, only one unpublished study has been conducted in Zambia which focused on radiographic human capital development. [11] A review of literature only pointed to this study as being the first research on the views of Zambian radiographers with regards to interpreting and reporting on general radiography images.

A modern healthcare system is required to be adaptive to changes that can improve the delivery of its services. [12] In the context of this research, this means the utilisation of available radiographers without compromising the quality of imaging services. This needs a change of policy by the Ministry of Health (MOH) and Health Professions Council of Zambia (HPCZ) to enable radiographers to undergo postgraduate training in image interpretation and report on general radiographic images. Literature cites that, when adequately trained, the specificity and sensitivity of radiographers' reports are within the acceptable range for quality imaging services. [13,14] This study, therefore, was aimed at determining the opinions of Zambian radiographers on extending their role in the interpretation and reporting of general radiographic images. It is important to discern the views of the end-users as part of the planning process.

METHODOLOGY

This study was conducted using a descriptive cross-sectional survey approach. A cross-sectional survey helped to provide the opinions of radiographers regarding image interpretation and reporting on general radiographic images at one specific point in time. This allowed the collection of data from radiographers across the country. [15-17] It also gave the opportunity to all eligible radiographers working in Zambia to participate in the study. All radiographers with a minimum of two years of working experience were invited to participate in the survey.

Data were collected using an online self-administered questionnaire between May and July 2021. The survey questionnaire was found as the most appropriate because it is economical, offers uniformity of questions and statements, and has a wide coverage. [16,17] It was developed based on the literature review relating to image interpretation and reporting by radiographers. [4,6,10] The questionnaire was created using Google Forms and hosted by Google.com. It consisted of three sections: demographics, eleven Likert scale statements on image interpretation and reporting by radiographers, two multiple-choice questions on training and an

open-ended question on the challenges to the establishment of reporting radiographers in Zambia.

The validity of the questionnaire was ensured by developing it based on previous studies and literature reviews. [4,6,10] The draft questionnaire was submitted to a reporting radiographer and radiologist to ascertain that the statements and questions reflect the opinions of radiographers on image interpretation and reporting. [15] The questionnaire was piloted on 10 radiographers who were excluded from the main survey to avoid contamination of the results. The pilot study was aimed at testing the correctness of the instructions, the wording of questions and statements, determining the time taken to complete it, and testing the data analysis methods. [15,16] Feedback from the pilot study did not warrant amendments to the questionnaire.

This survey commenced following ethical approval by the Lusaka Apex Medical University Bio-Medical Research Ethics Committee (Ref: 00133-21). Permission was also obtained from the heads of radiology departments in Zambia. An online questionnaire was posted on the Radiological Society of Zambia (RSZ) social media platforms (WhatsApp and Facebook), targeting Zambian-based radiographers. It was also emailed to all heads of radiology departments in Zambia who were requested to distribute it electronically to their staff. Participation in the survey was voluntary and respondents were informed of their right to withdraw from the study at any time before submitting the results for publication. To ensure anonymity, no personal identification information or names of hospitals were included in the questionnaire. To maintain confidentiality, the electronic data collected were stored on the computers of the four researchers and secured with passwords. The completion and submission of the questionnaire was considered as giving consent to participate in the survey.

This survey produced both quantitative and qualitative data. Quantitative data were analysed using descriptive statistics. Opinions on image interpretation and reporting by radiographers were presented using tabular and graphical displays. On the other hand, qualitative data from an open-ended question on the challenges to establishing reporting radiographers in Zambia were analysed using thematic analysis. The results were presented in tabular form.

RESULTS

The survey participants were drawn from all ten provinces of Zambia. A total of 81 responses were received. There were predominately more males than females with the age group 26-30 being the largest. The public facilities had a representation of about (80%, N=66). In terms of qualifications, diploma radiographers represented more than half of the participants. The range of work experience in years was from 2 to over 16. The majority (39.5%, N=32) had work experience of fewer than five years. Table 1 shows demographic data.

Table1: Demographic information of participants

Category	Subcategory	Female		Male		Total
		N	%	N	%	N
Number		25	31	56	69	81
Age	Less 25	3	14	4	8	7
	26-30	10	45	18	35	28
	31-35	6	27	11	21	17
	36-40	3	14	11	21	14
	More than 45	3	14	12	23	15
Type of facilities	Public	18	72	48	86	66
	Private	4	16	4	7	8
	Mission	3	12	3	5	6
	Mine			1	2	1
Qualification	Diploma	15	60	31	55	46
	Degree	7	28	22	39	29
	Masters	3	12	3	5	6
Work experience	2 to 5	9	36	23	42	32
	6 to 10	9	36	15	27	24
	11 to 15	3	12	7	13	10
	More than 16	4	16	10	18	14

To elicit information regarding the opinion on image interpretation and reporting, the participants were presented with eleven statements. These statements focused on the scope of practice, service efficiency, quality of services, and willingness to engage in image interpretation and reporting. The responses as shown in Figure 1 below indicate that radiographers in Zambia are for the introduction of these role extension roles. Most (93%, N=76) respondents indicated offering verbal opinion on image interpretation to referring clinicians). When asked if there was a need for role extension, (95%, N=78) agreed with this assertion. Respondents also affirmed that there would be improved service delivery (96%, N=79), increase job satisfaction (84%, N=69), and improved efficiency (98%, N=80). Participants in the study also indicated that radiographer role extension would free radiologists to focus on more complex imaging procedures, such as CT, MRI, and interventional radiology (88%, N=72), and help to bridge the gap created by the shortage of radiologists (96%, N=79). Furthermore, most (53%, N=43) the respondents did not agree that the newly introduced Specialised Training Programme (STP) for radiology training would answer the problem of unreported radiographic images. The radiographers who responded also indicated willingness to undertake this role extension with proper postgraduate education and training (95%, N=78), and were willing to be trained in image interpretation and reporting in general radiography (93%, N=76).

Figure 1: Scores on the opinions of radiographers on image interpretation and reporting

To build consensus on the acceptable level of training, respondents were asked to indicate their preferred level of education for the image interpretation training programmes. As depicted in Figure 2, most of the respondents preferred the training to be at postgraduate level (88%, N=72), with postgraduate diploma receiving the high preference (46%, N=38). In addition, respondents were asked what their preferred model of delivery of the image interpretation and reporting course would be. 19.5% (N=16) indicated full-time (classroom) studies were preferable whilst (63.4%, N=52) respondents preferred the blended learning (classroom and online/distance learning) approach. Part-time (full online/distance learning) was preferred by (17.1%, N=14) respondents.

Participants in the survey were asked to outline possible challenges they anticipated would be faced in the implementation of image interpretation and reporting by radiographers. Thematic analysis of the responses yielded four (4) thematic areas as shown in Table 2.

Table 2: Challenges to the establishment of reporting radiographers in Zambia

Theme	Sub-theme
Conflicts with medical practitioners	Radiologists
	Referring medical practitioners
Understaffing and inadequate establishment	Understaffing
	Increased workload
	Inadequate establishment
	Remuneration
Inadequate training capacity and sponsorship	Inadequate capacity
	Financing
	Inadequate infrastructure
Undefined scope of practice and legal framework	Scope of practice
	Policy and legal framework
	Inadequate advocacy

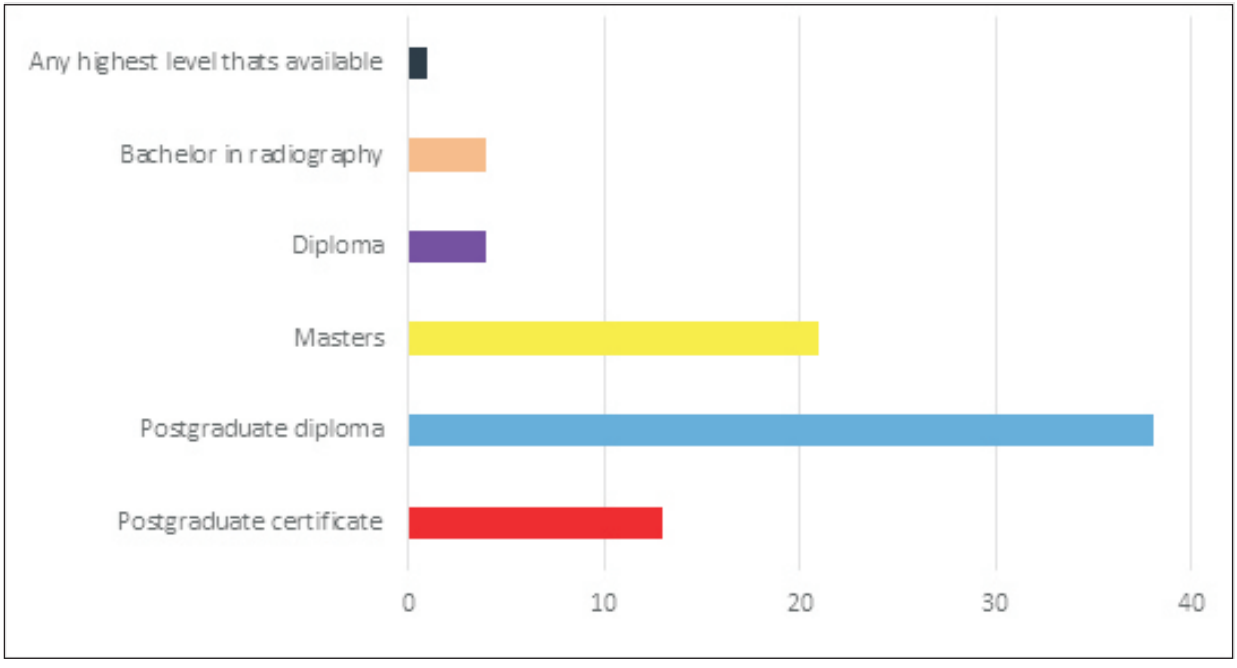

Figure 2: Preferred level of education and training in image interpretation

The first anticipated challenge was possible conflict with radiologists and referring medical practitioners. The respondents anticipated opposition by radiologists as this would be seen as an incursion into their domain. Furthermore, respondents felt that referring medical practitioners would not appreciate such a role extension because of their views concerning the competence level of radiographers. Another important observation was that the current workload of radiographers is prohibitive for them to take on additional responsibilities. They noted that there would be a need to increase the staff establishment and restructure the remuneration to take into account the increased workload and scope of practice. Other respondents felt that existing training facilities, staff, and financing structure were not streamlined enough to support the increased skill set development. It is also evident that the legal framework and policy implementation structure would also hinder the implementation of image interpretation and reporting by radiographers in Zambia.

DISCUSSION

This study investigated the opinions of Zambian radiographers on extending their role in the interpretation and reporting of general radiographic images. The Oxford English Dictionary [18] defines an opinion as a view or judgement about something. An individual opinion has an influence on the change of behaviour or practice. This means that a positive opinion of radiographers can lead to their acceptance of role extension and the opposite is true. The positive attitude can be seen in this survey, where most of the respondents indicated giving a verbal opinion on image interpretation when requested by referring medical practitioners. This finding concurs with other previous studies conducted in Africa. [6,7,9,12, 19] Most respondents in this survey also indicated their willingness to be trained and report on general radiographic images if trained in image interpretation and reporting. This finding is consistent with the study conducted in Kenya by Daniel and Motto, [10] where most of the radiographers were willing to train in image interpretation of the chest and musculoskeletal systems. This positive attitude of radiographers towards extending their role is encouraging for the development of the radiography profession and improving the quality of imaging services.

Literature reports that the greatest perceived benefit to the radiographers regarding extending their scope of practice and reporting on radiographic images is increased job satisfaction. [13,20] Steven and others [21] also found that the development of radiographers to report on radiographic images is an effective way to improve recruitment and retention of the radiography workforce. In our survey, most of the respondents agreed that the establishment of reporting radiographers would optimize the utilisation of the radiographers' knowledge and skills and would result in job satisfaction. This means that career progression is vital in the retention of radiographers. The introduction of reporting radiographers in the radiography career pathway in Zambia may result in the retention of radiographers as these posts come with increased pay to compensate for extra responsibility and workload. This is against the background of persistent immigration of Zambian radiographers to other countries that pay higher salaries.

The main beneficiaries of the establishment of reporting radiographers reported in the literature are the radiologists. [7,10,13,20] The shortage of radiologists leads to the pressure of work being handled by few radiologists which results in increased workload, stress, and possible errors. [7,9] In previous studies conducted by Daniel and Motto, [10] and Al Shiyadi and Wilkinson, [20] it was found that radiographer role extension increases radiologists' time for more complex procedures. This agrees with our finding where a significant number of respondents agreed that the establishment of reporting radiographers would allow radiologists to focus on specialised imaging examinations such as CT, MRI, and interventional radiology. For this reason,

radiologists should not see the introduction of reporting radiographers as an incursion into their domain, but as partners in the delivery of quality imaging services.

Literature reports that patients benefit from having reporting radiographers. The benefits emanating from this led to improved service delivery by addressing reporting backlogs, reducing patient report waiting time, reducing medical doctors' image interpretation errors, and reducing time to instigate treatment. [13,20,21] The establishment of reporting radiographers also eliminates outsourcing of image reporting and improves financial efficiencies.[21] A significant number of respondents in this study also indicated that the establishment of reporting radiographers would bridge the gap created by the shortage of radiologists in Zambia and reduce unreported images leading to prompt intervention by clinicians. In Zambia, only 9 radiologists are working in the public hospitals and are in two provinces: Lusaka and Copperbelt, leaving the other eight provinces with no direct radiologists' services. Therefore, the establishment of reporting radiographers would give an opportunity to all patients (both in urban and rural areas) access to diagnostic imaging reports because radiographers are found in all facilities offering imaging services in Zambia. However, most of the respondents were concerned with the increased workload and current understaffing of radiographers. This challenge should be considered by stakeholders during the planning stage.

To overcome the shortage of Radiologists in Zambia, the Ministry of Health has recently introduced Specialised Training Programme (STP) in radiology for medical doctors. However, most of the respondents in our survey indicated that this training programme will not overcome the challenge of unreported radiographic images. This is true because countries with more radiologists than Zambia such as the UK (N=4,000) [22] and Uganda (N=80) [9,23] are still training and recruiting reporting radiographers. The best initiative is to extend the scope of practice of radiographers to include image reporting on general radiographic images as indicated by nearly all the respondents in our survey. This strategy will ensure that most of the Zambian patients have access to imaging reports and would improve the delivery of imaging services as indicated in this survey. However, changes to the current scope of practice and legal framework should be made to allow radiographers to undergo training and report on general radiographic images.

In role extension for radiographers, postgraduate education and training are important to acquire new knowledge, skills, and competence. In our survey, a significant number of radiographers preferred having a postgraduate diploma in image interpretation and reporting. This finding is in contrast with a study conducted in Kenya by Daniel and Motto,[10] where most of the radiographers preferred a masters in image interpretation. The Kenyan study finding agrees with the College of Radiographers recommendation.[8] The most suitable qualification is masters because the curriculum includes a research component which is one of the non-clinical roles of a reporting radiographer. [4] Most radiographers also opted for a blended learning model where a combination of classroom and online methods are used to deliver the training programme. A study conducted in the UK by Leishman [24] found that image reporting education is not suitable for entirely online delivery because it requires physical interactions with experts in the field, such as radiologists and experienced reporting radiographers to enhance learning. Postgraduate education is also not suitable for full-time classroom learning because of trainees' work and family commitments.[25] However, this study identified inadequate training capacity as a challenge in the establishment of reporting radiographers. It should be mentioned that radiologists are key stakeholders in this initiative and should be engaged during the planning stage. The few radiologists available can offer training to trainee radiographers and the current radiography infrastructures used to deliver the training.

CONCLUSION

This research found that Zambian radiographers are ready and willing to be trained and report on general radiographic images to supplement the shortage of radiologists in the country. This requires adequate advocacy from the imaging and medical professionals, more research, a change of scope of practice for radiographers to include image interpretation and reporting, and the establishment of a postgraduate course. The introduction of reporting radiographers in the Zambian healthcare system would bring effective imaging services, both in urban and rural areas. In other words, it would help to achieve the objective of the Ministry of Health (MOH) of providing quality healthcare services as close to the family as possible.

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