

## Peer Reviewed Article

## ULTRASOUND CONTINUOUS PROFESSIONAL DEVELOPMENT PROGRAMME: PERCEPTIONS OF RADIOGRAPHERS

Everistus Obinna Abonyi<sup>1</sup> PhD | Regina Chukwuka<sup>2</sup> BSc | Julius Amechi Agbo<sup>1</sup> PhD | Sobechukwu WI Onwuzu<sup>1</sup> PhD | Benedicta Uloma Nwogu<sup>1</sup> PhD | Beatrice Ukamaka Maduka<sup>1</sup> PhD | Angel-Mary Chukwunyelu Anakwue<sup>1</sup> PhD | Felicitas Ugochinyere Idigo<sup>1</sup> PhD

<sup>1</sup>Department of Medical Radiography, Faculty of Health Sciences and Technology, College of Medicine, University of Nigeria, Enugu Campus, Nigeria

<sup>2</sup>Radiographers Registration Board of Nigeria, Enugu Zonal Office, Enugu, Nigeria

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### Abstract

**Background.** A continuous professional development (CPD) programme is an important tool for the improvement of knowledge, skills and practices of any profession. The ultrasound CPD programme by the Radiographers Registration Board of Nigeria (RRBN) is geared towards updating the knowledge and skills of radiographers in the field of ultrasonography. The paucity of data on the perceptions of radiographers towards ultrasound CPD necessitated this study.

**Method.** This cross-sectional survey study involved radiographers (n=111) who attended the ultrasound CPD programme organised by the Enugu Zonal office of the RRBN between January 2018 and January 2023.

**Results.** The study shows positive perceptions among radiographers towards the RRBN organised ultrasound CPD programme as participants agreed to have gained more knowledge and skills (mean = 4.11 ± 1.06) and that CPD is important for their career development (mean = 4.23 ± 1.09). Most of the participants agreed that the contents of the ultrasound CPD programmes were adequate (mean = 4.34 ± 0.99), including the time allocated to each CPD course. However, the time allocated to practical (hands-on) experience was inadequate (mean = 1.08 ± 1.19).

**Conclusion.** The participants perceived the ultrasound CPD activities offered by RRBN positively. They indicated improved skill and having a competitive edge over their peers as major motivating factors for engaging in the ultrasound CPD programme. But financial resources, time and remoteness from CPD venues were cited as major barrier to participation.

### INTRODUCTION

Radiographers are part of the healthcare team that uses different imaging modalities in the diagnosis and treatment of diseases. The applications of these imaging modalities in the provision of quality healthcare to patients require radiographers to possess adequate skills and knowledge of the different modalities including diagnostic medical ultrasonography. Diagnostic medical ultrasonography has become an acceptable medical procedure for the diagnosis of disease conditions due to the non-invasiveness, good visualisation characteristics, and non-ionising nature of ultrasound energy.<sup>[1]</sup> Its application in diagnostic medicine has increased over the past decade due to technological advancement in the manufacturing of ultrasound machines.<sup>[2]</sup> However, because ultrasound practice is operator-dependent, radiographers practicing it require a certain level of competence to provide quality images for the accurate

diagnosis of diseases. This implies that for radiographers to remain relevant in the practice of their profession, they should be up to date with the evidence-based practice and technological advancement associated with the innovations in the profession.<sup>[3]</sup>

It is important to note that the skills and knowledge gained by radiographers during their undergraduate studies are not enough to see them through their future professional practice, due to the ever-changing medical imaging landscape with regard to technology and techniques.<sup>[4]</sup> The dynamic nature of a working environment thus leads to some disparity between the actual practice of radiographers and what is regarded as best practice, which brings into question the quality of healthcare provided and the safety of patients.<sup>[5]</sup> Also, with the increase in the level of patients' awareness of their clinical management, it becomes imperative that radiographers justify their professional practice.

The practice of ultrasonography by radiographers in Nigeria is regulated by the Radiographers Registration Board of Nigeria (RRBN). They ensure that radiographers practice within the confines of the law and are continually improving their knowledge and skills in the practice of ultrasound. The regulatory body initiated an ultrasound continuous professional development (CPD) programme to achieve this task.

CPD is defined as learning experiences that help one to develop and improve their professional practice by building on their strengths and acquiring more knowledge where they have knowledge and skill gaps. According to studies<sup>[6-7]</sup> CPD in the health sector helps healthcare professionals to develop their skills and knowledge to keep abreast with recent developments in their field of practice, to contribute to improve service deliver to patients. Additionally, CPD helps healthcare practitioners to gain further confidence in their roles and develop positive attitudes.<sup>[8]</sup> Furthermore, CPD enables healthcare givers to respond to patients' needs by getting acquainted with new protocols, policies and constantly changing practice environments.<sup>[9]</sup>

The CPD programme organised by RRBN spans one year and comprises three modules, each lasting two weeks. It aims to equip participants with comprehensive ultrasound theoretical knowledge and practical skills essential for enhancing their proficiency in ultrasound examinations. The first module focuses on the fundamentals of ultrasound: the physics of ultrasound, instrumentation, knobology, the bioeffects of ultrasound, and ultrasound artifacts. Participants must complete the first module before progressing to the second module, which focusses on imaging techniques for the abdomen, pelvis and obstetrics. Successful completion of module 2 allows participants to progress to module 3. In this last module participants gain expertise in specialised areas, namely, small parts, musculoskeletal ultrasound, echocardiography and Doppler ultrasound. The three modules concludes with a hands-on practical session to reinforce the skills learned.

Despite the benefits of CPD in promoting professional proficiencies, CPD in low-income countries, such as Nigeria, has recorded low participation as opposed to those of high-income countries.<sup>[10]</sup> This study therefore aimed at assessing the perceptions of radiographers towards the ultrasound CPD programme organised by RRBN.

## MATERIALS AND METHODS

Ethics approval to conduct this study was granted by the ethics committee of the Enugu State Ministry of Health (MOH/PHD/D/11/03/219). This cross-sectional survey design involved radiographers who attended the ultrasound CPD programme organised by RRBN between January 2018 and January 2023.

The sampling strategy employed in this study is purposive sampling because the participants had experienced the programme and must have had their perception about it. Secondly the participants were available and willing to

participate. The sample size was determined using Taro Yamane formula as the population under study was a finite one. There were 150 radiographers ( $n=150$ ) who participated in the ultrasound course during the data collection period. Based on the Taro Yamane formula:  $n=N/(1+N*e^2)$ , using a 95% confidence interval and 10% attrition rate, the minimum sample size was determined as 109 ( $n=109$ ); the maximum sample size was 120 ( $n=120$ ).

A self-developed questionnaire was used as the data collection instrument.<sup>[11-12]</sup> The questionnaire comprised five sections. Section one focussed on participant demographics, section two the effectiveness of the ultrasound CPD programme, and sections three to five on the motivating factors, constraints and adequacy of the ultrasound CPD programme, respectively. The questionnaire link was sent to their respective email addresses. Informed consent was provided by the participants once they opened the emailed link. No identifiable details were gathered to ensure participant confidentiality and anonymity. This had to be completed before they could access the questionnaire.

A pilot study was conducted and included 20 participants ( $n=20$ ). The participants in the pilot study were radiographers who attended any form of CPD programme but not the ultrasound CPD programme organised by RRBN. We included 20 participants because literature reported that a sample size between 12 and 30 are adequate.<sup>[13-14]</sup> The results of the pilot study were not included in the main study.

To determine the internal consistency of the questionnaire the Cronbach's alpha was calculated. It was found to be 0.85, which suggests good internal consistency of the questionnaire.<sup>[15]</sup>

After the pilot study, the main data were collected. The questionnaire was distributed via email to 150 potential participants ( $n=150$ ).

Once the two-month data collection period was completed, data were captured on an Excel spreadsheet exported to the statistical package for social science (SPSS) software version 23 for analysis. Descriptive statistics (distribution frequencies, proportions, means and standard deviations) were used to analyse the data in line with the objectives of the study.

## RESULTS

One hundred and eleven ( $n=111$ ) questionnaires were returned of the 150 distributed. This means the response rate was 74%. Table 1 presents the participants' demographic information. Most were male ( $n=83$ , 74.8%), between the ages of 31-35 years of age ( $n=45$ , 40.5%) and had been practicing ultrasonography before the CPD programme ( $n=103$ , 92.8%). Many of the participants also work in private sector ( $n=82$ , 79.6%) and are employed full-time ( $n=75$ , 67.6%).

Table 2 presents the participants' perceptions about the ultrasound CPD programme. Most rated it as good (mean =  $3.8\pm 1.09$ ) and were satisfied with the new information and

skills gained during this programme (mean = 4.11±1.06). Also, many were of the opinion that ultrasound CPD is very important in their career development (mean = 4.23±1.09) and were willing to recommend the RRBN CPD programme to their peers (n=89, 80.2%).

Table 3 indicates the factors motivating participants to participate in and complete the RRBN ultrasound CPD programme. Most agreed that their motivation towards participating in and completion of the ultrasound CPD programme was to have an edge over their contemporaries (mean = 3.90±1.0) as well as the fact that the knowledge and skill they gain contributes to the improvement of their ultrasound practice (mean = 4.10±0.99). Participants disagreed that the CPD programme aids in securing lucrative roles abroad (mean = 2.4±1.4). Participants were not necessarily motivated by license renewal requisites (mean = 2.9±1.4) and increased remuneration after attending the CPD programme (mean = 2.7±1.4).

Participants' perceptions about the adequacy of the ultrasound CPD programme are presented in Table 4. Most of the participants agreed that it fulfilled their academic needs (mean = 3.86±1.09), it was taught by qualified personnel

(mean = 4.11±1.06) and that the time allotted to each lecture (mean = 4.10±0.99) was adequate. They also agreed that lecturers used audiovisual aids (mean = 3.63±1.22) while the lecture hall was spacious and well-ventilated (mean = 3.41±1.35). Many participants strongly agreed that the course content was rich (mean = 4.34±0.99). However, they strongly disagreed that the time allocated for practical demonstration (hands-on) was adequate (mean = 1.08±1.19).

Participants' perceptions about constraints that hinder participation and recommendations to improve the ultrasound

**Table 1.** Demographics of the participants

Parameters	Frequency (n)	Percentage (%)
<b>Biological sex</b>		
Female	28	25.2
Male	83	74.8
<b>Age</b>		
25-30	28	25.2
31-35	45	40.5
36-40	22	19.8
41-45	14	12.6
46-50	2	1.8
<b>Have you been practicing sonography before this ultrasound CPD?</b>		
Yes	103	92.8
No	8	7.2
<b>Nature of employment</b>		
Part-time	28	25.2
Full time	75	67.6
Not working	8	7.2
<b>Establishment ownership</b>		
Government	21	20.4
Private	82	79.6
<b>Have you been to any ultrasound CPD before now?</b>		
Yes	111	100.0
No	0	00.0
<b>Total</b>	<b>111</b>	<b>100</b>

**Table 2.** Participants' perceptions towards the RRBN ultrasound CPD programme

QUESTIONS	RESPONSES	N	%	MEAN±SD
How do you rate the RRBN ultrasound CPD?	Very poor	6	5.4	
	Poor	8	7.2	
	Neutral	15	13.5	
	Good	48	43.2	
	Excellent	34	30.6	3.8±1.09
Are you satisfied with new knowledge and skills gained?	Highly dissatisfied	8	7.2	
	Dissatisfied	1	0.9	
	Neutral	6	5.4	
	Satisfied	51	45.9	
How important is ultrasound CPD in your career development?	Highly satisfied	34	30.6	4.11±1.06
	Absolutely not important	1	0.9	
	Not important	3	3.7	
	Neutral	10	9.0	
	Important	40	36.0	
Are you satisfied with the learning environment?	Particularly important	57	51.4	4.23±1.09
	Highly dissatisfied	12	10.8	
	Dissatisfied	19	17.2	
	Neutral	20	18.0	
	Satisfied	45	40.5	
Can you recommend RRBN ultrasound CPD to your friends?	Highly satisfied	15	13.5	3.79±1.35
	Yes	89	80.2	
	No	22	19.8	

\*(Mean values: 1-1.8 = Highly dissatisfied; 1.81-2.60 = Dissatisfied; 2.61-3.40 = neutral; 3.41-4.20 = Satisfied; 4.21-5.00 = Highly satisfied)

\*(Mean values: 1-1.8 = Absolutely not important; 1.81-2.60 = Not important; 2.61-3.40 = neutral; 3.41-4.20 = Important; 4.21-5.00 = Very important)

CPD programme are presented in Table 5. Most participants agreed that time (mean = 3.54±1.4), finance (mean = 3.61±1.4) and distance to the venue (mean = 3.42±1.22) were constraints that hinder enrolment for the ultrasound CPD programme. Participants also recommended reduced registration costs for the ultrasound CPD programme, hav-

ing an ultrasound CPD programme centre in every state and that the practical sessions time allocation be increased.

**DISCUSSION**

There was an overall positive perception among the participants towards the ultrasound CPD programme organised

**Table 3.** Factors motivating participants to attend the RRBN ultrasound CPD programme

PARAMETERS	S/D	D	N	A	S/A	MEAN±SD
CPD ultrasound gives me an edge over my contemporaries	5(4.5)	8(7.2)	10(9.0)	50(45.0)	38(34.2)	3.9± 1.0
Knowledge and skills I will gain will improve my ultrasound practice	4(3.6)	4(3.6)	13(11.7)	45(40.5)	45(40.5)	4.10±0.9
It is a requirement for me to renew my license	27(24.3)	14(12.6)	23(20.7)	28(25.2)	19(17.1)	2.9±1.4
My only motivation in enrolling in CPD is because it will help me secure a lucrative job in Europe	35(31.5)	27(24.3)	21(18.9)	18(16.2)	10(9.0)	2.4±1.3
My salary will be increased because I obtained a PGD ultrasound certificate	32(28.8)	22(19.8)	11(9.9)	31(27.9)	15(13.5)	2.7± 1.4

SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree  
(Mean Values 1-1.8 = strongly disagree; 1.81-2.60 = disagree; 2.61-3.40 = neutral; 3.41-4.20 = agree; 4.21-5.00 = strongly agree)

**Table 4.** Adequacy of RRBN ultrasound CPD programme

PARAMETERS	S/D	D	N	A	S/A	MEAN±SD
CPD ultrasound by RRBN fulfills my academic needs	6(5.4)	8(7.2)	15(13.5)	48(43.2)	34(30.6)	3.86±1.09
Courses are taught by qualified personnel	8(7.20)	1(0.9)	6(5.4)	51(45.9)	45(40.5)	4.11±1.06
Time allotted for each lecture is adequate	4(3.6)	4(3.6)	13(11.7)	45(40.5)	45(40.5)	4.10±0.99
Course content is rich	6(5.4)	2(1.8)	11(9.9)	25(22.5)	67(60.4)	4.34±0.99
Time allotted to practical (hands-on) demonstration is adequate	62(56.8)	25(22.5)	12(10.8)	3(2.7)	8(7.2)	1.08±1.19
Lectures are facilitated using audio-visual aids	9(8.1)	13(11.7)	18(16.2)	41(36.9)	30(27.0)	3.63±1.22
Lecture hall is spacious and well ventilated	12(10.8)	19(17.1)	23(20.7)	25(22.5)	32(28.8)	3.41±1.35

SD = Strongly disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly agree  
(Mean Values 1-1.8 = strongly disagree; 1.81-2.60 = disagree; 2.61-3.40 = neutral; 3.41-4.20 = agree; 4.21-5.00 = strongly agree)

**Table 5.** Constraints towards attending RRBN ultrasound CPD programme and recommendations

PARAMETERS	S/D	D	N	A	S/A	MEAN±SD
My only constrain is time	17(15.3)	15(13.5)	12(10.8)	34(30.6)	33(29.7)	3.54±1.4
Finance is my major constraint	14(12.6)	14(12.6)	9(8.1)	29(26.1)	45(40.5)	3.61±1.4
I had to come from afar distance to attend the program	12(10.8)	19(17.1)	23(20.7)	25(22.5)	32(28.8)	3.71±1.2
<b>Recommendations</b>						
The registration cost for the program should be reduced	5(4.5)	2(1.8)	2(1.8)	40(36.0)	62(55.9)	4.44±1.2
RRBN CPD centers should be sited in every state	3(2.7)	10(9.0)	10(9.0)	38(34.2)	50(45.0)	3.9±1.0
Time for hands-on practical session should be extended	6(5.4)	2(1.8)	11(9.9)	25(22.5)	67(60.4)	4.34±0.99

by the RRBN (Table 2). This is a similar finding to previous work that also found that radiographers had a positive attitude and opinions about CPD programmes, primarily linked to the knowledge and skills gained from the programme.<sup>[11,16]</sup> Our study findings are also similar to other studies with regard to the factors motivating enrolment to CPD programmes (Table 3). Participants deemed it important that the CPD programme must fulfil their learning needs and assist them in improving their professional skill set and the quality of service delivery.<sup>[16-18]</sup>

The content of any CPD programme should be up-to-date, relevant and of practical importance to the participants.<sup>[19]</sup> Most participants in our study agreed that the ultrasound CPD programme fulfilled their academic needs (Table 4). This is in line with the work of Haddock<sup>[20]</sup> who found that the contents of the CPD programmes should align with the needs of the participants and should reflect current trends and developments in the profession. Participants in our study also agreed that the ultrasound CPD programme was taught by qualified personnel who used audio-visual aids in a well-ventilated and spacious hall, with adequate time allotted for each lecture. However, the time allocated for hands-on sessions were inadequate. These findings of our study are in line with the findings of Cheung and Ngai<sup>[21]</sup> and Osterman and Kottkamp<sup>[22]</sup> that found that active and interactive learning programmes and the use of technology-based delivery methods enhance learning experiences. Hence, participants in our study expressed their dissatisfaction regarding the limited time for the hands-on sessions in the programme.

Bwanga<sup>[23]</sup> underscores that time, finances and the distance to CPD programmes are barriers to radiographers attending and enrolling for CPD programmes in Africa. Anwara et al.<sup>[24]</sup> also found similar barriers in their work with work constraints being an additional barrier among physiotherapists. The findings of our study are similar to these studies (Table 5). Participants may see these as constraints in our study because the programme spans full-time participation for two weeks for each module, requiring participants to travel from various states to the host location (of which there is

only one currently). Additionally, those coming from distant areas must secure accommodation for the duration of the programme, which can be quite costly. It is also important to highlight that due to inadequate internet connectivity, online participation has not been a viable option.

## CONCLUSION

Participants demonstrated an overall positive perception towards the ultrasound CPD programme. They regard the programme important to their professional career development. They also perceive the programme's content to be rich and fulfilling their learning needs. There is room for improvement regarding the practical sessions' time allocation. There were various motivating factors and constraints that influenced participants' enrolment to the ultrasound CPD programme.

## COMPETING INTEREST

The authors declared no conflict of interest.

## AUTHOR CONTRIBUTIONS

All the authors participated actively during this study. EOA and JAA designed the study, collected and analysed the data. UBN, SWI and BUM drafted the manuscript. ACA and PCC revised the first draft of the manuscript. All authors revised the final manuscript for before submission.

## INFORMED CONSENT

Ethics approval to conduct this study was granted by the ethics committee of the Enugu State Ministry of Health (MOH/PHD/D/11/03/219).

## DISCLAIMER

The views and opinions expressed in the article are those of the authors and do not necessarily reflect the views of the publisher and editorial board.

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