

Radiographers' confidence in managing patients with claustrophobia during magnetic resonance imaging

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Abstract

Introduction: Claustrophobia is a major problem experienced by some patients referred for magnetic resonance imaging (MRI). This results in significant costs and delays to healthcare service provision due to appointment cancellations or patients' inability to complete MRI examinations. Radiographers may use several strategies to effectively manage patients with claustrophobia during MRI. This study aimed to determine radiographers' confidence in managing patients with claustrophobia and evaluate the perceived effectiveness of the intervention approaches employed.

Methods: With institutional ethical approval, an online survey was conducted (15th September to 9th November 2020) among Kuwaiti MRI radiographers. The survey was designed to obtain information relating to participant demographics and the perceived confidence of radiographers in their use of interventions to manage claustrophobia during MRI procedures. Data obtained were analysed using the Statistical Package for the Social Sciences (v.26).

Results: A total of 144 valid responses were obtained. Of the respondents, 82% (n=118) were confident that they could support claustrophobic patients during MRI examinations. Almost all respondents (97.9%, n= 141) employed various claustrophobia reduction and relaxation techniques to improve patient experience and increase scan completion rates. There was a significant association between radiographers' level of education ($r_s = +0.18$, $p=0.028$) and experience ($r_s = +0.33$, $p<0.001$) with their confidence managing claustrophobic patients. While participating radiographers considered lectures and training the most effective methods to improve their skills in managing such patients, educating claustrophobic patients prior to their MRI scan was the most effective technique for facilitating scan completion.

Conclusions: Kuwaiti MRI radiographers are confident in applying different claustrophobic management techniques to improve patient compliance. Patient education, through supportive discussion, prior to their MRI examination was identified as the most effective intervention for managing claustrophobia.

Implications for practice: Patient education before MRI examination is necessary to enhance their experience and optimise scan completion rates. In addition, it is essential that MR radiographers develop their practical competence in supporting patients with claustrophobia during their scans.

Keywords: Claustrophobia, Magnetic Resonance Imaging, MRI, Education, and Patient Care.

Introduction

Compared to other imaging modalities, Magnetic Resonance Imaging (MRI) provides superior soft-tissue contrast and multiplanar capabilities, facilitating the detection and characterisation of a range of pathologies^{1,2,3}. The magnetic resonance (MR) image production process does not utilise ionising radiation, thus, making it the preferred diagnostic tool in many clinical situations. In England, for example, about 3.46 million MRI examinations were performed in 2018⁴. However, due to claustrophobia, some patients referred for MRI as part of their clinical care management have a negative experience and may be unable to complete the scan^{5,6}.

Claustrophobia is a specific (isolated) phobic anxiety disorder where anxiety and fear are evoked predominantly by certain well-defined situations^{7,8}. Previous studies reported that some patients terminate their MRI examinations or their appointments due to claustrophobia, triggered mainly by the loud acoustic noise they experienced during their MR examinations and/or the nature of the scanner's design (e.g., the relatively small bore diameter)^{9,10,11,12}. Such incomplete MR examinations may have significant cost implications for healthcare services, with the potential for delayed patient management.

Several interventions have been shown to be effective in supporting claustrophobic patients during their MRI examination, ultimately improving their experience and increasing scan completion rates. These include the use of wide-bore scanners, open design MRI, musical therapy, patient education, the support of family and friends and, more recently, virtual reality tools^{10,13,14,15,16}. However, radiographers working in MRI also play a significant role in helping patients to control their claustrophobia as they are the critical interface between this imaging technology and patients. Poor or inadequate radiographer knowledge and communication in supporting patients with claustrophobia can result in poor outcomes. These may include motion artefact on images, incomplete scans due to premature termination of the examination by patients, with the potential for incomplete disease assessment and/or delayed patient management. The negative patient experience is also a significant outcome, highlighting the importance of appropriate support of claustrophobic patients in MRI to promote a more patient-centred approach^{9,10,11,12,17}. To the best of our knowledge, no published study has examined the MRI radiographers' confidence in administering the interventions used to manage claustrophobia. This study aimed to assess Kuwaiti MRI radiographers' confidence in supporting patients with claustrophobia and to evaluate their perception of the effectiveness of the interventions employed.

Methods

Study Design and Setting

A cross-sectional online survey was designed to recruit Kuwaiti MRI radiographers through a purposive sampling method, to obtain relevant data by targeting the appropriate participants¹⁸. All other radiology staff (i.e., nurses, radiologists and auxiliary staff), including those radiographers that are not working in MRI units, were excluded. Therefore, the two

key inclusion criteria were that participants were MR radiographers working exclusively in MRI departments in Kuwait.

Ethical approval for this study was obtained from the ethics committees of the Ministry of Health, Kuwait (ID: 1638/2020) and the School of Health and Social Work, University of Hertfordshire (ID: HSK/PGT/UH/04272).

Data Collection Instrument: Development and Distribution

The data collection instrument was developed by two radiography academics with expertise in MRI (OL and TA) and a practising clinical radiographer (AA). The two-part instrument included questions to obtain participants' demographic information (without identifying personal data) and their confidence in using interventions to support patients with claustrophobia during MRI procedures. The instrument primarily comprised closed questions with a section for free-text comments to capture additional, more in-depth information regarding the radiographers' opinions¹⁸. The questions were developed based on current literature in MR imaging practice relative to the management of claustrophobic patients^{9,10,11,12}. The data collection instrument was hosted on Google Forms (Google, Mountain View, CA) and tested in a pilot study to ensure face and content validity as well as to confirm compatibility on different electronic devices and platforms¹⁹. Of the 10 clinical MR radiographers invited to participate in the pilot study, seven responded, and indicated the questions were clear and understandable.

The MRI radiographers in Kuwait were invited to take part in the study via email issued through the Kuwait Association of Radiographers. In addition, the social media platforms (WhatsApp and LinkedIn) of the author (AA) were used to promote the study. Screening questions were incorporated at the start of the actual survey to filter individuals who were not eligible to participate. The study was active for eight weeks, from September 15th to November 9th, 2020. The participants were reassured that their responses would be anonymised and only used for this study.

Data analyses

Obtained data was imported into the Statistical Package for the Social Sciences (SPSS) version 26 (IBM Corp, NY, USA) for analysis. Descriptive statistics were used to determine the frequency information. In addition, inferential analysis was conducted using Spearman's rank correlation coefficient to measure the strength and direction of association between variables. The Friedman's test was used to determine the perceived effectiveness through ordered ranking of the interventions used to alleviate claustrophobia in MRI²⁰.

Results

Demographic characteristics of participants

The demographic characteristics of the radiographer participants presented in Table 1 show that there were 144 responses, of which, the majority were females (n=89, 61.8%). Those between 18 and 39 years of age formed three-quarters of the total participants (n=109,

75.7%). Bachelor's degree holders dominated the sample (n=116, 80.6%). Respondents having up to 10 years of professional work experience in MRI (n=118, 82%) and those working in government hospitals (n=128, 88.9%), each represented similar majority proportions.

Participants' confidence in managing patients with claustrophobia

Study participants indicated that patients with claustrophobia were commonly referred for MRI, with 70.8% reporting observing this response in their patients "very often" or at least "frequently". Furthermore, more than a quarter of respondents (n= 38, 26.4%) indicated that they "sometimes" hear their patients expressing anxiety related to claustrophobia during MRI procedures. The majority of respondents (n=118, 82%) reported that they were 'very confident' or at least 'moderately confident' in managing patients with claustrophobia during MRI. Only 18% of respondents stated that they had little or no confidence in managing such a situation.

Opinions of participants were sought on the six support approaches (Table 2) that radiographers could use to develop this skill. Participants were free to select a combination of these support approaches. In order of preference, the effective support approaches specified by respondents included: educational lectures alone or in combination with other methods (n=99, 48.5%), followed by weekly training (selected alone or in combination with other methods) (n=32, 15.6%) and study leave (n=7, 3.4%). These results suggest that relevant lectures and training were considered the most effective methods to enable participating radiographers to develop the requisite skills to support patients experiencing claustrophobia during MRI (see Table 2).

When asked about the availability of such support strategies within their MRI departments, 43.1% (n=62) of respondents reported that they had access to relevant education and training opportunities. However, 34.7% (n=50) of respondents reported that these support systems were not available to them, while a further 22.2% (n=32) did not know whether or not such supports were available. The participants believed that the MRI departments (n=39, 27.1%) and government (n=31, 21.5% alone or in combination) were the top entities responsible to help radiographers acquire the skills to support claustrophobic patients.

Effect of educational qualification and work experience on the radiographer's confidence level

The results showing the effect of level of educational qualification of participants and the level of confidence are illustrated in Figure 1. Half of the participants' group with the lowest level of academic qualification (i.e., Diploma in Radiography) indicated that they had little or no confidence managing patients with claustrophobia, whereas Bachelor's (86.2%) and Master's (80%) degree holders considered themselves more confident in patient management. However, the only participant holding a Doctoral Degree indicated little confidence in managing claustrophobic patients. Although, this degree might have been focused in another area of radiography and not clinical MRI. Nonetheless, a weak

correlation between a participant's level of education and confidence in supporting patients with claustrophobia ($r_s = +0.18$, $p = 0.028$) was determined.

Similarly, there is a positive, moderate, and statistically significant correlation between participants' level of experience in MRI and confidence ($r_s = +0.33$, $p < 0.001$). The results indicate that the higher a participant's level of practice-based experience, the higher their reported confidence.

The perceived effectiveness of techniques used to manage claustrophobia during MRI

Table 3 presents the ranking of the effectiveness of all techniques applied by participating radiographers for the management of claustrophobia patients. The majority of respondents ($n = 141$, 97.9%) indicated their use of a range of techniques to reduce the anxiety and fear experienced in particular by claustrophobic patients during MRI procedures. Participants' rating of the effectiveness of each of the methods was analysed using the calculated mean rank indices. In decreasing order of ranking from the highest to the lowest ranked mean index were: supportive instructions (3.36), mild sedation (3.20) and breathing technique (2.52). Ranking mean values of the various techniques varied significantly (Friedman's Statistic = 27.8, $df = 4$, $p < 0.0001$). Dunn-Bonferroni post hoc tests indicated that there were significant differences between the breathing technique (lowest ranked mean) and supportive instructions ($p = 0.001$) and mild sedation ($p = 0.01$). There were no significant differences observed between any other claustrophobia management techniques.

Discussion

Holders of a minimum of a Bachelor's degree in radiography constituted the majority (91.7%) of the study respondents, indicating they had an appropriate academic qualification to practice as professionals in the discipline. However, only 18.1% of all respondents had more than ten years of professional work experience in radiography. A substantial proportion (31.3%; $n = 45$) had worked in MRI for between 6 and 10 years. While the work history data for this study suggest that respondents have sufficient experience to enable them to work in MRI, the academic qualification attained by the majority (88.9%) of respondents was a Diploma or Bachelor's degree in radiography. Therefore, a case can be made for formal postgraduate training in MRI to improve radiographers' knowledge and ability to manage patients in this specialist area of imaging as this may not have been comprehensively taught at the diploma or undergraduate degree programme levels²¹. However, the authors acknowledge the possibility that some of the experienced MR radiographers may have developed and improved their knowledge and skills in claustrophobic patient management through experiential learning in the clinical department and/or attendance at local training programmes.

Findings in this study revealed that claustrophobia is a common occurrence in MRI scanning, corroborating previous literature evidence^{6,9,10,11,12}. In the systematic review by Munn et al.⁶, the authors highlighted a number of causes of claustrophobia in MRI, including pain and discomfort experienced whilst lying still and the enclosed design of the scanner. In addition, a longitudinal cohort study by Mubarak and colleagues²² demonstrated that a large proportion of patients referred for MRI experience claustrophobia. Consequently, the MRI

radiographer needs to be confident in the provision of effective support to patients with claustrophobia tendencies before during and after the MR scanning process.

However, this study determined that a number of the respondents reported not being confident in dealing with patients with claustrophobia. Considering the extensive cost to the health services as a result of appointment cancellations or incomplete MRI investigations due to claustrophobia^{5,6}, it is imperative that measures, including effective radiographer training, are implemented. Additionally, study findings demonstrated that the level of education and years of clinical experience among MR radiographers appear to have a strong relationship to their perceived skills and confidence in implementing effective interventional approaches to support patients with claustrophobia. According to the Health Care Professional Council²³, continuous professional development (CPD) is particularly important to healthcare practitioners in improving their professional skills. Radiographers need to be well-trained to know how to effectively support and manage different patient cohorts and corresponding behaviours. An educated and professionally competent MR radiographer can ensure patients are well supported by applying the relevant evidence-based principles to their interaction with each patient attending for MRI. Their skills when interacting with and managing patients, including those with claustrophobia, will then be based on sound principles, enabling them to provide care with a strong patient-centred focus.

The majority of responding MR radiographers working in Kuwait (97.9%) acknowledged the use of anxiety reduction methods to support patients with claustrophobia. Based on literature evidence, interventional approaches employed to support claustrophobic patients within MRI departments include sedation²⁴, musical therapy^{15,25}, and, more recently, virtual reality (VR)^{14,26}. The single most striking observation to emerge from this study (Table 2) was the high ranking assigned by MR radiographers to 'providing supportive instructions' as a method to support claustrophobic patients during their MRI scan. Mohammed and Lawend²⁷ concluded that female adolescents benefited from supportive instruction before their MR examination because they did not have sufficient prior knowledge about the MRI scan process. Therefore, supportive instructions are considered an effective technique to prepare patients in advance of their scan.

Consequently, supportive instructions from MRI radiographers who know more than other health care professionals about this imaging modality will enhance the patient experience and resultant MR image quality. However, literature evidence indicates that the way in which information and instructions are given to patients with claustrophobia prior to their MRI scan is important. Bolejko and Hagell²⁸ indicated that booklet information did not produce any difference in alleviating patient's anxiety. Patients felt more supported listening to instructions from an experienced MR radiographer, being able to ask questions to clarify specific issues of concern to them. Thus, the effect of some participant radiographers in this study being moderately confident or not confident in communicating with claustrophobic patients has the potential to negatively affect patients' experiences in MRI.

The second most common strategy for facilitating MRI scanning of claustrophobic patients is mild sedation. It is one of the interventions used extensively in MRI units, depending on the

individual patient case^{29,30}. This evidence is significant as it demonstrates just how useful mild sedation is in respectively reducing or eliminating the claustrophobia response. However, there are a high-risk group of patients, such as those with respiratory disorders and pregnant women, for whom the risks associated with sedation may outweigh the benefits. In addition, given the side effects (such as brain toxicity, central nervous depression, long-term neurocognitive effects to children, adverse events related to prescription errors, hypotension, etc.)^{31,32,33} and cost implication of giving sedation, this strategy is not usually the first-line approach in managing claustrophobic patients in MRI. Therefore, sedation should not be routinely prescribed for claustrophobic patients, and should only be considered where unsedated MRI cannot be achieved.

The third intervention commonly employed to help patients cope during MRI is musical therapy. Listening to music helps patients develop a more positive state of mind, distracting them from the feeling of being trapped in a tunnel and reducing the severity of anxiety they experience. Previous studies have evaluated the effect of live and recorded music on patients undergoing MRI scans, determining its effectiveness in reducing the severity of the claustrophobia response in patients¹⁵. This research highlighted the importance of music therapy in reducing anxiety, resulting in decreased individual examination times by reducing the likelihood of having to repeat sequences because of degradation due to motion artefact. The effect of music therapy on improving the patient experience in MRI was also affirmed by Stanley et al.²⁵. Based on radiographer rating, the current study has shown that the use of music was a practical and effective method of supporting patients with claustrophobia, enabling many to complete their MRI scans. Therefore, the results support established evidence that music therapy improves the MRI experience for claustrophobic patients.

Virtual reality (VR) was ranked fourth by the participating radiographers with a score a bit similar to that assigned to music therapy (Table 3). This intervention is popular among MR radiographers working in Kuwaiti hospitals³⁴. The patient is trained before the actual examination within a VR environment to help alleviate their anxiety and fear during the main MRI examination. Although applying the method is expensive, several studies have supported the use of VR equipment in reducing the level of claustrophobia experienced by patients during MRI^{14,26}. In contrast, Brown et al.¹⁴ determined that some patients had described the VR experience as annoying and ineffective in alleviating their fear. Although the main point of using VR equipment is in reducing nervousness before and during the MRI scan, the difference in actual outcomes might be due to different patient expectations. It is anticipated that not all claustrophobic patients will accept the VR experience as it does not change their fundamental perception of being trapped within the MR scanner bore. However, some patients believe that VR takes them to a different world, away from the MRI room, thus making the MRI experience bearable.

Limitations

The study is limited as its design did not enable the survey response rate to be determined. However, the study had a large sample size i.e., n=144 respondents. With improvements in questionnaire design, further insight could have been gained into why MR radiographers considered themselves to be confident or not confident at applying

various claustrophobic patient management strategies and the type of educational approaches that would be most effective to facilitate improvement in their practical communication and care skills when supporting claustrophobic patients in MRI.

Conclusion

This study determined that the radiographer's role is crucial in allaying the anxiety and fear experienced by patients referred for MRI, particularly those with claustrophobia. The ability to perform this task depends on the radiographers' confidence, experience, and educational status. While they perceive several interventions as effective for supporting patients with claustrophobia, instructional guidance was the preferred approach. Further research is needed to explore the structure and content of this supportive guidance so that radiographers can consistently apply it during their interactions with patients experiencing claustrophobia in MRI. Consequently, this study provides a number of recommendations to improve claustrophobic patients' experience in MRI. MR radiographers need to keep up-to-date with new research findings and develop the practical skill-set necessary to enable them to improve the experience of claustrophobic patients attending the MRI department, providing supportive encouragement to facilitate completion of their scan. Consequently, theoretical and practical training are important in the education of MR radiographers. Therefore, clinical departments and governmental institutions should provide the necessary opportunities and support required by MR radiographers to improve their knowledge and professional skills for the benefit of patients and quality MR service provision. Further research could explore MRI scan completion rates and patient satisfaction when treated by Kuwaiti MR radiographers who are confident supporting patients with claustrophobia.

References

1. Afonso PD, Mascarenhas VV. Imaging techniques for the diagnosis of soft tissue tumors. Reports in Medical Imaging. 2015 Apr 30; 8:63-70.
2. Bruno F, Arrigoni F, Mariani S, Splendiani A, Di Cesare E, Masciocchi C, Barile A. Advanced magnetic resonance imaging (MRI) of soft tissue tumors: techniques and applications. La radiologia medica. 2019 Apr 1;124(4):243-52.
3. Gomaa MA, Hammad MS, Abdelmoghny A, Elsherif AM, Tawfik HM. Magnetic resonance imaging versus computed tomography and different imaging modalities in evaluation of sinonasal neoplasms diagnosed by histopathology. Clin Med Insights Ear Nose Throat. 2013;6:9-15.
4. National Health Service England (2018) Diagnostic Imaging Dataset Annual Statistical Release 2017/18; Version number: 1.0. Accessed online (16/04/2021) at: <https://www.england.nhs.uk/statistics/wp-content/uploads/sites/2/2018/11/Annual-Statistical-Release-2017-18-PDF-1.6MB-1.pdf>
5. Baez YK, AL-Jumaily AS, Mahmood NA, Mohammed QH. Role of Nurse in Reducing Stress among Female Patients Performing Magnetic Resonance Imaging. Prof. RK Sharma. 2019 Jul;13(3):290.
6. Munn Z, Moola S, Lisy K, Riitano D, Murphy F. Claustrophobia in magnetic resonance imaging: a systematic review and meta-analysis. Radiography. 2015 May 1;21(2):e59-63.
7. World Health Organization (2019) International Statistical Classification of Diseases and Related Health Problems 10th Revision. World Health Organization, Geneva. Accessed Online (16/04/2021) at: <https://icd.who.int/browse10/2019/en>.
8. Björkman-Burtscher IM. Claustrophobia—empowering the patient. European Radiology. 2021 Apr 15:1-2.
9. Dewey M, Schink T, Dewey CF. Claustrophobia during magnetic resonance imaging: cohort study in over 55,000 patients. Journal of Magnetic Resonance Imaging: An Official Journal of the International Society for Magnetic Resonance in Medicine. 2007 Nov;26(5):1322-7.
10. Enders J, Zimmermann E, Rief M, Martus P, Klingebiel R, Asbach P, Klessen C, Diederichs G, Bengner T, Teichgräber U, Hamm B. Reduction of claustrophobia during magnetic resonance imaging: methods and design of the "CLAUSTRO" randomized controlled trial. BMC medical imaging. 2011 Dec;11(1):1-5.
11. Enders J, Zimmermann E, Rief M, Martus P, Klingebiel R, Asbach P, Klessen C, Diederichs G, Wagner M, Teichgräber U, Bengner T. Reduction of claustrophobia with short-bore versus open magnetic resonance imaging: a randomized controlled trial. PloS one. 2011 Aug 22;6(8):e23494.
12. Napp AE, Diekhoff T, Stoiber O, Enders J, Diederichs G, Martus P, Dewey M. Audio-guided self-hypnosis for reduction of claustrophobia during MR imaging: results of an observational 2-group study. European Radiology. 2021 Apr 15:1-9.
13. Ahlander BM, Engvall J, Ericsson E. Anxiety during magnetic resonance imaging of the spine in relation to scanner design and size. Radiography. 2020 May 1;26(2):110-6.

14. Brown RK, Petty S, O'Malley S, Stojanovska J, Davenport MS, Kazerooni EA, Fessahazion D. Virtual reality tool simulates MRI experience. *Tomography*. 2018 Sep;4(3):95.
15. Walworth DD. Effect of live music therapy for patients undergoing magnetic resonance imaging. *Journal of music therapy*. 2010 Dec 1;47(4):335-50.
16. Yakar B, Piriñci E. Investigation of the Effect of Written and Visual Information on Anxiety Measured Before Magnetic Resonance Imaging: Which Method is Most Effective?. *Medicina*. 2020 Mar;56(3):136.
17. Hyde E, Hardy M. Patient centred care in diagnostic radiography (Part 3): Perceptions of student radiographers and radiography academics. *Radiography*. 2021 Jan 28.
18. Ross T. A survival guide for health research methods. McGraw-Hill Education (UK); 2012 May 1.
19. Rubio DM, Berg-Weger M, Tebb SS, Lee ES, Rauch S. Objectifying content validity: Conducting a content validity study in social work research. *Social work research*. 2003 Jun 1;27(2):94-104.
20. Curtis E, Drennan J. Quantitative health research: issues and methods: issues and methods. McGraw-Hill Education (UK); 2013 Sep 1.
21. Westbrook C. Is there a relationship between how MRI is learned and knowledge?. *Radiography*. 2017 Sep 1;23:S43-7.
22. Mubarak F, Baig K, Anwar SS. Claustrophobia during Magnetic Resonance Imaging (MRI): Cohort of 8 Years. *International Neuropsychiatric Disease Journal*. 2015 Jan 22:106-11.
23. The Health Care Professional Council (2017). Continuing professional development and your registration. Accessed online (16/04/2021) at: <https://www.hcpc-uk.org/globalassets/resources/guidance/continuing-professional-development-and-your-registration.pdf>
24. Blayney M.R. Procedural sedation for adult patients: an overview. *Continuing Education in Anaesthesia, Critical Care & Pain*. 2012 Aug 1;12(4):176-80.
25. Stanley E, Craddock A, Bisset J, McEntee C, O'Connell MJ. Impact of sensory design interventions on image quality, patient anxiety and overall patient experience at MRI. *The British journal of radiology*. 2016 Nov;89(1067):20160389.
26. Rahani VK, Vard A, Najafi M. Claustrophobia game: Design and development of a new virtual reality game for treatment of claustrophobia. *Journal of medical signals and sensors*. 2018 Oct;8(4):231.
27. Mohammed E, Lawend JA. Effect of Health Instructions on Anxiety Levels and Claustrophobia Among Female Adolescents Undergoing Magnetic Resonance Imaging. *Tanta Scientific Nursing Journal*. 2016 Nov 1;11(2):25-43.
28. Bolejko A, Hagell P. Effects of an information booklet on patient anxiety and satisfaction with information in magnetic resonance imaging: A randomised, single-blind, placebo-controlled trial. *Radiography*. 2021 Feb 1;27(1):162-7.

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29. Almutlaq ZM. Discussion of the Causes, Effect and Potential Methods of Alleviating Patient Anxiety When Undergoing Magnetic Resonance Imaging (MRI). *The Egyptian Journal of Hospital Medicine*. 2018 Jul 1;72(5):4473-7.
 30. Munn Z, Jordan Z. Interventions to reduce anxiety, distress and the need for sedation in adult patients undergoing magnetic resonance imaging: a systematic review. *International Journal of Evidence-Based Healthcare*. 2013 Dec;11(4):265-74.
 31. Arthurs OJ, Sury M. Anaesthesia or sedation for paediatric MRI: advantages and disadvantages. *Current Opinion in Anaesthesiology*. 2013 Aug 1;26(4):489-94.
 32. Middelkamp JE, Forster BB, Keogh C, Lennox P, Mayson K. Evaluation of adult outpatient magnetic resonance imaging sedation practices: are patients being sedated optimally?. *Canadian Association of Radiologists Journal*. 2009 Oct;60(4):190-5.
 33. Deen J, Vandevivere Y, Van de Putte P. Challenges in the anesthetic management of ambulatory patients in the MRI suites. *Current opinion in anaesthesiology*. 2017 Dec 1;30(6):670-5.
 34. Koretić T, Mandić L, Agić A, Pibernik J. Developing Application for Virtual Reality. In 2020 International Symposium ELMAR 2020 Sep 14 (pp. 53-56). IEEE.

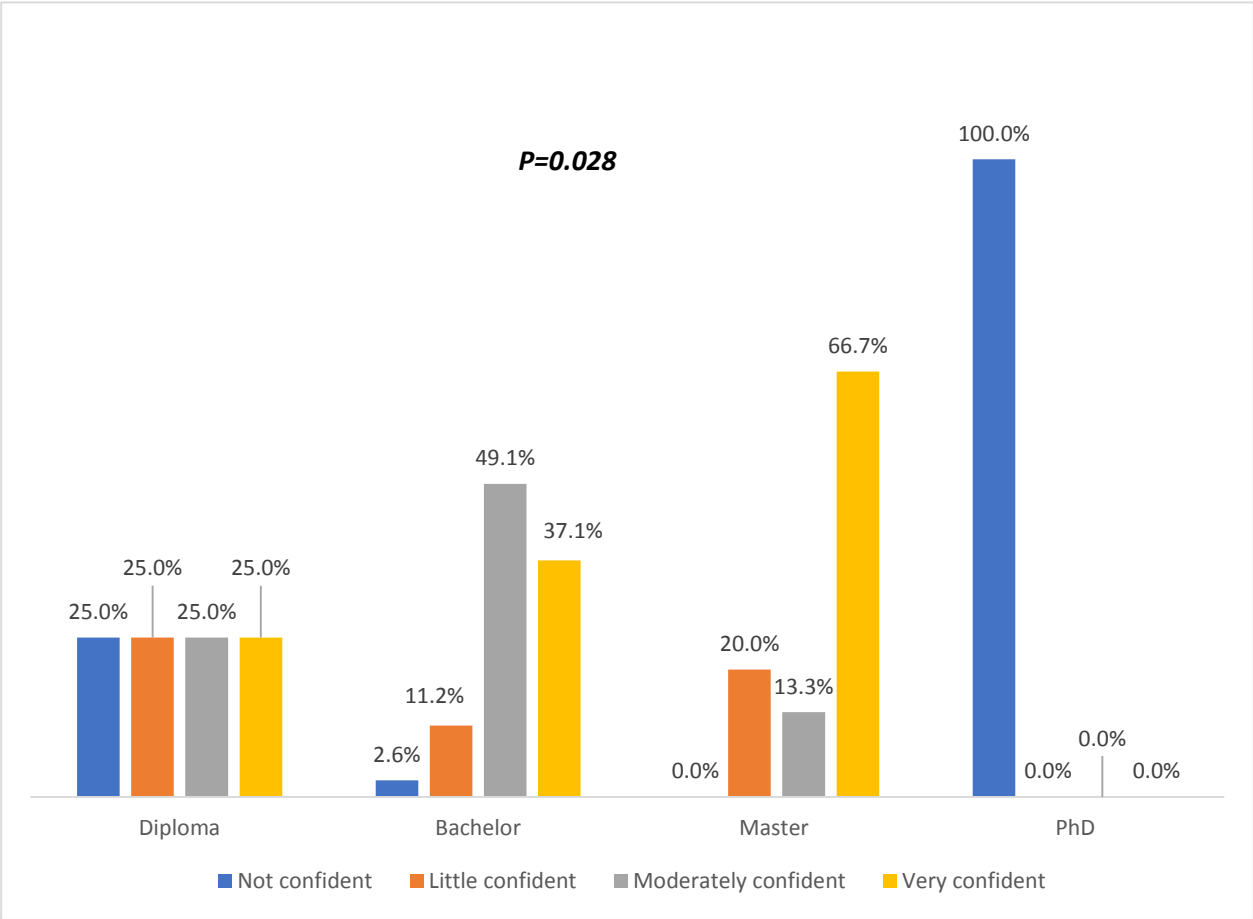


Figure 1. Effect of educational qualification on radiographers' confidence level

Table 1. Participants' demographic distribution.

Demographic variable (n=144)	Categories	n	%
Gender	Male	43	29.9%
	Female	89	61.8%
	Prefer not to mention	12	8.3%
Age group	18 - 29 years	21	14.6%
	30 - 39 years	88	61.1%
	40 - 49 years	31	21.5%
	50 - 59 years	3	2.1%
	60 & above	1	0.7%
Levels of education	Diploma	12	8.3%
	BSc	116	80.6%
	MSc	15	10.4%
	PhD	1	0.7%
Work experience	< 2 years	38	26.4%
	2 - 5 years	35	24.3%
	6 - 10 years	45	31.3%
	11 - 15 years	17	11.8%
	16 - 20 years	3	2.1%
	> 20 years	6	4.2%
Type of hospital	Government hospital	128	88.9%
	Private hospital	16	11.1%

Table 2. Participants' responses– Frequency of complaints and radiographer confidence at managing patients with claustrophobia.

Statements (n=144)	Responses	n (%)
How often do you hear patients complain of anxiety in MRI?	Never	2(1.4%)
	Very rarely	2(1.4%)
	Sometimes	38(26.4%)
	Frequently	71(49.3%)
	Very often	31(21.5%)
Rate your confidence level in managing claustrophobic patients	Not confident	7(4.9%)
	Little confident	19(13.1%)
	Moderately confident	62(43.1%)
	Very confident	56(38.9%)
What are the types of support needed to develop this skill?	Weekly training alone or in combination with other methods	32(15.6%)
	Educational lectures alone or in combination with other methods	99(48.5%)
	Financial support for academic training	26(12.7%)
	Time off work (time allocated for training)	24(11.7%)
	Study leave (i.e., long-term training)	7(3.4%)
	I don't know	16(7.8%)

Table 3. Ranking of participants' rating of the methods employed for supporting patients with claustrophobia.

Methods	*Number of participants	*Mean rank	Friedman's Statistic (Degrees of freedom <i>df</i>)	p-value	Rank
Supportive instructions	142	3.36 ^a	27.8 (4)	<0.0001	1
Mild sedation	138	3.20 ^a			2
Musical therapy	139	2.97			3
Virtual reality	125	2.94			4
Breathing technique	134	2.52 ^b			5

*Participants (n=144) made multiple selections of applicable methods employed for claustrophobia management in their practice.

* Mean rank values denoted by ^a and by ^b are statistically different.