

Original Research Article

Knowledge and awareness of radiography students towards advancement in the era

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Received: 30 March 2022

Revised: 28 April 2022

Accepted: 02 May 2022

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ABSTRACT

Background: Teleradiology is the computerized conveyance of radiological images of patients like x-ray digital radiography, Computed tomography (CT), Magnetic resonance imaging (MRI), Ultrasound imaging (USI), and Atomic medication imaging (AMI) pictures starting with one spot then onto the next with the end goal of translation and counsellor.

Methods: A prospective, comparative, questionnaire-based investigation was carried out in the Department of Radiological Imaging Techniques. A validated questionnaire was circulated among undergraduate and postgraduate Radiography students in the college of paramedical sciences, Teerthanker Mahaveer University. The study incorporated multiple-choice questions (MCQs) identified with segment attributes (age, sex), scholastic capability, and Information on Teleradiology, PACS, and DICOM.

Results: Out of the total of 157 participants 142 (90.44%) filled the questionnaire which was undergraduate and postgraduate students of Radiological and Imaging Techniques filled questionnaire. To assess knowledge about teleradiology, PACS, and DICOM which they gain during theory classes and from hospital postings. There were 89 (62.7%) males and 53 (37.3%) females with the age ranging from 18 to 28, mean of 23 years. The statistical data of all participants gave the correct answer is 85.48% we can say the level of knowledge and awareness of radiography students towards advancement in the era is very good.

Conclusions: Teleradiology is the computerized conveyance of radiological images of patients, and pictures starting with one spot then onto the next with the end goal of translation and counselling. The finding in this study indicates that radiography students have optimum knowledge with 85.48%.

Keywords: DICOM, HIS, MRI, PACs, RIS, Teleradiology

INTRODUCTION

Teleradiology is the computerized conveyance of radiological images of patients like x-ray digital radiography, computed tomography (CT), Magnetic Resonance Imaging (MRI), Ultrasound Imaging (USI), and Atomic Medication Imaging (AMI) pictures starting with one spot then onto the next with the end goal of translation and counselor.¹ Teleradiology may permit all the more opportune clarification of the radiological picture and give impressive admittance to auxiliary

conferences and improve proceeding with instruction. Commonly, it's done standard phone network, a wide region organization, or a neighborhood.²

By teleradiology, pictures can be shipped off another piece of the clinic or to another piece of the medical clinic, or to different areas around the world. Costumers in better places may at the same time see pictures. Likewise used, teleradiology may upgrade admittance to radiologic translations and in this way innately improve patient consideration.³

Teleradiology isn't appropriate if the accessible teleradiology framework doesn't give pictures of satisfactory quality to play out the show duty.⁴

At the point when a teleradiology framework is utilized to give the stylized understanding, we offer ought not to be a clinically significant loss of information from picture obtaining through assignment to the conclusive picture show.⁵ The show is utilized for the transmission of pictures, the nature of the picture ought to be sufficient to fulfill the fundamentals of the clinical conditions. The evaluation determines points, capabilities of faculty, gear, rules, license, credentialing, duty, correspondence, quality improvement, and quality control for teleradiology.⁶ While not comprehensive, the level should fill in as a model for all clinicians and wellbeing experts who use teleradiology.^{1,7} Teleradiology is grounded, accessible if the need arises and crisis detailing is being utilized in more than 70% of radiology rehearses in the United State and basic teleradiology by "nighthawk administrations" around the word.⁸ The interest for imaging and professional understanding has additionally had the result of making radiology administration 24×7 that requires not only inhabitants to be accessible if the need arises twilight and on ends of the week, yet the accessibility of with the exception of going to Radiologists also.⁸

Teleradiology, to some extent, makes this doable, and organizations like the ACR (America College of Radiology) and the European culture for Radiology rouse radiologists to utilize teleradiology benefits proactively that incorporate general and subspecialist radiologists through neighborhood zone networks in zones where set up outside radiology administrations and capability are inadequate.¹⁰ Truth be told, the ACR as of late refreshed its rules and strengths for teleradiology execution calling for sought after improvement of conventions and programming to approve having two-course correspondence between, clinical specialists, radio-technologists, and imaging administrators; super conventions for electronic clinical documentation mixes, peer survey offshoots, and greatness transcription frameworks that eliminate manual confederates.^{2,11}

DICOM (Digital Imaging and Communication In Medicine) web shows are broadly utilized for inspecting pictures and achieving essential analysis inside radiology and other imaging divisions, through picture PACS (Picture Archiving and communication system), DICOM, which is the transmission standard for radiological imaging, is practiced in teleradiology cases, where are pass on of patient clinical pictures starting with one spot then onto the next.¹²

In teleradiology, experts have a place with various branches of the Indicative community, medical clinic inward experts, or experts at home to communicate with the radiological imaging office.^{3,13} Radiological focus with the HIS (Hospital Information System) requires an

extraordinary and own data framework RIS (Radiology Imaging System).¹⁴ RIS requires a created framework (organization), equipment, and programming. The justification for this lies in the realities that radiology addresses a pictorial part of medication, that radiology utilizes pictures in everyday work, the radiological pictures are in an advanced structure, that radiological pictures as information records contain RIS number of information, for example, bytes, that x-beam machines are digitized, that assessment by x-beam advanced radiography, CT (Computed tomography), MRI (Magnetic Resonance Imaging) X-ray, Mammography, Ultrasound and other radiological imaging gadgets which give clinical imaging in the computerized organization of 1-600 MB, once in a while more than 600 MB.^{4,15}

The objective of this study was to check the knowledge and awareness of radiography students towards advancement in the era. To Assessment of the knowledge of DICOM, PACs, and Teleradiology in undergraduate and postgraduate radiography students of Teerthanker Mahaveer University, Moradabad, Uttar Pradesh.

METHODS

Study type

A prospective, comparative, questionnaire-based investigation was carried out in the Department of Radiological Imaging Techniques at the college of paramedical sciences, Teerthanker Mahaveer University Moradabad, Uttar Pradesh India. This study was based on Knowledge and Awareness of Radiography Students towards Advancement in the Era. To check the knowledge of undergraduate students and Postgraduate Radiography Students about the Teleradiology PACS, DICOM.

Study design

This study was designed to check the knowledge of Radiography undergraduate second year, final year, and Postgraduate First-year and final year students in the college of paramedical sciences, Teerthanker Mahaveer University, Moradabad, Uttar Pradesh, India.

Study area

Radiological and Imaging Techniques Students College of Paramedical Sciences, Teerthanker Mahaveer University Moradabad, Uttar Pradesh, India.

Study duration

This prospective questionnaire-based study was conducted for the time period of one year from May 2020 to May 2021 at the College of Paramedical Sciences, Teerthanker Mahaveer University Delhi Road Moradabad, Uttar Pradesh, India.

Study population

The study population consisted of radiography students excluding the students who fell under exclusion criteria. The size of the students was 157 undergraduate and postgraduate of radiological and imaging techniques. A probability sampling method was employed while collecting samples. Some batches are excluded because till the time they did not cover the theoretical part of their course which includes the topics related to this study.

Method of data collection

A validated questionnaire was circulated among undergraduate and postgraduate radiography students in the college of paramedical sciences, Teerthanker Mahaveer University. The study incorporated multiple-choice questions (MCQs) identified with segment attributes (age, sex), scholastic capability, and Information on Teleradiology, PACS, and DICOM.

Setting and resources

The project setting was done in the Department of Radiological and Imaging Techniques, College of Paramedical Sciences, Teerthanker Mahaveer University Moradabad, Uttar Pradesh India. This department is given facility for all necessary Services required for this study.

Statistical analysis

The data collected was compiled, tabulated, graphical, analyzed, and subjected to statistical tests. Analysis was done using Google form.

RESULTS

Out of the total 157 participants, 142 (90.44%) filled the questionnaire which was undergraduate and postgraduate students of Radiological and Imaging Techniques filled questionnaire. To assess knowledge about Teleradiology, PACS, and DICOM which they gain during theory classes and from hospital postings. There were 89 (62.7%) males and 53 (37.3%) females with the age ranging from 18 to 28, mean of 23 years. The demographic characteristics of participants are illustrated in a pie chart graph of gender and a bar graph showing the age of participants.

Table 1: Qualification (undergraduate and postgraduate) and a wise percentage of participants who gave the correct answers to the questions.

Total result	Undergraduate	Postgraduate
Mean values	80.74%	90.22%

The academic qualification and work experience of participants were varying. There were undergraduate and

postgraduate students of Radiology Imaging Techniques in the college of paramedical sciences, Teerthanker Mahaveer University, Moradabad, and Uttar Pradesh, India.

Table 2: Comparison undergraduate and postgraduate.

Question no.	Undergraduate (%)	Postgraduate (%)
1.	89.24	96
2.	90.91	89.47
3.	84.79	94.73
4.	82.85	92.10
5.	81.83	100
6.	91.28	100
7.	89.89	65
8.	89.33	97.36
9.	61.44	89
10.	63.85	96
11.	61.07	67.07
12.	90.89	97.36
13.	88.04	97.36
14.	69.87	84.60
15.	85.35	93.36
16.	82.66	87.23
17.	83.50	97.36
18.	75.35	89
19.	86.56	100
20.	66.17	71.47

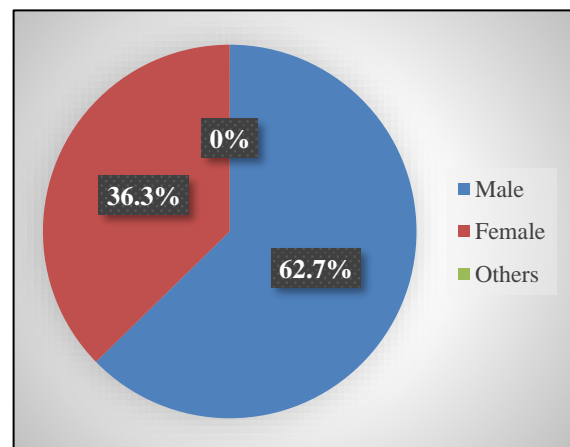


Figure 1: Ratio of male and female participants in this study.

There were undergraduate students BRIT 4th semester 60 (42.3%), BRIT 6th semester 49 (34.5%), and postgraduate students MRIT 2nd semester 14 (9.9%), MRIT 6th 19 (13.4%) are participating as well. Among 20 questions related to Teleradiology, PACS, DICOM the maximum and minimum scores obtained were 100% and 52% right answers respectively. The frequency of correct answers responded Table shows the batch-wise percentage of participants who gave the correct answer.

The table shows the qualification (Undergraduate and Postgraduate) a wise percentage of participants who gave the correct answers to the questions. The statistical data of all participants gave the correct answer is 85.48% we can say the level of knowledge and awareness of radiography students towards advancement in the era is very good. The comparison between undergraduate and postgraduate Radiological Imaging Techniques students' knowledge and awareness of Teleradiology, DICOM, PACS is postgraduate given a correct answer of 90.22% and undergraduate given a correct answer is 80.74%. Finally, postgraduates have excellent knowledge and awareness of Teleradiology, PACS, and DICOM.

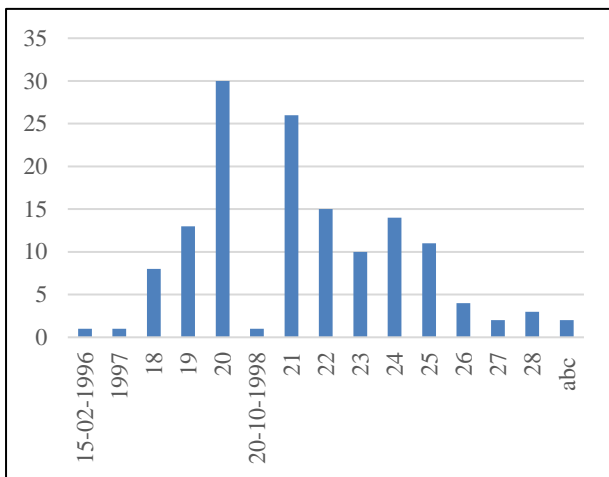


Figure 2: Age of all participants involved in this study.

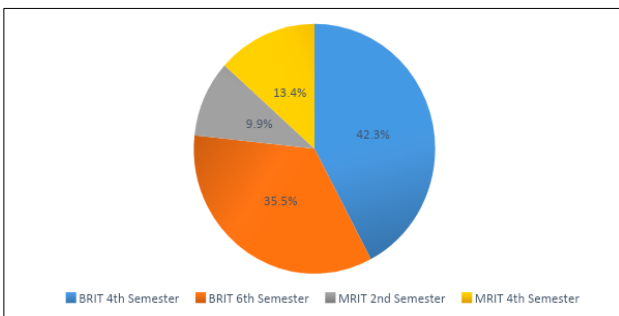


Figure 3: Semester-wise undergraduate and postgraduate participants.

Postgraduate students have excellent knowledge (90.22%) but the undergraduate students have a less knowledgeable comparison to postgraduate students. According to my knowledge, we can say all studies are done mostly related to the hypothesis of pragmatic schooling was first proposed by John Dewey in 1938.¹⁹ He proposed reasonable schooling in this work entitled Insight and Instruction.²⁰

In contrast to active training, the postulations schooling framework underlines the way toward learning through experience in teleradiology and DICOM, PACS, HL7, RIS, HIS, and mobile radiology.²¹ Medical management

had been revolutionized by innovations such as DICOM, PACS, HL7, and cloud-based techniques hindsight, prior to applications of these agreements and information systems security of the data was not as aspect. As radiology departments added modern Imaging technology the demand for efficient technology to transfer clinical data between physicians followed. Maintain probity to keep patient safety Infect. Above all also due diligence is needed to preserve the CTA tried.²²

DISCUSSION

The essential for the presentation of current advances in medication and radiology office is the digitization of Radiological modalities.¹⁶ Utilization of (web) innovation had made well-being aids become available to all, to give quick and productive treatment, and offer data to another at the opportune time.¹⁷ It is significant to follow the determinations and frameworks portrayed to the particularity of radiology data framework incorporate DICOM, PACS, teleradiology, versatile radiology and so forth Customary hands-on radiology instruction that keeps on being utilized today just showcase commonplace imaging layers as opposed to the entire radiology pictures.²¹ While this training method might be serving for assisting understudies with screwing common imaging perspectives, it could be deficient for learning radiological cross-sectional life structures.²⁴ Henceforth, understudies may proceed to give a perspective picture realizing the point when they were depended upon to perform freely during clinical posting.²⁵ Though an assortment of radiology preparation modes, for instance, burden-based learning and the usage of convincing pictures can address part of this intricacy, we acknowledge the primary working status tends to be the best learning procedure.²⁶ They have brought the experiential guidance technique into our radiology office instructing.²¹

Thus, we have introduced the knowledge and awareness of radio- Imaging students towards advancement in the Era. Students have very good knowledge and awareness about the teleradiology PAC, DICOM, HIS, RIS undergraduate and postgraduate both students of radio Imaging have known very well about teleradiology.¹⁸ Postgraduate students have excellent knowledge (90.22%) but the undergraduate students have a less knowledgeable comparison to postgraduate students.

According to my knowledge, we can say all studies are done mostly related to the hypothesis of pragmatic schooling was first proposed by John Dewey in 1938.¹⁹ He proposes reasonable schooling in this work entitled Insight and Instruction.²⁰ In contrast to active training, the postulations schooling framework underlines the way toward learning through experience in teleradiology and DICOM, PACS, HL7, RIS, HIS, and mobile radiology.²¹ The medical 43 management had been revolutionized by innovations such as DICOM, PACS, HL7, and cloud-based techniques hindsight, prior to applications of these

agreements and information systems security of the data was not as aspect. As radiology departments added modern Imaging technology the demand for efficient technology to transfer clinical data between physicians followed. Maintain probity to keep patient safety Infect. Above all also due diligence is needed to preserve the CTA tried.²² The contributions of compressed digital imaging tools and PACS have allowed the field of teleradiology to become more accessible and practicable to physicians and radio-technologist.⁷

CONCLUSION

Teleradiology is the computerized conveyance of radiological images of patients like x-ray digital radiography, computed tomography (CT), Magnetic Resonance Imaging (MRI), Ultrasound Imaging (USI), and Atomic Medication Imaging (AMI) pictures starting with one spot then onto the next with the end goal of translation and counselor. The finding in this study indicates that radiography students have optimum knowledge with 85.48%. Overall awareness and knowledge of radiography students towards advancement in the era. The Teleradiology, PACS, DICOM, RIS, etc. knowledge was very good. We recommend that Teleradiology, PACS, DICOM, and practical training should be a part of mandatory training. The knowledge about Teleradiology, PACS, and DICOM was satisfying with definite possibilities for further improvement of Radio-Imaging and Radio-diagnosis students and professionals. Regular conferences, symposiums, seminars, workshops, and Continuing Medical Education (CME) should be organized and implemented through collaboration between national and international organizations of Teleradiology should take prompt actions conducting education practical and theoretical courses through Open University and training courses.

ACKNOWLEDGEMENTS

Authors are thankful to Navneet Boora, Bhanu Pratap, Ajay Deep Singh, Gourav Kumar, Neeraj Kumar and Arpita Singh, engineer R. P. Singh for their support.

Recommendations

This type of study was less done in Indian Institutes and universities. These goals are primarily focused on improving patient care through accretion networking among radiologists and Radio technologists and physicians in order to reach an ultimate diagnosis in radio-imaging and radio-diagnosis departments provide practical training, theoretical and skill training should be organized National and International Conferences, Continue medical education (CME) to improve the knowledge and can update about the Teleradiology, PACS, DICOM, HIS, RIS, mobile radiology, etc.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Kumar D, Boora N, Kumar R, Sah NK. Knowledge and awareness of radiography students towards advancement in the era *Int J Res Med Sci* 2022;10:1279-85.

APPENDIX

Sample questionnaire

Propose of the research

The Research aims to Knowledge and Awareness of Radiography Students towards advancement In the Era in Teerthanker Mahaveer University Moradabad.

Research methods, research term

In this research, we will ask you to fill out an online questionnaire form, which will take about 10 to 15 minutes to finish.

Potential risk and discomforts

There are no foreseeable risks in participating in the survey.

Confidentiality

The information you provided will be very important for concerned authorities. We assure you that the information you provide will be kept completely confidential. We promise to protect your confidentially.

Part: A

Demographic session

1. What is your age?
.....
2. What is your gender?
.....

Part: B

S. no.	Sample questionnaire
1.	Do you know about DICOM, PACS, and Teleradiology?
2.	Which one is the full form of DICOM?
3.	PACS stands for
4.	What is the use of DICOM and PACS in the Radiology Department?
5.	Teleradiology work in which Mode?
6.	DICOM AND PACS can perform on which of the following reports?
7.	Is Teleradiology used in the case of the Emergency patient?
8.	Do you have knowledge about Hospital Information systems?
9.	RIS Stands for?
10.	Does Teleradiology work without the internet?
11.	How much MB data is transferred at one time with the help of Teleradiology?
12.	Will be used more in the Teleradiology future?
13.	Time can be saved for taking reports from Teleradiology?
14.	Can we have the Teleradiology report globally?
15.	For the Radio technologist learning to report Teleradiology is beneficial
16.	PACS replace hard copy replacement of medical images in future ERA.
17.	The motivation behind DICOM is to guarantee interconnectivity among computerized modalities and unique workstations.
18.	What is the term utilized for the virtual association made between two gadgets with the end goal of data?
19.	The service class provider (SCP) characterizes part of a gadget when its capacities as a worker.
20.	The first Digital Radiography used was in the 1880s by Fuji.