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STUDY OF THE PROTECTING AND TECHNICAL PERFORMANCE OF THE RADIOLOGISTS IN RADIOLOGY SECTORS IN SISTAN AND BALUCHESTAN PROVINCE, IRAN

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ABSTRACT

Background and Objective: Due to the significant role of radiography sectors in diagnosing many diseases, taking the appropriate technical criteria by radiologists to produce high quality images seems necessary and the staff performance of radiology sectors have a direct impact on image quality, and consequently the appropriate recognition of the radiology medicines. **Materials and Methods:** This study has been designed to determine the protecting and technical performance of the radiography sector's staff in Sistan and Balouchestan province and the staff of radiography sectors in nine hospitals have been studied in such a way that allthe staff in technical, protecting and specialized fields havebeen tested.

Findings: The staff's appropriate answers mean in technical field in three morning, evening and night working shifts were achieved 64.7%, 56.7 %and 53.8%, respectively. In addition, the staff's appropriate answers mean in protecting field of the aforementioned shifts were achieved 66.2%, 59.7% and 60.7% and in the specialized field were 47.1%, 41.9% and 35.7%. significant differences ($P<0.05$) were observed in each three technical, protecting and specialized fields. **Results and Discussion :** The staff's performance quality of radiography sectors is an acceptable level and it is required that more supervisions be made through relevant authorities, because the needed equipments to be shielded against radiation are not suitable available in all sectors and the standards related to patients being protected against the dangers resulted from X-rays are not often taken into the consideration.

Keywords: radiography, radiology, radiation protection

INTRODUCTION

Despite having much advantages of radiations to diagnose and treat patients, using these radiations in medicine should be applied with caution and by observing the ALARA (As Low As Reasonably Achievable) rule and the radiography sector's staff have the most heaviest responsibilities to observe the standards in this regard so that the image diagnostic value can be maintained as well as the exposure can be minimized as much as possible through appropriate choosing of radiography factors in radiography sectors. On the other hand, due to the fact that image quality are affected by radiation factors, the radiation factors should be chosen with according with concerned image quality and through applying the least patient's dose, because the average amount of people's annual exposure has been twice the ionization's radiations in the last 70 years by increasing the radiography demands and appropriate measures

should be taken to control the amount of people's exposure (1).

As such, a program has been devised by the European Union to decrease patient's dose and increase image quality of radiography and advised various countries to follow the related instructions. On the other hand, studies conducted in various countries show that following the guidelines suggested by the European Union significantly reduces the patient's absorbeddose (2,3,4).

On the other hand, according to the research conducted by Wogner, training the technical principles of radiography in radiography sectors to prevent from the damages caused by radiations are necessary (5-8). According to the performed studies, the performance of these staff can be improved through training the principles of radiography to the low-experienced residents (9-12).

Krutz performed a study in 2000 and a four-week-training course was hold concerning the radiation techniques and ray concentration and the staff's performance after the training period show that training has a significant impact on improving the imaging working quality (4).

Therefore, due to the fact that ionizing radiations are significant factors in making the biological impacts such as genetic changes, cataract and types of cancers, it is necessary that the factors causes increasing people absorbed dose be prevented. Hence, the present study aims to determine the staff's performance and knowledge of radiography sectors concerning the principles of radiography and safety tips.

MATERIALS AND METHODS

This study is cross-sectional and descriptive aims to determine the staff's performance and specialized knowledge. The statistical community was the staff employed in radiography centers in Sistan and Baluchestan hospitals and the Scientific Questionnaire, Radiography Questionnaire and observational checklist are used to collect data. The content reliability indexes and attitudes of five specialists in radiology are used to determine the checklist reliability. Accordingly, the observational checklist was completed in seven states through the researcher and radiography specialist.

The checklists containing Scientific Questionnaire to study the staff's knowledge are comprised of 30 technical questions, 10 safety questions and evaluating quantity and also 10 specialized questions. The radiographer's checklist consists of 15 questions related to radiographer's ideas as the section's technical committees concerning the amount of observing the safety, technical and protecting tips.

The observational checklist filled up by the researcher includes 35 cases of objective studies regarding the amount of observing specialized, technical and protecting tips in morning, evening and night working shifts.

Data collecting method was such that the researcher attended in the radiography sector without the staff being aware of and observed the performance of each staff in morning, evening and night working shifts and then recorded the obtained results in the checklist.

The set of questions of radiographer were distributed among the staff and then was responded by the researcher supervision without making reference to books or making use of other's information and just for studying their personal knowledge in technical, protecting and specialized fields.

In the next stage, the scores of questionnaire in three technical, protecting and specialized sectorshave separatelybeen calculated and were studied by statistical tests.

The mean and standard deviation of obtained scores was also calculated by Radiographer's Questionnaire and then was analyzed in the observational checklist. To analyze data, the

central indicators, distribution and t statistical test was used and ($P<0.05$) was considered as significant.

Findings

In the questionnaire related to radiographer's hospital centers regarding the condition of sectors in which they are activated, in the observational checklist in the technical field, the total percentage was 58.4 and was separately achieved in the morning shifts, 64.7%; evening shift , 56.7% and night shift, 53.8% (Table 1). In the field of protecting, the total mean was obtained 60.7% which was separately obtained in the morning shift, 66.2%; evening shift, 59.7% and night shift 59.1%. In the specialized shift, the total percentage in all three shifts was 41.5% which was separately achieved in the morning shift, 47.1%, evening shift, 41.9% and night shift, 35.7%. In all three technical, protecting and specialized fields, the overall percentages achieved in the morning shift was higher than that of evening and night working shift and the difference was significant ($P<0.05$). By studying the number of correct answers to the essential questions regarding evaluating the technical amount, the percentage of correct answers the questions raised here is as follows:

1. Where the film for controlling the evaluation should be installed? 45%.
2. Where the tube should be directed to in Cross Table radiography? 50.2%.
3. What is the minimum required distance while doing mobile radiography? 55.8%.
4. What is the rule of ALARA? 11.1%.
5. What amount of radiationis received to the patient's gonadal in an abdomen or pelvis radiography? 1.1%.

The following amount is also achieved in answering the technical questions:

1. Do you know how to study the deviation of optical field and radiation? 8.1%.
2. Explain the test related to study of film's defects in the darkroom. 0%.
3. What is the temperature appropriate for the equipment's fixation and emergence medicine? 45.3%.

On the other hand, the amount of observing the radiation's limitation in the observational checklist is 55.3% but it is 78.2% based on the radiographers' ideas.

There was a significant difference among three working shifts and in the three technical, protecting and specialized fields and on the other hand, the mean of performance percentage in the morning shift was higher than that of other shifts and the score percentage in the protecting fieldwas higher than that of other fields. The mean of questionnaire scores in the technical field was also higher than that of other fields. The staff's performance in the technical, protecting and specialized aspects have been shown in tables 1,2 and 3.

Table 1: The frequency percentage of how staff perform employed in radiography sectors in Sistan and Balouchestan province in the technical field

Cases of technical performance	Morning(%)	Evening (%)	Night (%)	Total (%)	P-Value
Observing the 180 centimeter distance in lung radiography	71	78	83	77.3	P<0.05
Training to take deep expiration in lung radiography	56	43.1	40.2	46.4	P<0.05
Training to take deep expiration in abdomen radiography	0	0	0	0	P<0.05
Leg and knee radiography with separate radiation	25	17.3	13	18.4	P<0.05
Palm and wrist radiography with separate radiation	71	65	49	61.7	P<0.05
Forearm and wrist radiography with separate radiation	63	45	47.1	51.7	P<0.05
Radiography of paranasal sinuses in the sitting or standing position	79	55.1	58	64	P<0.05
Open mouth in sinus X-ray	88	85	77.1	83.4	P<0.05
Neck cross-tybl X-ray of traumatic patients	77	65.2	69	70.4	P<0.05
Observing the proportion of cast and physical dimension	94	89	92.1	91.7	P<0.05
Nose radiography in both right and left sides	53	45	41.2	46.4	P<0.05
The initial open elbow 90 degrees in half the forearm	79	57.2	49.2	61.8	P<0.05
30 degrees in knee half angle	29	32.4	25	28.8	P<0.05
Putting a marker in its appropriate place	85	74	63.5	74.2	P<0.05
Giving quick services to emergency patients	100	100	100	100	P<0.05
Total	64.7	56.7	53.8	58.4	P<0.05

Table 2:**The frequency percentage of how staff perform employed in radiography sectors in Sistan and Balouchestan province in the protecting field**

Cases of protecting performance	Morning(%)	Evening (%)	Night (%)	Total (%)	P-Value
Observing the minimum distance of tube to patient	89	78.2	81	82.7	P<0.05
Not accompanying the patient in the room in the time of radiography	80	77.7	63.4	64.4	P<0.05
Closing the door in the time of radiography	100	100	98	99.3	P<0.05
Lead shield for the patient's accompanier in the radiography room	54	47	39.3	46.7	P<0.05
Delimiting the radiation field into the body dimensions	63	49.9	53	55.3	P<0.05
Legal compliance of converse squared distance	67	59	58.1	61.4	P<0.05
Appropriate kvp and mAs	71	68.6	70	69.8	P<0.05
Omitting metal devices of areas of radiography	79	73.5	69	73.8	P<0.05
Putting marker	49	43.2	59	50.4	P<0.05
Putting gonadal and thyroid shield for patients	10.1	0	0	3.4	P<0.05
Total	66.2	59.7	59.1	60.7	P<0.05

Table 3: the frequency percentage of how staff perform employed in radiography sectors in Sistan and Balouchestan province in the specialized field

Cases of specialize performance	Morning(%)	Evening (%)	Night (%)	Total (%)	P-Value
Warming up the equipment when the tube is cold	85	67	49	67	P<0.05
Rotating sectors slowly	71	73	61	68.3	P<0.05
Rotating the tube in the appropriate direction	87	79	78.6	81.5	P<0.05
Releasing the tube's lock after coming the radiography to an end	45	39.5	41	41.8	P<0.05
Radiation field adaption test	11	8	3.1	7.4	P<0.05
The test to determine the film's fog	0	0	0	0	P<0.05
Appropriate application of emergence and fixation medicine	71	62.1	53.3	62.1	P<0.05
The test of cast light leakage	5	4	0	3	P<0.05
The service of darkroom equipment	31	27	17.2	25	P<0.05
Screen installation and service	65.2	59	54.1	59.4	P<0.05
The total of each separate shift	47.1	41.9	35.7	41.5	P<0.05

RESULT AND DISCUSSION

The results of this research aiming to determine the staff's performance in radiography sectors in Sistan and Balouchestan hospitals performed in the three technical, protecting and specialized fields indicates the low level of staff's knowledge concerning the information that they are daily faced with. The total mean of correct answers was 59.5% and it ishigher separately for radiography techniquesquestions(75.7%) and this is the reason why it is increasingly significant in the daily activities of the staff. On the other hand, the staff's reduced information in the field of technical questions shows the lack of staff's enough attention to this issue despite having a significant role. Meanwhile, in the comparative studying of the tripartite fields, the lowest percentage is the specialized field and this can be the cause of high percentage of equipment's defects in radiography centers and also one of the mainreasonof low quality of radiography images. In addition, in the comparative studying among the morning, evening and night shifts, the percentage of answers and appropriate performance related to staff who work in the morning shift was higher than the ones who work in the other shifts and it seems that one of its reasons is attending the sector's supervisor and radiographer and the specialized supervisor in the morning shift.

On the other hand, there is a significant difference in the comparison between the observational checklist and radiographer's ideas concerning taking into account the technical and protecting tips ($P<0.05$), which can be resulted from the radiographer's optimism in filling the form out or lack of having enough information about the real condition of the sector.

The mean of correct answers to the questions related to ALARA rule and the amount of radiations received to gonadal in abdomen and pelvis radiography shows the low level of staff's information regarding the application of this rule.

On the other hand, lack of most staff's awareness about simple specialized tests indicates the necessity of more attention to the staff's training quality in academic stages and in-service trainings.

The results of this research regarding the application of shielding equipments indicate that not often the shielding equipments are used against X-rays, therefore considering the potential dangers of ionized radiations and emphasizing on ICRP for using the lead shields in imaging of the sensitive organs to rays, the continuous monitoring of physical health authorities in hospitals is necessary (13,14,15). Paying attention to the issue of shielding through authorities and the availability of shielding equipments in sufficient amount can have a decisive role in reducing the patient's absorbed dose (16).

Finally, the performance quality and staff's knowledge of radiography sectors is approximately desirable; however continuous in-service training, authorities' supervision and evaluation and more emphasis on the quality of academic training to enhance the image quality and also reduce the patient's absorbed dose is necessary.

REFERENCES

1. Almen A, Tingberg A, Mathson S. Influence of different technique factors on image quality of lumbar spine radiographs as evaluated by establisher CEC image criteria. Br J Radiol2000; 73(875): 1192-1199.
2. Muhogora WE, Nyanda AM, Kazema RR. Experiences with the European guidelines on quality criteria for radiographic images in

Tanzania.J ApplClin Med Phys2001; 2(4): 219-226.
3. Archer BR, Wagner LK. Protecting patients by training physicians in flouroscopy radiation management.J ApplClin Med Phys2000; 1(1): 32-37.
4. Krutz C, Czapp W, Jrampe I, Leppek R, Klose KJ. X-Ray taken by radiologists influence on a continous quality improvment process.RojoFortschrGebRontgenstrNeuenBildgebVerfahr2000; 172(4): 391-396.
5. Brucel. Reiner. SCAR Radiologic technologist survey. 2000. http: WWW.scarnet.org.
6. Kuon E, Schmitt M, Dahm JB. Significant reduction of radiation exposure to operator and staff during cardiac interventions by analysis of radiation leakage and improved lead shielding. Am J Cardiol.2000; 89(1): 44-49.
7. Gogos KA, Yakoumakis EN, Tsalafoutus LA, Makri TK. Radiation dose cons, ideration in common peadiatric X-ray examination. PediatrRadiol2003; 33(4): 236-240.
8. StatkiewiczSherer MA, Visconti PJ, Ritenour ER. Radiation protection in medical radiography 4th. St Louis: Mosby 2002.
9. Ballinger PW. Merrill's atlas of radiographic position and radiographic procedures. 9th ed. St Louis: Mosby 1999.
10. International Commission on Radiation Protection Recommendations of the International Commission on Radiological Protection. Oxford: ICRP Publication 1977: 26.
11. American Association of Physicists in Medicine. Basic Quality Control in Diagnostic Radiology.AAPM Report 1981; 4.
12. SO hrabi M, Borhan Azad S, Aghahadi B. Quality Control in Diagnostic Radiology. IAEA 1993; 796.
13. Jos J; Martin N; Rob J; Peter M; Albert R; Jan V. Scan optimization of gadolinium contrast-enhanced three dimensional mra of peripheral arteries with multiple bolus injections and in vitro validation of stenosis. Quantification magn.Reson. Imaging 1999; 17(1): 47-57.
14. National Council on Radiation Protection. Medical X-ray and Gamma-ray Protection for Energies up to 10 MeV; Equipment Design and Use; NCRP Report; 1968; No 33.
15. Goldman LW. Effects of film processing variability on patient dose and image quality, Rockville.Food and Drug Administration, Division of Training and Medical Applications, Burea of Radiological Health; 1979.
16. Rahimi S.A, Sarkar S, Abolhasani M.J, Salar S. Design of a computer software for calculation of required barrier against radiation at the diagnostic x-ray units. Journal of Mazandaran University of Medical Sciences 2005; 15(47): 90-97.