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AN ASSESSMENT OF SENIOR AND JUNIOR MEDICAL IMAGING STUDENT'S FAMILIARITY WITH CORRECT RADIOGRAPHIC EVALUATION CRITERIA AND CLINICAL TRAINING EFFICIENCY

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ABSTRACT

This study assessed the student's awareness and knowledge of radiographic positioning and its evaluation criteria and concluded the efficiency of clinical training. One hundred and sixteen third and fourth year students at Al-Quds University and Al-Ahliya University, students filled a multiple-choice questionnaire. One point was rewarded for right answers while zero was given for wrong ones and a score was calculated from all answers and converted to percentage. Most students didn't achieve good score. The mean score average for Al-Quds University was 60% and 56% for Al-Ahliya University, the English level of students and their attendance has an effect on their scores. The assessment of students' knowledge of radiographic positioning criteria demonstrates better performance with higher English level students and higher attendance students. This study demonstrates a weak performance at questionnaires by the students.

KEYWORDS: Radiographic positioning, Radiographer, Radiologists, clinical training.

INTRODUCTION

An x-ray is a common imaging test that has been used for helping doctor to give a proper diagnosis without using different devices to see the internal organs. the important for x-ray summarized in some conditions like Arthritis, blocked blood vessels, bone cancer, breast tumors, conditions affecting the lugs, digestive problems, enlarged heart, fractures, infections, osteoporosis, swallowed items and tooth decay[1,2]

Radiographer or medical technologist is a trained health professional who performs medical imaging by producing high quality x-ray pictures or images, the efficiency for providing the suitable treatments for The patient's depended on the perfect Radiographic positioning and technique, in the same time the Radiologists should depend on these radiographs to provide correct diagnosis[3]. A good positioning technique is of great importance in radiology in order to obtain accurate diagnostic information and reduce the patient's X-ray exposure, because of that the positioning training in hospitals considered very important issue for students to provide the abilities

and supporting for them to dealing with patients to obtain the perfect outcome for treatment system[4,5].

The students in Practice follows the fundamental radiographic method and a positioning technique for the different organs to be examined, practical skills are also required to make the necessary adjustments for each subject. These fundamental includes courses on anatomy, radiographic technologies, etc [6,7]. The main objective of the medical curriculum is to provide medical students with knowledge, skills and attitudes required for their practice, Students also practice their communication skills with volunteer patients[8,9].

The acquisition of proper clinical skills is a key element of health care education. Clinical skills learning facilities usually consist of a set aside for this purpose in which students can develop their clinical qualification using manikins, fellow class members and both artificial and real patients. Feedback may be provided through television control or directly via appropriately trained simulated pat patient instructors or tutor[10, 11]. Evaluation criteria are designed to be applied on a radiograph to assess in correct diagnosed by radiographer without any repetition; it provided correct analysis of the image quality, by using the standard evaluation criteria [12-14].

Imaging modalities in medical department is divided to an *Ionizing radiation and *No ionizing radiation [15] including Plain radiography (XR) which Images created by exposure of the body part to x-ray, Mammography that is the study of the breast using x-ray. Fluoroscopy which consider technique for obtaining “live” x-ray images of living patient [16]. Computed tomography (CT) in this modality take body section radiography where gathered image data is processed by a computer [17]. Nuclear Medicine (NM) which Studies involve making the patient temporarily radioactive, with a very small amount of an isotope. The images are obtained by looking for the small amount of radioactivity given off by the patient.

Also, Magnetic Resonance imaging (MRI), It is a technique that combines a large magnetic field and some radio frequency antennas (coils). The pictures look like “section” or “cuts” just like in CT. Except in the MR, the resulting image primarily reflects the water protons in the patient, as well as their chemical Association with proteins [18], and Ultrasound (US): Images are created by exposure of the body part to high frequency sound waves. In this study the researcher will focusing on the student’s awareness in both universities Quds University and Al-Ahliya University about the radiation knowledge by using questionnaires method and comparing the results for each other.

MATERIALS AND METHODS

116 questionnaires of multiple choice questions were distributed to the study population composed of 3rd to 4th year medical imaging students at Al-Quds University and Al-Ahliya University at the end of the fall semester of the academic year (2016), 69 questionnaires at Al-Quds University and 47 at Al-Ahliya University. The anonymous questionnaires followed a multiple-choice format and were divided into three sections: Section 1: about the student's general information. Section 2: included 30 questions about radiographic positioning and radiographic criteria. Section 3: about the clinical practicum. Right answers from section 2 were scored 1 while wrong or blank answers were scored 0, all scores were summed up and given a mark of 30, the mark was converted to percentage. The results were put into strata according to gender, clinical practicum areas, university, university level and English language skills. Data analyses was done using IBM SPSS Statistics version 22.0. Frequencies and custom tables were used for percentages of answers; Mann-Whitney and Kruskall-Wallis were used for hypothesizes analysis. And a p-value of less than 0.05 was identified as the statistical significance.

RESULTS

116 questionnaires were distributed to fourth and third year medical imaging students at Al-Quds University (69 Students) and Al-Ahliya University (47 Students) with a response rate of 100%. 31 third year students and 38 fourth year from Al-Quds University and 20 third year and 27 fourth year students from Al-Ahliya University. 53 students were males and 63 were females, with a ratio of 33.3 % males and 66.7 % females at Al-Quds University and 63.8 % males and 36.2% females at al Al-Ahliya University. For training centres the distribution of Al-Quds University students was 19 at Al-Makassed Hospital, 18 at A'alya Hospital, 7 at Al-Hussien Hospital, 15 at Ramallah Medical Complex and 10 at Yatta Hospital, for Al-Ahliya University students was 2 at Al-Makassed Hospital, 1 at A'alya Hospital and 44 at Al-Hussien Hospital. At Al-Quds University 4.3 % rate their English level as Bad or very bad, 37.7 % as Moderate and 58% as Good or Very Good, while at Al-Ahliya 12.7 % rate as Bad or Very Bad, 31.9 % as Moderate and 55.3 % as Good or Very Good. Al-Quds University Students got a total score of 18.13/30 and Al-Ahliya got 16.48/30. Percentage shown in the Figure 1.

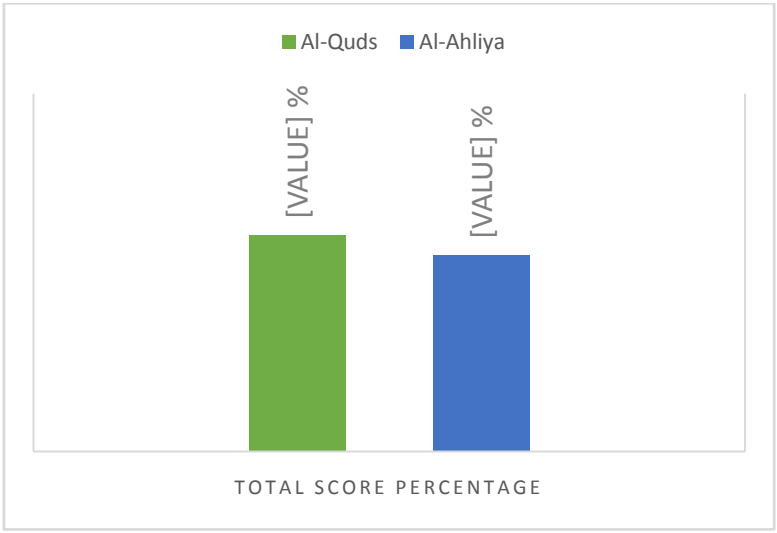

Figure 1: Percentage of total scores.

The score of each question for Al-Quds and Al-Ahliya University is shown in Table 1.

Table 1: Percentage of right answers for questions

	Question Number	Al-Quds	Al-Ahliya
BASIC	Q1 (Chest PA)	95.65 %	89.36 %
	Q2 (Chest Lat.)	59.42 %	53.19 %
	Q3 (Abdomen AP)	94.20 %	76.60 %
	Q4 (Hand PA)	78.26 %	78.72 %
	Q5 (Hand Obliq.)	55.07 %	51.06 %
	Q6 (Wrist PA)	71.01 %	72.34 %
	Q7 (Wrist La.t)	85.51 %	70.21 %
	Q8 (Elbow Lat.)	79.71 %	78.72 %
	Q9 (Shoulder AP)	59.42 %	42.55 %
	Q10 (C.Spine Lat.)	60.87 %	63.83 %
	Q11 (L.Spine AP)	79.71 %	74.47 %
	Q12 (L.Spine Lat.)	56.52 %	55.32 %
	Q13 (Pelvis AP)	52.17 %	38.30 %
	Q14 (Knee AP)	52.17 %	55.32 %

	Q15 (Knee Lat.)	53.62 %	57.45 %
	Q16 (Ankle AP)	34.78 %	36.17 %
	Q17 (Ankle Lat.)	46.38 %	46.81 %
	Q18 (Ankle Mortise)	63.77 %	46.81 %
	Q19 (Foot Med. Obliq.)	49.28 %	48.94 %
	Q20 (Foot AP)	53.62 %	34.04 %
SPECIAL	**Q21 (C. Spine Obliq.)**	56.52 %	70.21 %
	Q22 (L.Spine Hyperflextion)	37.68 %	36.17 %
	Q23 (Sacrum AP Axial)	60.87 %	36.17 %
	Q24 (Sacroiliac AP)	65.22 %	61.70 %
	Q25 (Knee Obliq.)	42.03 %	55.32 %
	Q26 (Calcaneus PD Axial)	53.62 %	25.53 %
	Q27 (Patella Skyline)	59.42 %	53.19 %
	Q28 (Clavicle AP Axial)	55.07 %	55.32 %
	Q29 (Scapula Y Lat.)	46.38 %	25.53 %
	Q30 (Scaphoid PA)	55.07 %	59.57 %

The difference in scores for basic and special projections scores between Al-Quds and Al-Ahliya Universities is shown in Figure 2.

Figure 2: Basic and Special projections score

The difference in scores between fourth and third years' students is shown in Figure 3 for Al-Quds University and Figure 4 for Al-Ahliya University.

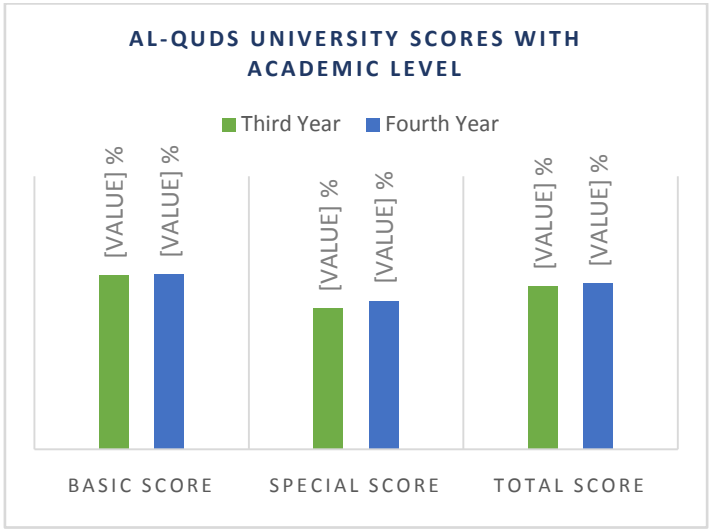

Figure 3: Al-Ahliya unit scores with level

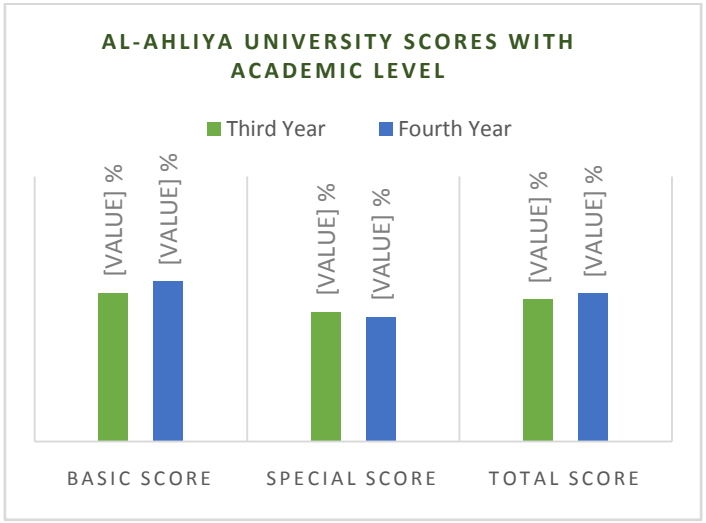

Figure 4: Al-Ahliya unit scores with level

The answers on how much students rate their attendance is shown on Table 2.

Table 2: Attendance rate

University	Attendance	n	%
Al-Quds University	40%	6	8.7 %
	60%	11	15.9 %
	80%	36	52.2 %
	100%	16	23.2 %
Al-Ahliya University	40%	2	4.3 %
	60%	14	29.8 %
	80%	22	46.8 %
	100%	9	19.1 %

At Al-Quds University 71 % and 72.3 % at Al-Ahliya feel used by the working stuff at the hospital, 79.7 % of students at Al-Quds University and 91.5 % at Al-Ahliya are committed to wearing uniforms at clinical practicum, When students where asked if the instructor or staff question about their uniform if they don't wear it 68.1 % at Al-Quds University and 72.3 % at Al-Ahliya said yes. 75.4 % at Al-Quds University and 78.7 % at Al-Ahliya said that they repeat rejected radiographs. 84.1 % at Al-Quds University and 89.4 % at Al-Ahliya said that they learned medical terminology at clinical practicum. For the question if the instructor introduced students to medical imaging ward at clinical practicum 87 % at Al-Quds University and 89.4 % at Al-Ahliya said yes. 63.8 % of students at Al-Quds University and 70.2 % at Al-Ahliya University said that the instructor notifies them of any pathology on radiographs. Students were asked if they learned the most from their instructor, the medical imaging staff at the hospital or both of them, their answers are shown in Table 3.

Table 3: Students most learned from

University	From	n	%
Al-Quds University	Instructor	8	11.6 %
	Staff	10	14.5 %
	Both	51	73.9 %
Al-Ahliya University	Instructor	7	14.9 %
	Staff	10	21.3 %
	Both	30	63.8 %

Students were asked if one advanced clinical practicum course is enough, 50.7 % of Al-Quds University students and 59.6 % of Al-Ahliya University students said it's enough. Finally, students were asked if they have seen medical imaging modalities other that routine X-Ray imaging, their answers are shown in Table 4.

Table 4: Imaging modalities

Modality	Ans.	Al-Quds	Al-Ahliya
CT	Yes	84.1 %	0 %
	No	15.9 %	100 %
US	Yes	56.5 %	0 %
	No	43.5 %	100 %
MRI	Yes	65.2 %	0 %
	No	34.8 %	100 %
Fluoroscopy	Yes	56.5 %	0 %
	No	43.5 %	100 %
Mammography	Yes	29 %	0 %
	No	71 %	100 %
Dental Panoramic	Yes	62.3 %	0 %
	No	37.7 %	100 %
Nuclear Medicine	Yes	1.4 %	0 %

	No	98.6 %	100 %
Cardiography	Yes	7.2 %	0 %
	No	92.8 %	100 %
DEXA	Yes	10.1 %	0 %
	No	89.9 %	100 %

DISCUSSION

The medical complex at Palestine Ahliya University College is one of the most prominent medical faculties in the Palestinian universities. Each year it graduates hundreds of students of all medical majors, from health professions to medicine. Medical imaging department poses an important division of the complex and plays a significant role in the process of diagnoses and treatment. Senior and junior medical imaging students should be familiar at least with the evaluation criteria to distinguish between the normal and abnormal findings in radiographs, not just for medical applications but also to improve the diagnosis of each case they deal with. This study is important to assess the capabilities of 3rd and 4th medical imaging students to recognize the correct evaluation criteria of basic positions and the role of clinical training.

Although the averages weren't satisfying with a representative mean average of Palestine Ahliya University College = 55%. We started comparing the results and scores they got with their attendance at the clinical training and their English level which both have high relationship with the scores (P value < 0.05), while gender, scholastic level and place of training had no effect on the scores. The less the students attend the clinical training the lower the scores and students with bad English skills scored the lowest. Students got higher scores at the basic positions they are familiar with at their training centers which has a lot to do with attendance and commitment to clinical training (P value < 0.05). PA chest evaluation criteria was the most correctly answered question (89.36%) considering it the most common radiographic examination in hospitals and medical institutions, Chest x-ray uses a very small dose of ionizing radiation to produce a radiograph of the inside of the chest. It is used to evaluate the lungs, heart and chest wall and may be used to help diagnose shortness of breath, persistent cough, fever, chest pain or injury. It also may be used to help diagnose and monitor treatment for a variety of lung conditions such as pneumonia, emphysema and cancer. Because chest x-ray is fast and easy, it is particularly useful in emergency diagnosis and treatment [19], Figure 5.

Figure 5: Normal erect PA chest

As for the special positions sacroiliac joint AP was the most correctly answered question (61.7%), it is a radiograph that displays sacroiliac joints, L5-S1 junction and entire sacrum and it shows if there's any fracture, dislocation or subluxation of sacroiliac joints, Figure 6.

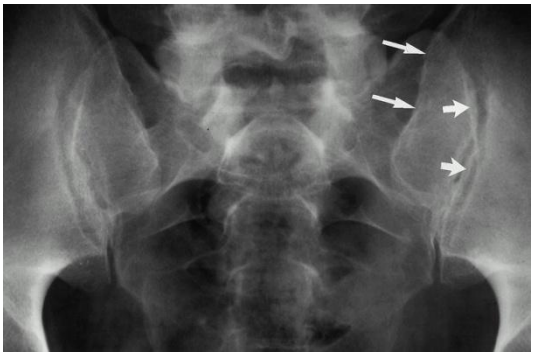

Figure 6: Normal AP sacroiliac joint

These results show the effect of training on students' knowledge and experience, each procedure and every examination they face plays a significant role in their familiarity with the work this profession requires besides the literal materials. As for the efficiency of clinical training at Palestine Ahliya University College we found out that the students' attendance at the training centers is highly affected by several factors:

- Feeling used by the staff.
- Not being questioned about the uniform (negligence)
- The amount of knowledge and experience they gain from the training

The more these factors are improved the more the students would commit to completing the required training hours.

Nearly half the study population considered one advanced clinical training enough, but when we look at the percentages of the familiar advanced imaging modalities about 6 out of 9 modalities were not even seen by the students, which represents a huge gap between what the students want and what is best for them. This research was done at Palestine Ahliya University College whose students scored 54% with approximately alike percentages.

Recommendations:

1) Broaden the training domain to include private centers or several other hospitals.
2) Follow the 6-weeks rotation system in training to help the students recognize and work in every available medical sector.
3) To include an introduction about all the medical imaging modalities as a part of the positioning lab plan.
4) Include medical terminology in the curriculum.
5) Dedicate obligatory dental training hours at the university's outer clinics to be more familiar with dental radiography.
6) Mammography, dental imaging, DEXA should be obligatory to all students.
7) Set another advanced clinical practicum in the curriculum or increase the required training hours especially for MRI and CT to identify their procedures.

CONCLUSION

The assessment of students' knowledge of radiographic positioning criteria demonstrates better performance with higher English level students and higher attendance students. This study demonstrates a weak performance at questionnaires by the students.

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