

## Assessment of Clinical Competences and Self-confidence of Radiologist and Technologist at Asir Region Hospitals, Saudi Arabia

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### ABSTRACT

**Background:** Evaluating the clinical competencies of radiologist and technologist is the primary important factor in all medical imaging areas, and it is a necessary prerequisite for assuring professional standard care in radiography.

**Aim:** to evaluate clinical competences from the views of radiologists and technologists by applying the Radiographers' Competence Scale (RCS).

**Method:** A cross-sectional survey conducted on 185 participants recruited from six hospitals of Asir region of Saudi Arabia. All data were collected using the self-administrative questionnaire of 28 items scale of radiographer competence scale consisting of the two components; initial care scale and technical radiographic process. The level of competencies scale was rated through 10 – point and frequency of use on 6 – point scale.

**Results:** The survey completed by 82 (44.3%) radiologist and 103 (55.7%) technologist. Overall mean significant ( $P < 0.001$ ) differences scores of Initial Care scale observed between radiologist and technologist. However, with reference to technical and radiographic process no mean significant differences were detected between the two groups. The technologist attributed the highest evaluations to such competencies as "Adequately informing the patient" and "Guiding the patient's relatives", while other attributes the lowest evaluations expressed in the competencies. The radiologists attributed the highest evaluations to such competences as "Collaborating with physicians" and "Independent carrying out of the doctor's prescriptions", while the lowest evaluations to the same competences as the technologists.

**Conclusion:** The significant findings underline the radiologist and high technologist competences in both "Initial Care scale" and "Technical and Radiographic Process". However, the lower rated competences emphasis on continuous professional development in the area of medical radiology.

**Key words:** Assessment, radiologists, technologists, radiographs.

### INTRODUCTION

The skill and art of radiography appeared a hundred years ago, and from the earliest days, there have been several arguments about the characteristics of the radiographer in the field of diagnostic imaging and radiation therapy. From the foundation the level of radiography has been one of constant, continuously changing and growing technology and radiographers have been on the main line of the developments that have taken place in healthcare industry<sup>[1-3]</sup>.

The field of radiography established differently in the United States and other European countries, which caused substantial differences in the educational curriculum and professional training of these specialists<sup>[4-5]</sup>. Therefore, the institutions of these countries organized their workstations, plan, carry out, and evaluated diagnostic and therapeutic radiological measures as per to the well-defined competences to ensure the quality of the product<sup>[3,6</sup>

- 7]. However recently, the rapid growth of the diagnostic and therapeutic imaging system, the continuous development of new measurement procedures, the increasing volume and maintenance of the quality of services and growth in the field of radiology which directly affects the skills of the radiologist. Consequently, it also impacts on their jobs and daily task that needs competent knowledge and skills which are reflect on patient care too<sup>[8-9]</sup>. Consistently improvement and advancement in the field of radiology and the changed radiographic procedures and nursing focus have persuaded radiologist's clinical competency<sup>[17, 21]</sup>. Because patients need quality care and support so that patient's condition can be identified by the healthcare professionals<sup>[22]</sup>. Furthermore, it is also essential to understand the patient care and emergency management, especially quick diagnosis and testing procedure. However, a rare clinical condition, for example, mobile radiography

services in primary health care or in homes for the elderly patients where no conventional measures are possible, which makes a need for flexibility <sup>[23]</sup>. Moreover, the modern development of radiology, especially in the field of molecular imaging, needs more competency and high quality of skills <sup>[24]</sup>. Clinical competency of radiologist and technologist is practically related to patient safety, quality development, and cost of healthcare activities. The new technology and advancement in the field of radiology simultaneously raised the demand for a competent radiologist and radiographer. Therefore, the healthcare professionals should be aware about the mandatory clinical requirement concerning patient's safety and outcomes. Furthermore, the positive development and securing the future competency requirement in the clinical work which led to identifying the weakness, organizational deficiencies and lack of training. Whereas, lack of competency due to insufficient education and poor knowledge may increase the misdiagnosis and mistreatment of the patient <sup>[11-15]</sup>.

Competency assessment is the way to encourage skill development and professionalism. Evaluation of clinical competency of radiographer and radiologist is the new sign of improvement in all medical imaging department. Also, it is essential requirement for assuring the professional standardization and progression of radiography services. None of the studies were defining the standard registered system for radiologist and technologist <sup>[16-20]</sup>.

This study will be the first of its kind in Asir region that evaluate the clinical competencies of radiographer and technologist and identify the socio-demographic and critical factors which may associate with competences and professional experience. Furthermore, the outcomes and recommendations of the study will provide practical information and point out the main aspects of improvement.

## **MATERIALS AND METHODS**

### **Study Design**

This cross-sectional survey was conducted at six hospitals (Asir Central Hospital, Khamis Mushayt General Hospital, Abha Maternity and Children Hospital, Khamis Mushayt Maternity and Children Hospital, The armed forces hospitals southern region and Ahad Rufaidah general Hospital) of Asir regions in 2017. Ethical approval obtained from the

Institutional Review Board at King Fahad Medical City from July 2017 to December 2017.

### **Study Population**

The target population of this study was recruited from the radiology department of the six hospitals. All the medical professionals were classified into two broad categories namely; Radiologists and Technologists. However, these professionals are working together and providing services in diagnostic radiology, including X-ray, computed tomography, nuclear medicine, magnetic resonance imaging, and angiography.

### **Data Collection**

Data were collected using self-administered questionnaire based on the information obtained from the Swedish literature researcher Bodil T. Andersson - the Radiographers' Competence Scale (RCS) <sup>[12]</sup>. The questionnaire divided into two sections; the first one was to collect the data pertinent to 'Initial Care scale' (18 items) and the second was about the 'Technical and radiographic processes' (10 items). The respondents evaluated each competence twice. Each item signified a competence and was answered using a two-part scale, one of which concentrated on the value located on the radiologist or technologist' competences and the other on the frequency of its use. Radiologist/technologist responded to statements by ranking the ability on a 10-point scale (1-10), where one was the lowest and ten the highest grade. The incidence of using the competence was rated by means of the following response replacements: "never used", "very seldom used", "sometimes used", "often used", "very often used" and "always used".

### **Sample size and sampling technique**

The sample size is calculated by the Raosoft® sample size software of prevalence studies. Therefore, an estimated sample **185** participants that apportioned into the above-mentioned two groups as per population proportion sampling (PPS) technique from six hospitals at Asir region.

### **Statistical Analysis**

Categorical variables gender, nationality, age, designation, etc. presented in frequencies and percentages. Whereas, continuous variables like all test scores of radiographer's competence scale (RCS) expressed as Mean  $\pm$  S.D. Independent sample t-test / Man-Whitney test was used to test significant differences between these two study

groups, with Initial Care scale and technical radiographic process. Bivariate analysis, i.e., Pearson's Chi-square was performed to find out the association and identify the factors that may associate with Initial Care scale and technical and radiographic process. P – value < 0.05 two tailed was considered as statistically significant. All data were entered and analyzed through statistical package SPSS 22 (SPSS Inc., Chicago, IL, USA).

**RESULTS**

The present study was conducted on 185 healthcare workers who belonged to medical radiology profession and was further classified into two main categories radiologist and technologist. They were selected by population proportion sampling technique (PPS). The total number of male health care workers participating in the study

137 (74.1%) were more than females, and 157 (84.9%) of the participants were Saudi. The majority of participants 87 (47%) were 31 – 40 years of age, while 78 (42.2%) were 20 – 30 years of age and 15 (8.1%) were 41 – 50 years and the remaining 5 (2.7%) were more than 50 years. Participants were classified as per their occupation/title as Radiologist 82 (44.3%) and technologist 103 (55.7%). Similarly, the majority of the participants 143 (77.3%) belonged to diagnostic radiology, 30 (16.2%) from nuclear medicine and 12 (6.5%) interventional radiology department.

According to education, 36 (19.5%) high school diploma holder, 119 (64.3%) bachelor degree holder, 14 (7.6%) Master’s degree holders and remaining 16 (8.6%) Ph.D. degree holders (Table 1).

**Table (1): Socio-demographic characteristics of the participants**

Characteristics	Description	n(n%)
Gender	Male	137 (74.1%)
	Female	48 (25.9%)
Nationality	Saudi	157 (84.9%)
	Non-Saudi	28 (15.1%)
Age Group	20 – 30 years	78 (42.2%)
	31 – 40 years	87 (47.0%)
	41 – 50 years	15 (8.1%)
	>50	5 (2.7%)
Occupation/Title	Radiologist	82 (44.3%)
	Technologist	103 (55.7%)
Department	Diagnostic Radiology	143 (77.3%)
	interventional radiology / angiography	12 (6.5%)
	Nuclear Medicine	30 (16.2%)
Highest Degree	Bachelor	119 (64.3%)
	High School Diploma	36 (19.5%)
	Masters	14 (7.6%)
	Postgraduate level ( MD - PhD - Board eligible )	16 (8.6%)
Years in present position	0 – 5 years	74 (40.0%)
	6 – 15 years	83 (44.9%)
	16 – 25 years	21 (11.4%)
	>25 years	7 (3.8%)

**Table (2): Impact and association between socio-demographic characteristics and occupation of the participants**

Characteristics	Description	Radiologist (n = 82)	Technologist (n = 103)	P - value
Gender	Male	75 (91.5%)	62 (60.2%)	< 0.001
	Female	7 (8.5%)	41 (39.8%)	
Nationality	Saudi	66 (80.5%)	91 (88.3%)	0.138
	Non-Saudi	16 (19.5%)	12 (11.7%)	
Age Group	20 – 30 years	29 (35.4%)	49 (47.6%)	0.832
	31 – 40 years	43 (52.4%)	44 (42.7%)	
	41 – 50 years	7 (8.5%)	8 (7.8%)	
	>50	3 (3.7%)	2 (1.9%)	
Department	Diagnostic Radiology	56 (68.3%)	87 (84.5%)	0.032
	interventional radiology / angiography	7 (8.5%)	5 (4.9%)	
	Nuclear Medicine	19 (23.2%)	11 (10.7%)	
Highest Degree	Bachelor	43 (52.4%)	76 (73.8%)	< 0.001
	High School Diploma	14 (17.1%)	22 (21.4%)	
	Masters	10 (12.2%)	4 (3.9%)	
	Postgraduate level ( MD - PhD - Board eligible )	15 (18.3%)	1 (1.0%)	
Years in present position	0 – 5 years	32 (39.0%)	42 (40.8%)	0.280
	6 – 15 years	33 (40.2%)	50 (48.5%)	
	16 – 25 years	13 (15.9%)	8 (7.8%)	
	>25 years	4 (4.9%)	3 (2.9%)	

Table (2) illustrates that statistical significant ( $p < 0.001$ ) association found between gender and occupation i.e. 75 (91.5%) male and 7 (8.5%) female radiologists were participated in contrast with 62 (60.2%) male and 41 (39.8%) female technologists participated in this study.

On the other hand, there was statistically significant ( $p < 0.001$ ) association found between highest degrees and occupation of the participants and majority of the technologist and radiologist were Bachelor degree.

However, according to professional experience, mostly radiologist and technologist had 6 – 15 year of experience in the current position.

**Table (3): The level of competencies of Initial Care scale in contrast with two groups**

<b>Initial Care Scale</b>	<b>Radiologist</b>	<b>Technologist</b>	<b>P - value</b>
1. Carrying out doctor's prescriptions	7.16 ± 3.13	8.7 ± 1.78	0.007
2. Applying ethical guidelines	7.41 ± 2.95	8.82 ± 1.72	0.006
3. Adequately informing the patient	7.12 ± 3.01	8.83 ± 1.8	< 0.001
4. Guiding and educating the patient	6.99 ± 3.16	8.67 ± 2	< 0.001
5. Empowering the patient by involving him/her in the examination and treatment	6.79 ± 3.14	8.54 ± 2.15	< 0.001
6. Guiding the patient's relatives	7.28 ± 2.82	8.67 ± 1.98	0.001
7. Encouraging and supporting the patient	7.39 ± 3.06	8.76 ± 1.87	0.007
8. Protecting the patient's integrity	7.23 ± 2.89	8.53 ± 1.85	0.009
9. Alleviating the patient's anxiety	7.1 ± 3.07	8.74 ± 1.79	< 0.001
10. Judging the risk of leaving the patient unattended	7.44 ± 2.72	8.44 ± 2.12	0.008
11. Observing and monitoring the patient	7.34 ± 2.84	8.74 ± 1.65	0.001
12. Identifying and encountering the patient in a state of shock	7.38 ± 2.89	7.55 ± 2.74	0.687
13. Identifying pain and pain reactions	7.01 ± 2.88	7.27 ± 2.8	0.439
14. Collaborating with internal and external colleagues	7.45 ± 3.1	8.92 ± 1.9	< 0.001
15. Collaborating with other internal and external professional	7.56 ± 3.08	8.88 ± 2.06	0.003
16. Supervising and training colleagues and other co-workers	7.61 ± 3.09	8.87 ± 1.65	0.042
17. Reporting to colleagues and other professionals, internal as well as external	7.28 ± 3.18	8.77 ± 2.08	0.002
18. Participating in quality improvement regarding patient safety and care	7.2 ± 3.08	8.7 ± 2.1	< 0.001
19. Organizing and planning taking account of the clinical situation	7.18 ± 3.05	8.51 ± 2.12	0.006
20. Responsibility for preparing the medico-technical equipment	7.02 ± 3.14	8.47 ± 2.31	0.001
21. Independently planning and preparing work on the basis of existing documentation	7.15 ± 2.94	8.69 ± 2	< 0.001
22. Prioritizing patients in the work flow	7.56 ± 2.84	9.09 ± 1.6	< 0.001
23. Adapting the examination to the patient's prerequisites and needs	7.48 ± 2.94	8.97 ± 1.71	0.001
24. Minimizing radiation doses for patient and staff	7.33 ± 2.87	8.79 ± 1.86	< 0.001
25. Producing accurate and correct images	7.44 ± 2.9	9.01 ± 1.48	< 0.001
26. Evaluating the quality of the medical image in relation to the referral and the question stated therein	7.4 ± 2.98	8.83 ± 1.57	0.010
27. Optimizing the quality of the image	7.27 ± 2.91	9 ± 1.5	< 0.001
28. Preliminary assessment of images	7.59 ± 2.77	8.97 ± 1.67	0.001

Table (3) illustrates that the two groups (radiologist and technologist) rated their professional competences were high.

Overall mean significant differences were observed between the two groups. In 'Initial Care scale, the highest graded competencies observed in technologist group as compared to radiologist's group. For example, 'Carrying out doctor's prescriptions', 'applying ethical guidelines', 'Adequately informing the patient', 'Guiding and educating the patient' and 'Judging the risk of leaving the patient unattended' etc. were observed

high mean scores in the technologist group and these results were statistically significant at (p < 0.05).

On the other side, in the technical and radiographic process the only two items 'Identifying and encountering the patient in a state of shock' and 'Identifying pain and pain reactions' were not statistically significant in the two groups. However, in 'Technical and radiographic processes' all the high mean scores were observed in the technologist group.

**Table (4): Comparative analysis of radiologist and technologist with respect to “Technical and Radiographic Process”**

		<b>Radiologist</b>	<b>Technologist</b>	<b>P - value</b>
1. Carrying out doctor’s prescriptions	Sometimes	0 (0.0%)	4 (2.5%)	0.587
	Often	2 (7.1%)	7 (4.5%)	
	Almost Always	26 (92.9%)	146 (93.0%)	
2. Applying ethical guidelines	Sometimes	1 (3.6%)	3 (1.9%)	0.596
	Often	3 (10.7%)	10 (6.4%)	
	Almost Always	24 (85.7%)	144 (91.7%)	
3. Adequately informing the patient	Sometimes	1 (3.6%)	6 (3.8%)	0.001
	Often	9 (32.1%)	10 (6.4%)	
	Almost Always	18 (64.3%)	141 (89.8%)	
4. Guiding and educating the patient	Sometimes	0 (0.0%)	8 (5.1%)	0.061
	Often	6 (21.4%)	13 (8.3%)	
	Almost Always	22 (78.6%)	136 (86.6%)	
5. Empowering the patient by involving him/her in the examination and treatment	Sometimes	3 (10.7%)	11 (7.0%)	0.561
	Often	4 (14.3%)	15 (9.6%)	
	Almost Always	21 (75.0%)	131 (83.4%)	
6. Guiding the patient’s relatives	Sometimes	2 (7.1%)	7 (4.5%)	0.024
	Often	6 (21.4%)	10 (6.4%)	
	Almost Always	20 (71.4%)	140 (89.2%)	
7. Encouraging and supporting the patient	Sometimes	1 (3.6%)	13 (8.3%)	0.201
	Often	4 (14.3%)	9 (5.7%)	
	Almost Always	23 (82.1%)	135 (86.0%)	
8. Protecting the patient’s integrity	Sometimes	3 (10.7%)	12 (7.6%)	0.814
	Often	2 (7.1%)	9 (5.7%)	
	Almost Always	23 (82.1%)	136 (86.6%)	
9. Alleviating the patient’s anxiety	Sometimes	1 (3.6%)	13 (8.3%)	0.587
	Often	4 (14.3%)	16 (10.2%)	
	Almost Always	23 (82.1%)	128 (81.5%)	
10. Judging the risk of leaving the patient unattended	Sometimes	3 (10.7%)	16 (10.2%)	0.700
	Often	3 (10.7%)	10 (6.4%)	
	Almost Always	22 (78.6%)	131 (83.4%)	
11. Observing and monitoring the patient	Sometimes	4 (14.3%)	16 (10.2%)	0.813
	Often	2 (7.1%)	12 (7.6%)	
	Almost Always	22 (78.6%)	129 (82.2%)	
12. Identifying and encountering the patient in a state of shock	Sometimes	10 (35.7%)	33 (21.0%)	0.228
	Often	2 (7.1%)	17 (10.8%)	
	Almost Always	16 (57.1%)	107 (68.2%)	
13. Identifying pain and pain reactions	Sometimes	6 (21.4%)	33 (21.0%)	0.098
	Often	6 (21.4%)	13 (8.3%)	
	Almost Always	16 (57.1%)	111 (70.7%)	
14. Collaborating with internal and external colleagues	Sometimes	3 (10.7%)	10 (6.4%)	0.679
	Often	1 (3.6%)	8 (5.1%)	
	Almost Always	24 (85.7%)	139 (88.5%)	
15. Collaborating with other internal and external professional	Sometimes	2 (7.1%)	6 (3.8%)	0.447
	Often	1 (3.6%)	15 (9.6%)	
	Almost Always	25 (89.3%)	136 (86.6%)	
16. Supervising and training colleagues and other co-workers	Sometimes	2 (7.1%)	12 (7.6%)	0.429
	Often	4 (14.3%)	11 (7.0%)	
	Almost Always	22 (78.6%)	134 (85.4%)	
17. Reporting to colleagues and other	Sometimes	3 (10.7%)	12 (7.6%)	0.766

		<b>Radiologist</b>	<b>Technologist</b>	<b>P - value</b>
professionals, internal as well as external	Often	2 (7.1%)	8 (5.1%)	
	Almost Always	23 (82.1%)	137 (87.3%)	
18. Participating in quality improvement regarding patient safety and care	Sometimes	6 (21.4%)	16 (10.2%)	0.081
	Often	0 (0.0%)	14 (8.9%)	
	Almost Always	22 (78.6%)	127 (80.9%)	
19. Organizing and planning taking account of the clinical situation	Sometimes	3 (10.7%)	20 (12.7%)	0.631
	Often	5 (17.9%)	18 (11.5%)	
	Almost Always	20 (71.4%)	119 (75.8%)	
20. Responsibility for preparing the medico-technical equipment	Sometimes	4 (14.3%)	21 (13.4%)	0.970
	Often	3 (10.7%)	15 (9.6%)	
	Almost Always	21 (75.0%)	121 (77.1%)	
21. Independently planning and preparing work on the basis of existing documentation	Sometimes	6 (21.4%)	16 (10.2%)	0.237
	Often	2 (7.1%)	14 (8.9%)	
	Almost Always	20 (71.4%)	127 (80.9%)	
22. Prioritizing patients in the work flow	Sometimes	3 (10.7%)	14 (8.9%)	0.371
	Often	3 (10.7%)	7 (4.5%)	
	Almost Always	22 (78.6%)	136 (86.6%)	
23. Adapting the examination to the patient's prerequisites and needs	Sometimes	1 (3.6%)	8 (5.1%)	0.334
	Often	4 (14.3%)	10 (6.4%)	
	Almost Always	23 (82.1%)	139 (88.5%)	
24. Minimizing radiation doses for patient and staff	Sometimes	2 (7.1%)	10 (6.4%)	0.789
	Often	1 (3.6%)	11 (7.0%)	
	Almost Always	25 (89.3%)	136 (86.6%)	
25. Producing accurate and correct images	Sometimes	2 (7.1%)	9 (5.7%)	0.747
	Often	3 (10.7%)	11 (7.0%)	
	Almost Always	23 (82.1%)	137 (87.3%)	
26. Evaluating the quality of the medical image in relation to the referral and the question stated therein	Sometimes	2 (7.1%)	9 (5.7%)	0.820
	Often	1 (3.6%)	10 (6.4%)	
	Almost Always	25 (89.3%)	138 (87.9%)	
27. Optimizing the quality of the image	Sometimes	2 (7.1%)	11 (7.0%)	0.739
	Often	1 (3.6%)	12 (7.6%)	
	Almost Always	25 (89.3%)	134 (85.4%)	
28. Preliminary assessment of images	Sometimes	2 (7.1%)	15 (9.6%)	0.571
	Often	4 (14.3%)	13 (8.3%)	
	Almost Always	22 (78.6%)	129 (82.2%)	

Table – 4 illustrates that overall there was no significant association between radiologist and technologist concerning technical and radiographic processes.

However, only two items “Adequately informing the patient” and “Guiding the patient’s relatives” were statistically associated with agreement or responsibility of radiologists and technologists.

**Table (5): The comparative evaluation of radiologists and technologist competence**

	Radiologist	Technologist	P - value
	Median (Min-Max; Mean)		
Competences with reference to Initial Care scale	8.98 (1.79 - 10.00; 7.56)	9.00 (1.79 - 10.00; 8.44)	0.233
Competences with reference to Technical and Radiographic Process	5.50 (1.00 - 6.00; 5.18)	5.50 (1.00 - 6.00; 5.40)	0.217

The technologist expressed high mean evaluations of competences in Initial Care scale in contrast with the radiologist and slightly high median assessment as well. On the other side, no differences observed in the evaluation of "technical and radiographic process". Furthermore, no mean / median significant differences found in the regarding Initial Care scale and technical radiographic process between radiologist and technologist (Table 5).

## DISCUSSION

The radiologist and technologist abilities and competencies are vigorous for the patient. As one of the most progressive areas of medicine. The nonstop changing and developing field of diagnostic radiology directly influences radiologist and technologist pace of work. The competence "Guiding the patient's relatives" is rarely applied and thus receives low evaluations. Though, the competencies that received high evaluations from both groups of the respondents, "Observing and monitoring the patient", "Encouraging and supporting the patient", and "Collaborating with physicians", were directly related to patient care and the quality of the procedures [21].

The competence "Preliminary assessment of images" also received the lowest evaluations from both respondent groups because in Saudi Arabian populations, like in other nations, the accountability for the evaluation of radiographs lies with radiologists and technologist. High evaluations of the competences "Responsibility for preparing the medico-technical equipment", "Adapting the examination to the patient's prerequisites and needs", and "Producing accurate and correct images" indicated a high level of professionalism. High evaluations of the competence "Prioritizing patients in the work flow" indicated good work planning and management skills [22].

As in many other evaluations of competences in numerous professional groups, our study also revealed a link between the evaluation of the competence and the frequency of its practical implications and the evaluators' age and work experience as well [21-24].

Regarding human resources in healthcare, staff' competence has been possibly investigated the most, and its measurements and evaluations have been supported out in several aspects, using the Initial Care scale [29, 30]. Only limited sources on radiologist and technologist' competencies have been

established in the scientific literature [25 - 26]. The Swedish study on radiographers' competence is one of the most recent and broad studies in this area, focusing on radiographers' professional competence in the field of diagnostics [27-28].

Self-evaluation of their competence will allow Saudi Arabian radiologist and technologist to review their knowledge and capabilities and to reveal on their professional performance with patients and colleagues. Organized and frequent studies on competence would undeniably arouse the development and continuous development of the profession, which, in turn, would progress patient Initial Care scale. Conducting this study across other countries would allow for the assessment of the results in the international context, and would expose the relationships and differences in the professional activity of radiologists and technologists throughout different nations. The results of the study would also be useful for heads of healthcare institutions as well as for regulating occupational standards, medical models, and other documents regulating medical diagnostic professional activity on both the national and the international levels. Training institutions engaged in professional education and training of radiographers may use the results of this study for the adjustment of their curricula and expected learning outcomes.

## CONCLUSION

Radiologists and technologists had high or very high evaluations of radiographers' competences and the frequency of their clinical practices. The capabilities of both the "Initial Care scale" and the "Technical and radiographic processes" fields reported correspondingly significant components of radiologist and technologist for their entire career. The outcomes of the study recommend that the radiologists and technologists professional experience, education and age directly correlated to the evaluation of the clinical competencies.

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