

### Assessment of Radiology Technology Students' Internship with Objective Structured Clinical Examination

**Background:** Programming and planning an appropriate structure for internship and purposeful assessments of students play a considerable role in developing their practical and theoretical knowledge level. One of the suitable alternatives for the traditional method is assessing internship through Objective Structured Clinical Examination (OSCE). Therefore the aim of the present study is to perform an objective and structured method for assessing and evaluating radiology students' internship and comparing it with the previous common method.

**Methods:** This is a descriptive cross-sectional study which participants were all B.Sc. radiology students, having started university in 87 and 88 solar year in Urmia University of Medical Sciences. For reaching the aims of the study a form called radiology students' internship assessment was planned. Its validity and reliability were confirmed through content validity and test-retest methods respectively.

**Results:** The results of this study were achieved through assessment form with correct and incorrect answers of students in different working stands and their satisfaction. The results in the form of the percent of correct and incorrect answers of students to each one of the items of working stands showed that in the working stands under study the coefficient of correct answer were 79.5% to 95.5%. The results also showed that 72% of students preferred the mentioned method to the traditional one.

**Conclusions:** Assessment of learners is one of the basic fields of educational activities; therefore a method based on OSCE was used for assessing radiology students' internship in Urmia University of Medical Sciences for the first time. The results of this study showed that involving the students during internship and fulfilling tasks individually by the students are necessary for expressing students' scientific and practical qualifications.

**Keywords:** Learners' assessment, Radiology Students, Objective Structured Clinical Examination (OSCE)

### التقييم الداخلي لطلاب قسم الأشعة بالاعتماد على الفحص السريري بطريقة OSCE

**الخلفية والأهداف:** إن للتخطيط وتحديد الأطر لعملية التقييم المراد للطلاب دور مهم في المعرفة النظرية والعملية لهم، فالتقييم بالاعتماد على طريقة OSCE هي طريقة مناسبة تحمل معدل الطرق التقليدية. هدف هذه الدراسة هي إجراء طريقة منظمة لتقييم طلب قسم الأشعة ومقارنتها بالطرق المتداولة الأخرى.

**الطريقة:** تشمل هذه الدراسة طلاب بكالوريوس قسم علم الأشعة في جامعة العلوم الطبية في ارومية، وفرض تقييم طلاب قسم الأشعة تم تدوين استمارة بعنوان ((استمارة تقييم طلاب قسم الأشعة)) وتم تأييد محتواها من قبل قسم ((تأييد صلاحية المحتوى)) ودفننا ومنتشرنا عن طريق إجراء اختبارات متعددة.

**النتائج:** تم الحصول على نتائج الدراسة بواسطة النظر في الإجابات الصحيحة والخاطئة ومدى رضا الطلاب في مختلف المحطات. تم عرض النتائج على شكل جداول موضحة النسبة المئوية لعدد الاجابات الصحيحة والخاطئة ومدى رضا الطلاب.

**الاستنتاج:** إن تقييم المتعلمين أحد أساسيات الأنشطة التعليمية، وتم تجربة الطريقة بالاعتماد على اختبار OSCE لتقييم طلاب قسم الأشعة لأول مرة في جامعة العلوم الطبية في مدينة ارومية.

حيث اظهرت نتائج هذه الدراسة أن اعطاء فرصة للطلاب في مجال الفحص السريري وإكمال أمورهم المحولة لهم للقيام بها بشكل شخصي وانفرادي بواسطة نفس الطالب من الضروريات والواجبات في اطرار القرارات العملية والعملية لهم.

**الكلمات الرئيسية:** تقييم المتعلمين، طلاب قسم الأشعة، الفحص السريري بالاعتماد على طريقة OSCE.

### رئیدیالوجی کے طلباء کے لئے کلینیکل امور پر مشتمل کورس سے تعلیم اور اس کا جائزہ:

**بیک گراؤنڈ:** طبی طلباء کی صلاحیتوں کو بڑھانے کے لئے نصاب میں کو حالات کے مطابق بنانا بہت ضروری ہوتا ہے تا کہ طلبہ مختلف شعبوں میں عمدہ تعلیم حاصل کر کے پیشترتہ روشوں سے مریضوں کا علاج کرسکیں۔ اسی بنا پر ہم نے ریدئیولوجی کے طلباء کے لئے او ایس سی ای پروجے تیار کئے ہیں جس کا هدف ان کی تعلیم کے طریقوں کا سٹیٹیسٹیک جائزہ لینا ہے۔

**روش:** یہ تحقیق ارومیه میڈیکل یونیورسٹی میں ریدئیولوجی کے بی اے کے طلباء کی شرکت سے انجام دی گئی۔ اس کے لئے ایک سوالوں کا ایک فارم تیار کیا گیا جسے طلباء نے پر کیا تھا۔ اس فارم کی علمی توثیق ٹسٹ اور ری ٹسٹ کے ذریعے کی گئی۔

**نتائج:** طلباء کے نظریات اور ان کی رضایت کا پتہ ان فارموں سے لگا جو انہیں پر کرنے کے لئے دئے گئے تھے۔ اس تحقیق کے نتیجے جدول کی صورت میں پیش کئے گئے ہیں۔

**سفارشات:** طلباء کی نظر کا جاننا کسی بھی تعلیم ادارے میں ایک بنیادی امر شمار ہوتا ہے کیونکہ اس سے تعلیمی امور کی توانائیوں کا پتہ چلتا ہے۔ اسی وجہ سے ریدئیولوجی کے طلباء کے نظریات جاننے کی کوشش کی گئی۔ اس سے پتہ چلا ہے کہ کلینیکل سطح پر طلباء کو کام کر کے موقع دینے سے ان کی صلاحیت میں نکھار آتا ہے اور وہ زیادہ اعتماد سے کام کرسکتے ہیں۔

**کلیدی الفاظ:** نظریات، طلباء ریدئیولوجی .

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Received: MARCH 6, 2012  
Accepted: APRIL 15, 2012

### ارزیابی کارآموزی دانشجویان تکنولوژی رادیولوژی با روشی مبتنی بر آزمون بالینی با ساختار عینی (OSCE)

**زمینه و هدف:** برنامه ریزی و طراحی چهارچوب مناسب برای کارآموزی و ارزیابی های هدفمند دانشجویان در ارتقا سطح دانش تئوری و عملی آنها نقش بسزایی دارد. یکی از جایگزین های مناسب برای روش سنتی، ارزیابی کارآموزی به صورت آزمون OSCE است. لذا هدف مطالعه حاضر اجرای روشی ساختارمند و عینی برای سنجش و ارزیابی کارآموزی دانشجویان رادیولوژی و مقایسه آن با روش متداول قبلی می باشد.

**روش:** جامعه پژوهش این مطالعه مقطعی-توصیفی شامل دانشجویان کارشناسی پیوسته رادیولوژی دانشگاه علوم پزشکی ارومیه ورودی ۱۳۸۷ و ۱۳۸۸ بود. به منظور ارزیابی کارآموزی دانشجویان رادیولوژی فرمی تحت عنوان فرم ارزیابی کارآموزی دانشجویان رادیولوژی تدوین گردید. که روایی آن از طریق روایی محتوا و پایایی آن از طریق آزمون و بازآزمون مورد تأیید قرار گرفت.

**یافته ها:** یافته های پژوهش از طریق فرم ارزشیابی در قالب پاسخهای صحیح و نادرست دانشجویان در ایستگاههای کاری مختلف و رضایتمندی آنان بدست آمد. میزان پاسخهای صحیح بین ۷۹/۵٪ تا ۹۵/۵٪ بود. ۷۲٪ از دانشجویان روش اسکی را به آزمون سنتی ترجیح دادند.

**نتیجه گیری:** ارزیابی فراگیران یکی از حیطه های اساسی فعالیت های آموزشی بوده بر این اساس برای اولین بار جهت ارزیابی کارآموزی دانشجویان رادیولوژی در دانشگاه علوم پزشکی ارومیه روشی مبتنی بر آزمون OSCE مورد بررسی قرار گرفت. نتایج این پژوهش نشان داد که فرصت دادن به دانشجویان در عرصه کارآموزی بالینی و انجام امور محوله به صورت انفرادی توسط دانشجو از مواردی است که برای نشان دادن قابلیت های علمی و عملی دانشجویان ضروری است.

**واژه های کلیدی:** ارزیابی فراگیران، دانشجویان رادیولوژی، آزمون بالینی با ساختار عینی (OSCE)

## INTRODUCTION

Internship is the most important part of paramedical students' education specially radiology in which students learn all scientific subjects practically during theoretical and practical courses in a real situation, with real patients and therefore develop their practical skills, treat patients, and deal with them based on scientific principles. Thus, programming and planning an appropriate framework for internship and purposeful assessment of students play a considerable role in developing their practical and theoretical knowledge level. It can be said that educational assessment is measuring students' progress based on defined criteria and related educational course. In this manner clinical internships are basic parts of students' education and the intern has to achieve the defined standards and progress year by year. Therefore the assessment progress has to give an appropriate picture of educational development of each one of interns in regular time periods to trainers. The assessment of clinical qualifications of students and their efficiency is one of the most difficult tasks of faculty members and trainers of internship programs (1). If we consider improving the quality of learning and teaching as the most basic role of universities, assessment plans are an important part of their activities (2). In a way that assessment is an essential part of education process and identifies proofs of student's accessibility to learning purposes (3). Students as receivers of educational services are the best source of identifying the problems of clinical education because they directly interact with this process (4, 5). In contrast with the availability of different methods of clinical assessment, evidences show that usually student assessment is limited to mental information and precise assessment of clinical skills has been ignored. While skills and practical work play major roles in medical education and mental knowledge is the second priority (6-8). Since the two previous decades, educational assessment has developed following the acceptance of clinical examination with objective structure and clinical examination with objective structure plays the main role in submitting educational degrees to medical sciences students (9). One of the viable alternatives of the traditional attitude is clinical assessment through OSCE. OSCE stands for Objective Structured Clinical Examination which was first described in Scotland in 1975 by Harden. This examination is not like other examinations such as oral question, written or multiple choices, and it has an organized structure including different stands (10). In this examination, with using simulation instead of examination, a vast spectrum of basic and technical skills are assessed therefore the subject of the test and questions are the same for all the students (11) OSCE is a clinical show which develops the function and improves professional roles of students. Also it is a reliable method for assessing technical and clinical skills which has the most criteria (reliability, validity, and practicality). Although OSCE is an effective method for assessing students' instances clinical qualifications, but it is not appropriate for assessing all clinical aspects and instances such as experience of workforce, resources and facilities, and being time-consuming are considered as its execution problems. Also

Its success depends on exact planning, environment, appropriate measurement tools, and facilities for assessing students (12). According to previous students assessment methods in most clinical courses, besides being inappropriate with educational aims, are not efficient in assessing clinical skills and function of students and although clinical skills and practical work play the major roles in medical education, success of learners of medical department depends to a great extent on their memorization (13-14). In OSCE, the topic of stands is determined based on internship aims. According to most clinical instructor's opinion, this examination reflects students' function better than the traditional examination (15). Identification of clinical education status helps improve the weak points and can develop accessing educational goals, training skillful people, and giving treating and caring services with higher quality. Giving such services needs training individuals with high scientific basis and developing their skills for performing practical and technical jobs with the least error. In this way assessing and measuring clinical skills during students internship specially radiology students play the main role because of the importance of reducing repeated exposures and so far the assessment of clinical skills of these students has not been done objectively and in a structured manner during internship. Therefore the purpose of the present study is to perform a structured and objective method based on OSCE for assessing and measuring clinical function of radiology students and comparing this method with the previous common method. Thus a method was planned in paramedical school of Urmia University of Medical Sciences in the second educational year (1390-91) and was applied objectively in assessing clinical function of radiology students having started university in 1387 and 1388 in Emam Khomeini Hospital of Urmia.

## METHODS

This study was a descriptive cross-sectional one which data has been gathered through qualitative methods and then been analyzed. The participants included all B.Sc. radiology students started university in 1387 and 1388 that were spending clinical internship course in treatment-educational center of Emam Khomeini Hospital in Urmia. For achieving the goals of study a form called radiology students' clinical function assessment was designed which validity and reliability were confirmed through content validity and test-retest methods respectively. In this study the details of lessons of internship II and III courses and assessment forms were distributed among students started university in 1387 and 1388 respectively and the necessary explanations were given in the case of assessment method at the end of the term. In the assessment form there were seven steps called work station for performing a clinical task (taking radiography). In each of the mentioned steps, the tasks which students had to perform in a working station were explained in details. Working stations included: prescription reading, taking the first steps after the identification of the type of radiography, preparing the patient, taking radiography, taking the necessary actions for the image processing, evaluating the

prepared radiographs, and dealing with patients. The number of items of each station was between 3 to 6, totally for 7 stations, 30 items were provided. For each one of the mentioned items, there were two choices of Yes or No. The students got 0.5 for performing each item correctly. It is worth mentioning that there was no average choice in this examination as the assessor measured each item at least twice so that he could achieve acceptable certainty in the case of tight or wrong tasks of the student. Therefore the total score given to each student was 15 out of 30, and if the student did all the tasks correctly he could get 15. The students got another 5 score from the items allocated to the internship trainer. Items allocated to the trainer included: activity, interest and perseverance of the student during internship, on time presence of the student in the ward, respecting ethics and appropriate behavior with colleagues. The score students got from this field was based on student's assessment by the trainer during internship. 50 B.Sc. students of radiology (23 having started in 1388 and 27 in 1387) who were passing internship II and III courses in treatment-education center of Emam-Khomeini Hospital of Urmia were selected through census and at the end of clinical internship course were assessed individually. Working stations and considered items were similar for all students. In the first stations, a limited number of prescriptions in Persian/English and prescriptions including abbreviations or history written by the physician were given to the student. In this station, students' deduction from prescription and recognition of the relationship between the required radiography and the recorded history by the physician were assessed. In this stage if a student read a prescription incompletely, for precise assessment one or two similar prescriptions were given to him so that the examiner could get a certain conclusion about the students' function. In the second station, actions that the student took after reading the prescription such as selecting the suitable room and radiography device, preparing the

necessary tools, choosing the appropriate film with the type of radiography and patient's status were assessed. The third station included assessing the student in the case of communicating with the patient and getting his cooperation for doing the radiography. At this stage the student had to give the necessary information about the method of taking radiography to the patient and try to involve the patient while doing his tasks and also apply techniques for redacting artifacts resulting from external object. In the fourth stand correct appropriate radiography with physician's request and patient's status were assessed. In this stage, 4 basic items which had to be taken in to consideration for a correct radiography by the students were assessed. In the fifth station the students' ability in image processing correctly or totally all the activities he had to do in dark room were assessed. In this stage 5 basic items in correct image processing solutions were assessed. In the sixth station, student's correct examination of the radiographs from the point of quality and applied technique was assessed. In this stage, 6 items were assessed. In the final station, student's ability in guiding the patient after the end of radiography was assessed. In this study data was analyzed through descriptive criteria.

## RESULTS

The results of the study, through the assessment form provided for the clinical internship of radiology students, are presented in two tables. In table number 1, working stations and results related to correct and incorrect answers of students to each one of the items are given. The scale of answering each item was the positive score of 0.5 to each correct answer and not getting any scores for incorrect answers and finally the number of correct and incorrect answers are expressed by percent. The results clarify that the most and least correct answers relate to stations 4 and 7 respectively which is because of simplicity and complexity of each of the mentioned stands.

**Table 1. The results of students' answers in each stand**

No. of station	The name of working station	Correct answers	Incorrect answers
1	Assessment of student's skill in reading prescriptions and having an appropriate understanding of the required radiography	82.4%	17.6%
2	Assessment of student's skill in choosing the radiography room, film size based on radiography type and patients' status	95.5%	8.5%
3	Assessment of student's skill in communicating with patients and getting their help in taking radiography	86.6%	13.4%
4	Assessment of student's skill in taking the right and appropriate radiography according to the physician's request and patient's status	79.5%	20.5%
5	Assessment of student's skill in image processing correctly	88.4%	11.6%
6	Assessment of students' skill in the correct evaluation of radiography from the point of used quality and technique.	85.3%	14.7%
7	Assessment student's skill in guiding the patient after radiography.	93.3%	6.7%
8	Assessment during the course by the instructor	84%	16%

**Table 2. The results of satisfaction rate of students with the assessment method**

The satisfaction rate of students with the type of internship	Yes	No
Do you prefer the present method to the previous one?	72%	28%
In your opinion is it better to do assess internship course through this method in the Future semesters?	72%	28%

In table 2 the results of students' satisfaction with the method of holding this examination and its advantage to the previous common method are shown. In the previous method the assessment of clinical internship of radiology students was based on deduction and opinion of the trainer about the students' function during internship which included: practical and scientific activities, interest and perseverance of the student during internship course, physical presence and punctuality of the student in the department of Radiology, respecting ethics and appropriate behavior with colleagues. Therefore most of the details of clinical function and practical skills of the student were not assessed and cared. But in the presented method all skills and functional abilities of the student are assessed and as a result the score that he gets is more real than the previous method.

## DISCUSSION

Assessment of learners is one of the most basic fields of education activities therefore most of the studies conducted in this field had emphasized on a tool which can assess assessment goals appropriately. Thus the main purpose of this study has been planning and using on appropriate tool for assessing clinical internship course of radiology students which can measure all skills of students and determine the amount of getting access to identified educational goals in the department. This method was first used for assessing radiology students' internship course in Urmia University of Medical Sciences. The results of the study showed that involving students in the field of clinical internship and performing the burdened tasks individually by the student are the cases which are necessary for presenting scientific and practical qualifications of students and are effective in an attempt to get professional skills. Assessment of learners in the past which was just based on instructor's deduction and opinion could not show the real difference between the students and express their scientific and practical skills in performing the burdened tasks. But in the new method according to the identification of the assessed items in the framework of working stands, and similarity of the them for all the students gives them the chance to use all their abilities and skills in performing tasks and this leads to the possibility to see the differences between students and assess more accurately as a result. Assessment of learners especially in clinical internships is very much valued in getting their qualification because students are involved in real practical and executive conditions while being assessed which can help increase learners' skills and make them able to perform their tasks with a better quality. The present study was planned and conducted for examining the new method of assessing learners' internship based on OSCE. The results of this study like other studies conducted with OSCE for other clinical majors showed that this type of assessment increases

self-confidence of students in clinical function (16). While in a study conducted for the first time in Australia, on B.S. medical sciences students, it was shown that doing practical skills in laboratory wards although improved students' clinical education learning but OSCE didn't show high satisfaction of students with clinical learning assessment in hospitals (17).

During the past years, the assessment of clinical skills had become increasingly complex, patient centered, and student driven (18). We are observing constant changes of assessment methods from teacher-centered and very much controlled assessments to students-driven and patient centered ones (19). Student driven assessment usually provides an unstructured environment even similar to natural and real conditions, not being limited to a list or obliging them to use a special argumentation method (19). Glassman and Chambers have described student driven assessment as: "in real assessment faculty members may not be able to test all the content but this real assessment courses the student to have a chance for showing his abilities to give a real appropriate answer, based on his knowledge and learned skills" (20). Petrusa in 2004 has indirectly supported student driven assessment with giving some tips and made us to think vaster about these methods. For improving in this field he has recommended to develop a tradition simulation structure which is done by two simulators to simulation with some more people and change measurement methods from checklists and measurement scales to measurements with more potentiality for assessing identification advanced skills (21). These recommendations have provided the chances to measure clinical skills which are more credited and measure identification advanced levels. Today we are receding from the structure of limited examinations and move toward more complex types and real eclectic assessment methods based on patient simulator or standardized patient with clinical argumentation simulation. This movement not only has caused unique challenges but also is a great educational achievement for measuring and developing clinical skills (22). It seems that reforming strategies in the case of improvement of clinical function assessment in a local or national level has been a complex activity and needs time, cooperation, resources and considerable attempt. However we are sure that achieving clinical skills , develops the quality of patient care, therefore we have to pay the costs (22). Totally the conclusion of the present study showed that using structured assessment for learners' clinical internship provide the chance to real assessment of practical and scientific skills, increasing learners' and teachers' satisfaction, doing purposeful educational programming, and finally improving the quality of education.

**Conflict of interest:** The authors declare no conflict of interest.

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