International Emergency Nursing xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

International Emergency Nursing

journal homepage: www.elsevier.com/locate/aaen

Imaging appropriateness in an academic emergency medicine program

Ali Arhami Dolatabadi, Majid Shojaee, Hamid Kariman, Ali Shahrami, Sarah Abolmaali *

Department of Emergency Medicine, Imam Hossein Hospital, Shahid Beheshti University of Medical Sciences, Tehran 16177, Iran

ARTICLE INFO

Article history:
Received 31 January 2017
Received in revised form 1 July 2017
Accepted 10 July 2017
Available online xxxx

Keywords:
Academic education
American College of Radiology
Appropriateness criteria
Diagnostic imaging
Emergency Medicine

ABSTRACT

Introduction: As radiologic assessment is a key part in evaluating patients visited in emergency department, this survey was conducted to measure emergency medicine residents' competency in choosing appropriate diagnostic imaging in different clinical scenarios.

Methods: All emergency medicine residents enrolled in an academic emergency medicine discipline in the three medical universities of Tehran, Iran were recruited. A questionnaire was designed consisting of 10 clinically common scenarios selected from the American College of Radiology appropriateness criteria. Each resident completed the survey separately with answers only given after all residents participated.

Results: 196 residents completed the survey (95% of all residents). The results were stratified by postgraduate year and university. The average number of correct answers was 6.2. First, second and third year residents scored the average of 6.1, 5.8 and 6.5, respectively (P = 0.04). The average score of residents from different universities did not differ significantly.

Conclusion: According to the low average score, it is recommended that attentive educational perfections are needed to help residents order more appropriate diagnostic images, which may also be helpful for other healthcare providers. However, it seems that our emergency medicine academic curriculum is relatively efficient to enhance residents' skills in choosing proper imaging.

1. Introduction

Radiology and imaging have substantial roles in assessment of patients in emergency situations [1–3]. The growing body of public awareness concerning potential risks of ionizing radiation as well as financial concerns, however, have bolded the importance of correct initial imaging evaluation more than before [4–9]. On the other hand, the diversity and variety of available imaging modalities and ongoing development of new techniques, each with different specific features, makes the initial decision on asking for proper imaging more intriguing.

Traditionally, the knowledge of appropriate imaging technique for various clinical situations has been somehow acquired through clinical practice and different resources such as informative articles, unorganized verbal consultations from expert physicians and passively from radiology consults. Unfortunately, there is still no teaching emphasis on radiology in many post graduate disciplines other than major radiology residency programs [10,11]. Lacking this skill may involve unnecessary requests leading to waste of money and time, increasing staff workload and delayed diagnostic work-up [8,12,13] without even helping in the final decision and being some way harmful for specific groups like children or pregnant women [14–17].

Since many decisions in emergency situations are in part taken according to initial radiologic assessments and there is no practical radiology training in emergency medicine residency, employing appropriateness criteria as a reference for this purpose might be helpful [11,13,18]. An acceptable and yet still underused worldwide measure, American College of Radiology (ACR) Appropriateness Criteria [19], has been long available to aid physicians and other health care providers including nursing staff in choosing appropriate imaging.

Some studies have been done in order to evaluate and/or improve radiologic knowledge, though most of them involved only residents of radiology or were focused on voluntary radiology courses. As far, few studies are available on evaluation of this skill in post graduate disciplines including emergency medicine [20,21].

This survey aimed to measure emergency medicine residents' competency in choosing most appropriate diagnostic imaging in pre-defined scenarios and determine its improvement through

* Corresponding author at: Department of Emergency Medicine, Imam Hossein Hospital, Shahid Beheshti University of Medical Sciences, Madani St., Tehran 16177, Iran.

E-mail address: s-abolmaali@sbmu.ac.ir (S. Abolmaali).

http://dx.doi.org/10.1016/j.ienj.2017.07.004
1755-599X/

their academic program. As nursing staff and especially emergency nurse practitioners are also involved in ordering and interpreting radiologic images [22,23], the result of this survey may be helpful in improving such skills in nursing staff.

2. Methods

All emergency medicine residents in all three universities of Tehran-Iran, according to Iranian Council for Graduate Medical Education were recruited. Thus, 206 residents of all levels were identified initially from these universities: Shahid Beheshti University of Medical Sciences, Tehran University of Medical Sciences, and Iran University of Medical Sciences. The survey invitation was sent to program directors asking them to inform their residents of the survey. The survey was undertaken in April 2016.

A multiple choice questionnaire was designed consisting of 10 clinically common scenarios selected from the ACR appropriateness criteria. Each scenario was provided with 5 possible choices comprising of 4 possible diagnostic imaging and a choice of "no imaging required". A few preliminary questions were included in the questionnaire asking residents to identify their gender, level of emergency medicine residency training and years of previous clinical experience. They were also required to name their university and hospital. However, the survey was completed anonymously.

The selected scenarios were intended to denote a summary of cases typically seen in the emergency situations by residents (Appendix). Attempts were made not to include more challenging scenarios for whom the most appropriate initial imaging is debated. Concerning questionnaire validity, we used the original scenarios mentioned in ACR appropriateness criteria and in the original language (English); all participants had enough English language proficiency to understand the questions. All residents were given the questionnaire in person by the researcher, completed the survey individually in his/her presence and handed over the answered questionnaire. The answer key with detailed correct options based on the 2014 ACR appropriateness criteria was delivered to participants after all questionnaires were collected (approximately 1 month).

The mean number of correct answers was identified in general and for different universities. Scores were also stratified based on the level of emergency medicine training. The ratio of correct responses for each scenario was also calculated. Student *t*-test and analysis of variance were used appropriately to compare the results. A P value of less than 0.05 considered significant. The study was approved by the research committee of Shahid Beheshti University of Medical Sciences. All calculations were done with SPSS statistical software Ver. 21.0 (Chicago, Illinois, USA).

3. Results

A total of 196 emergency medicine residents (95%) participated in the survey: 70 from Shahid Beheshti University of Medical Sciences (SBMU), 65 from Tehran University of Medical Sciences (TUMS) and 61 from Iran University of Medical Sciences (IUMS). 101 (51.5%) were females and the number of residents from each level were nearly similar. Table 1 shows the general characteristics of participating residents.

After initial calculations, the range of scores was 3–9 (out of 10) and with the median score of 6. Sixty-eight percent managed to answer more than half of the questions and the most frequent

Table 1
General characteristics of survey participants.

	n (%)
Age	
25–30 years	36 (18.3%)
31–35 years	99 (50.5%)
36–40 years	30 (15.3%)
41–45 years	31 (15.8%)
Gender	
Female	101 (51.5%)
Male	95 (48.5%)
Emergency medicine training level	
1st year	65 (33%)
2nd year	61 (31%)
3rd year	70 (36%)
Prior clinical experience	
≤3 years	120 (61%)
>3 years	76 (39%)

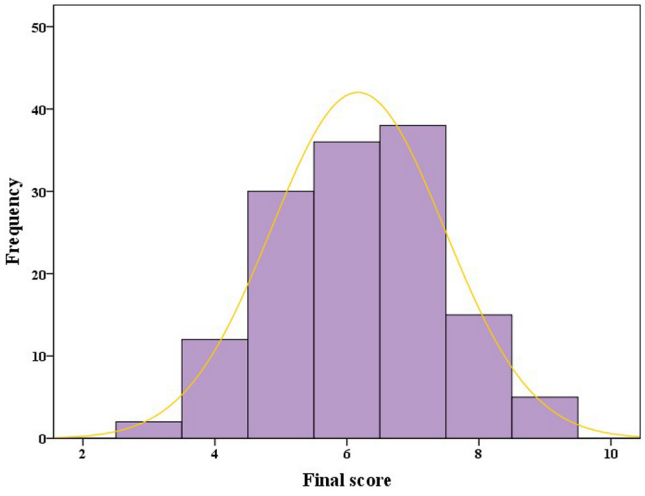

Fig. 1. Score distribution among emergency medicine residents.

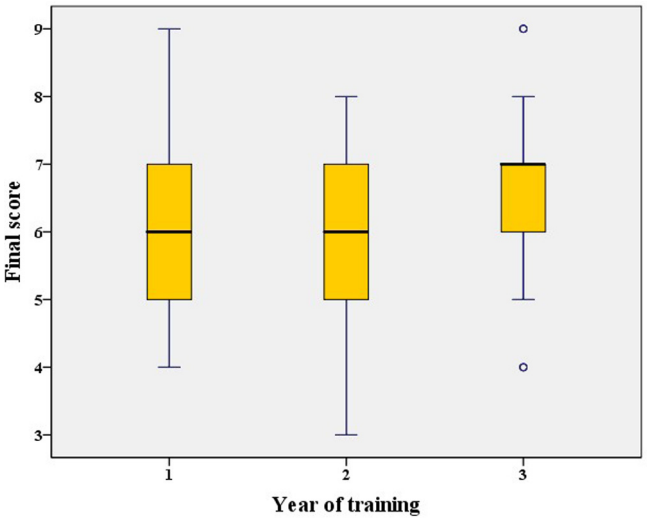

Fig. 2. Residents' score regarding level of training.