

## A Survey of Goals and Interests of Medical Faculty Members Who Write Residency Promotion Test Questions in Shiraz University of Medical Sciences

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### Abstract

**Background and Purpose:** The quality of residency promotion tests is effective in resident's knowledge and learning quality. We aimed to investigate the methods of writing questions for the residency promotion test by the faculty members of Shiraz University of Medical Sciences.

**Methods:** In this cross-sectional study, we designed questionnaires to assess the faculty member's goals, purpose and interests in writing questions.

**Results:** 50% of the faculty members wanted to evaluate what residents learn when they write questions. Also, 60% of them focus on what is expected from residents in practice. The priority of 82.5% of the faculty members was the first line management of common diseases.

**Conclusions:** We found no significant difference between questions made by faculty members and questions written by those who have no specific academic education. Faculty members with more experience assess the ability of residents to solve complicated questions more than those with less experience.

**Keywords:** MULTIPLE CHOICE QUESTIONS; MCQ'S; INVESTIGATION; RESIDENCY PROMOTION TEST; QUESTIONS; FACULTY MEMBERS

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### Introduction

In entering a higher school year, specialized medical residents should participate in improving residency promotion tests at any university in the country. Generally, obtaining an academic position at a higher level is determined by the consensus of teachers and finishing previous education, while a written test is essential for the structure of the process. Since 2006, exams are held independently for resident's entrance to a higher level in each university and

designing the questions is the faculty members' responsibility.

In the field of medical sciences that are directly associated with public health and society, increasing the knowledge and technical skills of students and graduates is of particular importance. The quality of the tests has a considerable impact on the quality of the teaching and learning process (1, 2). Therefore, the quality of exams and how to design questions have great impact on increasing students' knowledge and their learning process.

The purpose of holding exams is to evaluate learning (3, 4). Well-designed questions could effectively evaluate the scientific level and practical skills. If the exam results are not satisfactory, maybe is due to low student

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effort, but it can also be indicative of poor teaching or poor exam quality.

Each exam has validity, reliability and practicality (5) which is divided into two categories, essay and objective tests (6). Written test questions are normally divided into two categories of anatomical and multiple choice questions. Multiple choice questions are used in exams because they can cover different topics and can also be prepared in a short time. They enable the examination of many students and are comfortable and consistent with standards (7). Multiple choice questions allow students to answer the question with the view of the correct option which is called cueing (8, 9) and this problem happens especially when we want to evaluate diagnostic reasoning. It is one of the major diagnostic errors in medicine to make a decision before correct diagnosis (10). Adaptive questions (some questions with the same list of possible answers) and short answers with open-ended questions can minimize the phenomenon (11). The use of multiple choice questions enables the assessment of the knowledge of a broad group of examinees. The possibility of convenient scoring is another benefit of multiple-choice questions. However, lack of familiarity with the techniques of designing questions can considerably decrease the educational quality of the test in distinguishing weak students from strong ones. The residency promotion test will strengthen the teacher skills and enable the educational departments exercise reasonable managerial role. But it is obvious that this method of test management in the universities can be followed with respect to new teachers and designing tests by the view of unnecessary issues, bias and non-compliance question designing with scientific principles and improper taxonomy (12). Studies show that a high percentage of multiple-choice questions is a structural problem in universities around the world (13-15). Studies conducted in national universities also show a similar situation. Haghshenas and colleagues found that 54% of questions have a structural

problem (16). Another study also showed a structural problem in more than 38% percent of questions (17). One study compared the quality of pre-board questions between the pediatric residency test of Tabriz University of Medical Sciences and the national board examination by multiple choice questions (18). The study showed a significant lower level of learning in pediatric residency of Tabriz Medical University compared to the multiple choice questions of the National board examination.

We aimed to write residency promotion test questions by Shiraz University of Medical Sciences faculty members and comparing the following factors of the educators in the design of questions based on their department, scientific level, age, sex, and work history.

1. Assessment of residents' practical skills
  2. Residents proficiency assessment of educational resources on various subjects
  3. Assessing the ability of residents to solve complex issues related to technical assistance
  4. Assessment of resident learning
  5. Assessment based on the training of residents
  6. The criteria for designing various parts of questions by each faculty member
- Evaluation of the study of the specialized resources by the educator to design a question.

## Methods

Procedures and skill domains: The list of approved essential procedural skills from medical graduates defined exit outcomes were reviewed in detail. In this study 42 procedures and skills were selected in a check list. These 42 procedures and skills were as follows: suturing-dressing, dislocation-fracture, fixation, intoxication, convulsion, frost bite and heat exhaustion, sinking, burning, adult resuscitation, newborn resuscitation, venous- arterial sampling and venous injection, intra-muscular, intra dermal

and subcutaneous injection, intraosteal injection, venous puncture, microscopic urinary analysis review, urine culture, nasogastric tube application and gastric lavage, skin abscess drainage, pap smear, anterior nasal packing, vaginal delivery, circumcision, urinary catheter placement, national vaccination program, simple casting, electrocardiography, cerebro-spinal fluid aspiration, ascitis fluid aspiration, pleural fluid aspiration, staining and microscopic exam of different body fluids, microscopic exam of stool smear, Acid-fast staining exam, Micro tube measurement of hematocrit, Intra ocular pressure measurement, venous cut-down, tension pneumothorax management, microscopic exam of peripheral blood smear (malaria), arterial blood gas sampling, arterial blood gas explanation, PPD test, PPD test result interpretation, a potassium hydroxide (KOH) skin test and research.

**Participants:** One hundred and two medical graduates (general practitioners) of 4 medical universities located in a big city in Iran who were available, were selected to be asked on the level of their ability to do these procedures and apply the required skill. All medical graduates with a valid phone number who responded included in the study. These general practitioners had been graduated within 4 last years. All of graduates were

called by phone and were asked about their willingness to answer these questions and the time they preferred for telephone interview to answer 42 questions that takes about 30-40 minutes. For each question, the respondents was asked to self-evaluate his/her ability (knowledge-skill) in that procedure in a scale of 1-20. Scale was categorized as follows: Acceptable (15-20), low score (10-15), very low score (5-10) and poor score (below 5). SPSS software version 17 was used to analyze data. Mean (standard Deviation) and Median (range) were used to describe the results.

Oral consent was obtained from the volunteers and they were assured of confidentiality and anonymity of data collected, also details and purpose of the study were disclosed.

## Results

Seventy-six questionnaires were distributed between internal medicine, surgery, pediatrics and gynecology faculty members to discuss how to design the residency promotion test questions by Shiraz University of Medical Sciences faculty members and their trends in the questions design.

**Table 1.** The descriptive study of question no. 1 in designing of residency promotion test questions by the education groups

| Department                                                                                                       |                                                                        | Internal Medicine | Surgery    | Pediatrics | Gynecology | <i>p</i> -value |
|------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------|------------|------------|------------|-----------------|
| <b>Question no. 1</b><br>What is the basis of topics identified by your department for questioning by designers? | <b>A. Specialized Designers field</b>                                  | 9 (50%)           | 16 (84.2%) | 15 (93.8%) | 13 (65%)   | 0.0180          |
|                                                                                                                  | <b>B. Designers Personal interest and their educational experience</b> | 6 (33.3%)         | 3 (15.8%)  | 1 (6.2%)   | 2 (10%)    |                 |
|                                                                                                                  | <b>C. Order and/or Turn</b>                                            | 0 (0%)            | 0 (0%)     | 0 (0%)     | 0 (0%)     |                 |
|                                                                                                                  | <b>D. Random (No order and no major)</b>                               | 3 (16.7%)         | 0 (0%)     | 0 (0%)     | 5 (25%)    |                 |
|                                                                                                                  | <b>Total</b>                                                           | 18 (100%)         | 19 (100%)  | 16 (100%)  | 20 (100%)  |                 |

**Table 2.** The descriptive study of question no. 2 in designing of residency promotion test questions by the education groups

| Department     |                                                                                                                             | Internal Medicine                                                  | Surgery    | Pediatrics | Gynecology | p-value  |       |
|----------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|------------|------------|------------|----------|-------|
| Question no. 2 |                                                                                                                             |                                                                    |            |            |            |          |       |
|                | Which is the greatest goal of questions designing at the time of the questioning residents in Residency Qualification Exam? | A. Resident's Teaching                                             | 6 (33.3%)  | 6 (33.3%)  | 6 (35.3%)  | 11 (55%) | 0.469 |
|                |                                                                                                                             | B. what Residents have learned to evaluate                         | 11 (61.1%) | 8 (44.4%)  | 9 (52.9%)  | 6 (30%)  |       |
|                |                                                                                                                             | C. What residents should have learned but they did not learn       | 1 (5.6%)   | 1 (5.6%)   | 0 (0%)     | 0 (0%)   |       |
|                |                                                                                                                             | D. Evaluating the ability of residents in solving complex problems | 0 (0%)     | 3 (16.7)   | 2 (11.8%)  | 3 (15%)  |       |
| Total          |                                                                                                                             | 18 (100%)                                                          | 18 (100%)  | 17 (100%)  | 20 (100%)  | 73       |       |

**Table 3.** The descriptive study of question no. 3 in designing of residency promotion test questions by the education groups

| Department     |                                                                                  | Internal Medicine                                                 | Surgery   | Pediatrics | Gynecology | p-value    |       |
|----------------|----------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------|------------|------------|------------|-------|
| Question no. 3 |                                                                                  |                                                                   |           |            |            |            |       |
|                | According to current regulations, what is the most focus on designing questions? | A. Evaluation of residents ability of reference materials         | 6 (33.3%) | 9 (47.4%)  | 2 (11.8%)  | 5 (26.3%)  | 0.048 |
|                |                                                                                  | B. Evaluation the ability of residents in what action he expected | 9 (50%)   | 4 (21.1%)  | 11 (64.7%) | 13 (68.4%) |       |
|                |                                                                                  | C. Evaluation of the intellectual ability in solving problems     | 3 (16.7%) | 6 (31.6%)  | 4 (23.5%)  | 1 (5.3%)   |       |
|                |                                                                                  | D. others                                                         | 0 (0%)    | 0 (0%)     | 0 (0%)     | 0 (0%)     |       |
| Total          |                                                                                  | 18 (100%)                                                         | 19 (100%) | 17 (100%)  | 19 (100%)  | 73         |       |

For the test questions, every table contain frequency and frequency percentage of designing a promotion test questions by faculty members of internal medicine, surgery, pediatrics and gynecology of Shiraz University of Medical Sciences. (I don't

understand the meaning of this sentence, please rephrase so it could be edited). Four educational groups were questioned and p-value were calculated.

Table 1 shows the frequency and percentage of responses received by different faculty members regarding question 1. The

**Table 4.** The descriptive study of question no. 2 in designing of residency promotion test questions by dividing the faculty history

| Faculty History                                                                                                                                      |                                                                      | Less than 15 years | More than 15 years | p-value |
|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|--------------------|--------------------|---------|
| <b>Question no. 2</b><br>Which is the greatest goal of questions designing at the time of the questioning residents in Residency Qualification Exam? | <b>A. Resident's Teaching</b>                                        | 14 (42.4%)         | 1 (11.1%)          | 0.020   |
|                                                                                                                                                      | <b>B. Evaluation of what residents have learned.</b>                 | 17 (51.5%)         | 4 (44.4%)          |         |
|                                                                                                                                                      | <b>C. What residents should have learned but they did not learn</b>  | 1 (3%)             | 1 (11.1%)          |         |
|                                                                                                                                                      | <b>D. Evaluation of the intellectual ability in solving problems</b> | 1 (3%)             | 3 (33.3%)          |         |
|                                                                                                                                                      | <b>Total</b>                                                         | 33 (100%)          | 9 (100%)           |         |

**Table 5.** The descriptive study of question no. 3 in designing of residency promotion test questions by dividing the faculty history

| Faculty History                                                                                           |                                                                          | Less than 15 years | More than 15 years | p-value |
|-----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------|--------------------|---------|
| <b>Question no. 3</b><br>According to current regulations, what is the most focus on designing questions? | <b>A. Evaluation of residents ability of reference materials</b>         | 14 (41.2%)         | 0 (0%)             | 0.150   |
|                                                                                                           | <b>B. Evaluation the ability of residents in what action he expected</b> | 11 (32.4%)         | 7 (87.5%)          |         |
|                                                                                                           | <b>C. Evaluation of the intellectual ability in solving problems</b>     | 9 (26.5%)          | 1 (12.5%)          |         |
|                                                                                                           | <b>D. others</b>                                                         | 0 (0%)             | 0 (0%)             |         |
|                                                                                                           | <b>Total</b>                                                             | 34 (100%)          | 8 (100%)           |         |

significance level of 0.05 in question 1 design is not accepted by most objective people in relation to the education departments ( $P=0.469$ ). In other words, the most objective type of question designer does not affect the design. Tables 2 and 3 shows that the relationship between the departments are not rejected with concentration and the first design priority in the designing question ( $p=0.048$  and  $p=0.033$ ). In other words, education group has effect in the most designers on design question and the first design priority.

Table 4 shows the effect of faculty's members experience in the most designer aim in question designing and Table 5 shows the effect of faculty's history on most designers focus on designing effective questions. (I don't understand the meaning of this sentence, please rephrase so it could be edited. It seems that these sentences were

translated by Google translate!! And I can't understand what the author wants to say).

## Discussion

All faculty members are involved in assessing the proficiency of students and interns. They will be asked to evaluate the knowledge, academic and professional skills of the students. There are various methods for evaluating and measuring the level of knowledge and practical skills but each has some strengths and limitations.

Epstein and colleagues (19) showed that medical competence is in strategic use of knowledge, technical ability, clinical reasoning, emotions and values in daily work for the benefit of individuals and society. In the United States, residents and medical student's assessment are based on a model which has been written by the accreditation

council for graduate medical sciences. This model uses 6 relevant competencies including scientific knowledge, patient care, professionalism, communication and interpersonal skills, learning-based practice and practice-based systems (20). Competence is an evolutionary process. Habits of mind and behavior take shape with appropriate training and experience (21).

The main objectives of the exam are improving the ability of students and doctors with giving impetus and direction for education, the protection of society by identifying inefficient doctors, and provide the basis for selection of applicants for advanced training (22). All the exam methods have strengths and weaknesses. The use of different assessment methods over time can be decreasing somewhat the shortcomings of each of the methods (19, 23). Vleuten and colleagues (24) state 5 criteria for measuring the usefulness of the exam methods: Reliability (the accuracy and reliability of the test result if repeated), validity (what it is intended or not for a test evaluation), the impact on education and work in the future, accepting students and price.

Reliability and objectivity are the most challenging aspects of the exam and the reliability and objectivity of multiple choice question tests are of high quality (25). Improving the content and structure of multiple choice questions can be one of the best and most desirable ways of questions to assess the students.

Web and co-workers (26) showed that questions written by faculty in the form of multiple choice questions had significantly fewer errors. Difficulties of learning causes difficulties for the learner and multiple choice questions can be fashioned to promote the type of retrieval processes for improving learning (27).

By analyzing data obtained from the 76 questionnaires distributed among educators of surgery, internal medicine, gynecology, and pediatrics, a significant difference was obtained between departments on issues identified by the faculty members on how to

design for each question, the greatest concentration of the designer at the time of designing the question and the first priority of the design questions. We can say that this is due to discipline or more qualified faculty members to instill the mentality of younger faculty members in the department. Surgery departments are less practical to evaluate skills compared with other departments. However, according to the assessment of ongoing practical training in surgical departments, faculty members are looking for evaluation of residents to reference material and the intellectual ability.

Significant differences were obtained between faculty faculty members with work experiences of more and less than 15 years with experience in the most objective designer in the aspects of: the time of the question for residents, residency promotion test and the highest concentration of designer at the time of the question. More experiences faculty faculty members are more likely to test practical skills and ability to solve complex problems. Also, none of the faculty faculty members with the history of more than 15 years of educating to residents was not in the priority for the design question.

## Conclusion

In order to improve the quality of residency promotion tests, it seems essential to survey forms and structural shape of the questions, check the quality and content of questions and focus of the faculty members to design essential questions.

## Conflict of Interest

The author declares no conflict of interest.

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