Original Article

Quality of Multiple-Choice Questions (MCQs) as Perceived by the Postgraduate Residents Appearing in Mid Training Assessment (MTA) During January 2022 at Rawalpindi Medical University

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ABSTRACT

Impartiality and reliability of Multiple-Choice Questions (MCQs) render them an ideal assessment tool for measuring higher order cognition. **Objective:** To determine the perception of postgraduate medical trainees pertinent to the quality of MCQs administered in Mid Training Assessment (MTA) January 2022. **Methods**: A cross-sectional descriptive study was carried out among 40 postgraduate trainees who appeared in MTA during January 2022. About 23, 12 and 05 of these trainees were doing MS and MD training at Benazir Bhutto Hospital, Holy Family Hospital and DHQ Hospital Rawalpindi respectively. Trainees were enrolled in the study through consecutive non-probability sampling. The feedback from the trainees about quality of MCQs was gathered by means of a structured questionnaire based on 5-point likert scale. Data analysis was done by using SPSS version 25.0. **Results:** About 67% of the trainees were pleased with the quality and construct of MCQ in their assessment in terms of illustration of the information in their stems needed to understand the clinical problem. More than 82% trainees satisfied with the time allocated for attempting MCQs papers. Only 55% trainees agreed with alignment of MCQs with given Table of Specification (TOS). Most (32.5%) wanted to have difficulty level of the MCQs in accordance with level of training. Around 27.5% and 22.5% of the residents proposed to incorporate more clinical reasoning and problem solving MCQs respectively. **Conclusions:** Trainees were substantially contented with the standard of MCQs. They suggested for inclusion of more clinical reasoning and problem-solving type questions in alignment with TOS.

INTRODUCTION

Assessment in medical education is of paramount significance to verify the achievement of desired learning outcomes. Multiple Choice Questions (MCQs) are primarily designed to assess the knowledge of the students due to their validity, reliability and cost-effectiveness [1]. It is quite feasible to implement MCQs based assessment pertinent to all cognitive domains in any institute in compliance with the employed faculty [2]. MCQs are purposely constructed with meaningful and equally plausible distractors for assessing the students and promoting their deep learning [3]. They are commonly used in higher education for efficiently assessing the extensive course material in a short time period [4]. Being a user-friendly assessment, multiple choice testing is carried out in numerous educational settings globally [5]. Questions for high stake examinations like that of undergraduate and postgraduate medical education should properly be constructed and reviewed before administration by experts in order to ensure their flawlessness [6]. Apart from recall of knowledge, multiple choice questions are

also designed and administered for conceptual testing and measuring the problem-solving skills of the students [7]. MCQs are preferably used for assessing the knowledge due to easiness of scoring and non-subjectivity [8]. Moreover, high achievers can very well be differentiated from low achievers by means of well-constructed MCQs [9]. Students who cannot perform well in MCQs are incapable of adequately attempting other types of assessment [10]. Elimination of the distractors by the students from MCQ options illustrates that students have knowledge of content more than that is questioned [11]. Some experts challenge the ability of MCQs to assess higher order learning that is basically attributed to poor quality MCQs having ineffective distractors [12]. Poorly designed MCQs are also known to negatively influence the students' achievement [13]. The current study is aimed to assess the quality of one best MCQs that were predominantly designed for postgraduate residents intended to appear in Mid Training Assessment (MTA) at Rawalpindi Medical University. Being a high-stake assessment, the MCQs for this purpose should be flawless and objectively assess the knowledge, comprehension and analysis. The feedback of the trainees gathered in this study would really prove valuable for qualitatively upgrading the assessment.

METHODS

A cross-sectional descriptive study was done to get feedback of 40 postgraduate trainees who appeared in MTA during January 2022. About 23, 12 and 05 of these trainees were doing MS and MD training at Benazir Bhutto Hospital, Holy Family Hospital and DHQ Hospital Rawalpindi respectively. These 3 teaching hospitals were affiliated with Rawalpindi Medical University Rawalpindi. Trainees were enrolled in the study through consecutive non-probability sampling. The feedback from the trainees about standard of MCQs was gathered by means of a structured questionnaire based on 5-point likert scale. Residents were also asked to give their valuable suggestions for improvement. Data were analyzed by SPSS version 25.0.

RESULTS

Of the 63 postgraduate trainees appearing in Mid Training Assessment (MTA) during January 2022 at Rawalpindi Medical University, 40 trainees gave their viewpoints about the quality of Multiple-Choice Questions (MCQs) that were incorporated in their assessment. Of the 40 trainees, most (17.5%) were doing training in Obstetrics and Gynecology. The number of residents enrolled in each training program from all three teaching hospitals is revealed below in Table 1.

Training programs	Training institutes		
	Holy Family Hospital (HFH)	Benazir Bhutto Hospital (BBH)	DHQ Hospital
MS Obstetrics & Gynecology	4	2	1
MS Urology	0	5	0
MS General Surgery	0	3	0
MS Neurosurgery	2	0	2
MS Orthopedics	0		0
MS Pediatric Surgery	1	0	0
MD General Medicine	0	4	1
MD Nephrology	1	0	0
MD Cardiology	0	2	0
MD Gastroenterology	1	0	0
MD Dermatology	0	1	0
MD Pediatrics	1	0	0
MS Otorhinolaryngology	0	0	1
MS Anesthesiology	1	3	0
MD Diagnostic Radiology	1	2	0
Total	12	23	5

Table 1: No. of residents from different training programs (n = 40)

Feedback was gathered from the university residents regarding standard of MCQs and around 66.7% trainees were satisfied with their quality. In addition to the stem of MCQs, the time allocated for solving them and their problem solving aspect were agreeable among our residents as illustrated below in Table 2.

Attributes	Agree	Neutral	Disagree
Stem of the MCQs had adequate information necessary to understand the question and choose the correct answer	33 (82.5%)	04 (10%)	03 (7.5%)
MCQs scenarios were too long to read in specified time	14 (35%)	12 (30%)	14 (35%)
All the options of MCQs were of the same length	22 (55%)	11 (27.5%)	07 (17.5%)
There were no grammatical errors or spelling mistakes in MCQs	28 (70%)	02 (5%)	10 (25%)
MCQs were based on problem solving	33 (82.5%)	01 (2.5%)	06 (15%)
MCQs were designed to assess our knowledge application in addition to recall of knowledge	30 (75%)	03 (7.5%)	07 (17.5%)
Options of "all of the above" and "none of the above" were sternly avoided	31 (77.5%)	07 (17.5%)	02 (5%)
It was easily understandable what is being asked in the scenario without reading the options	20 (50%)	13 (32.5%)	07 (17.5%)
Unnecessary difficult vocabulary was avoided	30 (75%)	07 (17.5%)	03 (7.5%)
Presence of any abbreviation in the MCQs' stem that was not clear to you	17 (42.5%)	09 (22.5%)	14 (35%)
The content asked in MCQs was according to the TOS (Table of Specification) given in your MS / MD curriculum	22 (55%)	05 (12.5%)	13 (32.5%)
Time allocated for paper-I was sufficient	34 (85%)	04 (10%)	02 (5%)
Time allocated for Paper-II was adequate	33 (82.5%)	04 (10%)	03 (7.5%)

Table 2: Feedback of the trainees about MCQs of Mid Training Assessment (MTA) January 2022

Most (32.5%) of our trainees were dissatisfied with the difficulty level of MCQs and suggested for designing them in compliance with acquisition of respective competencies. About 22.5% trainees recommended for incorporation of more problem-solving questions in assessment as shown below in Figure 1.
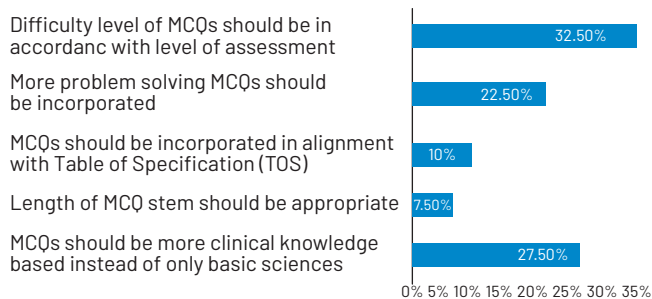

Figure 1: Suggestions of postgraduate trainees to improve the quality of MCQ

DISCUSSION

Although multiple choice questions are frequently administered assessment tool due to their objectivity, validity and reliability; their quality should be optimal for accurately differentiating the high from low performers [14]. In current study, about 82.5% postgraduate trainees appearing in Mid Training Assessment during January 2022 perceived the stem of MCQs in their theory papers appropriate with respect to illustration of considerable information deemed necessary to comprehend and choose from the given options as correct answer. About 50% of our residents confessed they chose the correct answer conveniently just be reading the stem of MCQs. Developing MCQs with suitable scenario for understanding the healthcare problem in accordance with lead in statement is not an easy job. Likewise, MCQs developed for access exam to diverse medical specialties from 2009-2013 were identified with multiple errors. One of them was negative /unfocussed stems of MCQs and this defect persisted throughout the 5 years. Such stems were quite cumbersome that candidate faced difficulty in choosing the correct answer without reviewing all the options. However, such flaws in stems were intensified periodically [15]. Similarly, a study by Dowing SM et al revealed such flaws related to construct and content of MCQs that deprived medical students from good scores in their achievement examination [16]. Such flawed items make it difficult for the candidates to attempt the paper in specified time. The faculty members involved in designing MCQs should be skilled enough to avoid technical flaws. National Board of Medical Examiners (NBME) has developed a guide for convenience of the Higher Education faculty in this regard [17]. However, faculty members

should also be well-versed in recent medical advancements in order to meet the requirements of World Federation for Medical Education (WFME) [18]. The present study revealed satisfaction among 55% of our MS and MD trainees who appearing in MTA at Rawalpindi Medical University with respect to allocation of test items in accordance with Table of Specification (TOS) that was shared with them for guidance well before assessment. TOS is made available to the candidates ahead of exam in order to ensure content validity of the assessment [19]. Ideally learning objectives of a curriculum should be aligned with its assessment [20]. In addition to getting arrayed with the teaching methodologies. This is imperative to promote students' learning. Provision of TOS to students ensures content validity of an assessment; in other words, TOS reflects the course on the basis of which performance of the students is scored [21]. Continuing Professional Development (CPD) of the teaching faculty should regularly be organized in higher education institutes for capacity building and guaranteeing the assessment of the future professionals in true spirit. Although 82.5% of our respondents perceived the MCQs incorporated in their MTA assessment as based on problem solving traits, however 27.5% recommended to design items to judge their clinical reasoning more than that of their basic sciences knowledge as this has already been tested while enrolling for postgraduate training through central induction process. Being high stake assessments, clinical reasoning should substantially be merged in test items predominantly designed for postgraduate trainees for adequate comprehension of problem and to rationalize the respective treatment [22]. Clinical vignette multiple choice questions are also essential to elicit critical thinking after appraising the case [23]. Cognition level of MCQs should preferably be advanced in order to make real difference in undergraduate and postgraduate medical assessments. Most (32.5%) of our respondents opined that difficulty level of questions should be according to their level of assessment. As Mid Training Assessment (MTA) is executed for the trainees who have successfully accomplished all training requisites with respect to their training years, so their assessment should vary substantially from those who are assessed on training completion. Professional teachers are bestowed with an art of fusing knowledge of the topics taught with problem solving skills in real life scenario [24]. Although difficulty index of MCQs can accurately be determined by item analysis [25], the feedback of the trainees for improving the existing scenario also carries weightage. Developing curriculum before commencement of program and year-wise segregation of course content along with its learning objectives and assessment TOS can prove valuable in

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assessing the postgraduate trainees in congruence with level of training.

CONCLUSIONS

Although candidates were substantially satisfied with the quality of MCQs; however, incorporating more clinical vignette-based items and paper setting in compliance with level of training was strongly suggested. Apart from getting trainees' feedback, MCQs should also be reviewed by the faculty involved in designing the items in addition to educationist for comprehensive review in accordance with standard MCQ writing guidelines. Faculty training for their capacity building in this regard at institutional level will also be beneficial.

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

[1] Abdel-Hameed AA, Al-Faris EA, Alorainy IA, Al-Rukban MO. The criteria and analysis of good multiple-choice questions in a health professional setting. Saudi Medical Journal 2005; 26910); 1505-10.

[2] Harper R. Multiple Choice Questions – A Reprieve. Bioscience Education 2003; 2(1): 1-6. doi.10.3108/beej.2003.02000007.

[3] Vegi VAK, Sudhakar PV, Bhimarasetty DM, Pamarthi K, Edara L, Kutikuppala LVS, et al. Multiple-choice questions in assessment: Perceptions of medical students from low-resource countries. Journal of Education and Health Promotion. 2022; 11: 103. org.4103%2Fjehp.jehp_621_21.

[4] Bailey PH, Mossey S, Moroso S, Cloutier JD, Love A. Implications of multiple-choice testing in nursing education. Nurse Education Today 2012; 32(6): e40-e44. doi.10.1016/j.nedt.2011.09.011.

[5] Marsh EJ, Roediger HL, Bjorkm RA, Bjork E. The memorial consequences of multiple-choice testing. Psychonomic Bulletin and Review 2007; 14 (2): 194–199. doi.10.3758/BF03194051.

[6] Belay LM, Sendekie TY, Eyowas FA. Quality of multiple-choice questions in medical internship qualification examination determined by item response theory at Debre Tabor University, Ethiopia. BMC Medical Education 2022; 22: 635. doi.10.1186/s12909-022-03687-y.

[7] Karpicke JD and Blunt J. Retrieval practice produces more learning than elaborative studying with concept mapping. Science 2011; 331: 772-775. doi.10.1126/science.1199327.

[8] Tarrant M and Ware J. A framework for improving the quality of multiple-choice assessments. Nurse Education Today. 2012; 37: 98–104. doi.10.1097/nne.0b013e31825041d0.

[9] Abdel-Hameed AA, Al-Faris EA, Alorainy IA, Al-Rukban MO. The criteria and analysis of good multiple-choice questions in a health professional setting. Saudi Medical Journal 2005; 26(10): 1505–10. PMID: 16228046.

[10] Adhi MI and Aly SM. Student perception and post-exam analysis of one best MCQs and one correct MCQs: A comparative study. Journal of the Pakistan Medical Association. 2018; 68(4): 570-575.

[11] Harper R. Multiple-choice questions – A Reprieve. American bee journal. 2003; 2(1): 1-6. doi.10.3108/beej.2003.02000007.

[12] Braddom CL. A brief guide to writing better test questions. American journal of physical medicine. 1997; 76:514-516. doi.10.1097/00002060-199711000-00015.

[13] Clifton SL and Schriner CL. Assessing the quality of multiple-choice test items. Nurse Education today. 2010; 35: 12–16. doi: 10.1097/NNE.0b013e3181c41fa3.

[14] Brown GTL and Abdulnabi HHA. Evaluating the quality of higher education instructor-constructed multiple-choice tests: Impact on student grades. Frontiers of Education. 2017; 2: 24. doi.10.3389/feduc.2017.00024.

[15] Rodríguez-Díez MC, Alegre M, Díez N, Arbea L, Ferrer M. Technical flaws in multiple-choice questions in the access exam to medical specialties ("examen MIR") in Spain (2009-2013). BMC Medical Education. 2016;16: 47. doi.10.1186%2Fs12909-016-0559-7.

[16] Dowing SM. The effects of violating standard item writing principles on tests and students: the consequences of using flawed test items on achievement examinations in medical education. Advances in Health Sciences Education. 2005; 10:133–3. doi.10.1007/s10459-004-4019-5.

[17] Case SM, Swanson DB. Constructing written test questions for the basic and clinical sciences. Philadelphia: National Board of Medical Examiners; 1998 Oct.

[18] Fernandez RS, Méndez Díaz C, Rodríguez E. Continuing Medical Education: how to write multiple choice questions. Radiology. 2013; 55(1): 28–36. doi.10.1016/j.rx.2013.01.001.

[19] DiDonato-Barnes N, Fives H, Krause ES. Using a table of specifications to improve teacher constructed traditional tests: An experimental design. Assessment in Education: Principles, Policy, and

Practice 2013; 21(1): 90–108. doi.10.1080/0969594X. 2013.808173.

[20]   FitzPatrick B, Hawboldt J, Doyle D, Genge T. Alignment of learning objectives and assessments in therapeutics courses to foster higher-order thinking. American journal of pharmaceutical education. 2015 Feb; 79(1): 10. doi.10.5688%2Fajpe79110.

[21]   Alade OM and Igbinosa VO. Table of specification and its relevance in educational development assessment.

[22]   Derakhshandeh Z, Amini M, Kojuri J, Dehbozorgian M. Psychometric characteristics of Clinical Reasoning Problems (CRPs) and its correlation with routine multiple choice question (MCQ) in Cardiology department. Journal of Advances in Medical Education & Professionalism. 2018 Jan; 6(1):37-42.

[23]   Heist BS, Gonzalo JD, Durning S, Torre D, Elnicki DM. Exploring Clinical Reasoning Strategies and Test-Taking Behaviors During Clinical Vignette Style Multiple-Choice Examinations: A Mixed Methods Study. Journal of graduate medical education. 2014; 6(4): 709-14. doi.10.4300%2FJGME-D-14-00176.1.

[24]   Ma N, Xin S, Du JY. A peer coaching-based professional development approach to improving the learning participation and learning design skills of in-service teachers. Journal of Educational Technology & Society. 2018 Apr 1;21(2):291-304.

[25]   Kumar D, Jaipurkar R, Shekhar A, Sikri G, Srinivas v. Item analysis of multiple-choice questions: A quality assurance test for an assessment tool. Medical Journal Armed Forces India (MJAFI). 2021; 77(1): S85-89. doi.10.1016/j.mjafi.2020.11.007.