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Original Article

Implementation and Challenges of Competency-Based Medical Education: Evidence from Mashhad University of Medical Sciences

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Abstract

Background: Competency-based medical education (CBME) is an approach focused on training and evaluating medical professionals. The introduction of CBME frameworks has significantly transformed medical education. This research represents the first attempt to evaluate the acquisition of essential competencies within the general medicine program at Mashhad University of Medical Sciences (MUMS), utilizing feedback from graduates and medical interns.

Methods: This cross-sectional study was conducted at MUMS in 2023 and 2024, involving medical graduates and interns from the previous two years at the Faculty of Medicine. Participants were selected using convenience sampling. A researcher-designed questionnaire, developed from a literature review and incorporating elements of the Association of American Medical Colleges (AAMC) questionnaire, was used. The questionnaire's validity was established through content validity, and its reliability was assessed using Cronbach's alpha.

Results: The questionnaire return rate was 97%. A study of 367 medical graduates and interns at MUMS revealed an overall mean self-reported competence of 79.02%. Additionally, 62% of graduates felt adequately prepared for independent practice. However, there were notable weaknesses in areas such as information technology, rational drug prescribing, and general procedures. Graduates perceived the relevance of basic science content to general practice as low, with physiology and pharmacology rated highest and genetics and medical physics lowest.

Conclusion: This study showed that the medical education program in Mashhad is not based on CBME and strongly advocates a systemic revision of the medical curriculum at MUMS to align with a CBME framework, thereby strengthening medical students' capabilities.

Keywords: Competency-based education, Curriculum, Education, Medical students

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Introduction

Competency-based medical education (CBME) is a medical training and evaluation model that focuses on acquiring specific skills and measurable competencies essential for practicing medicine. (1). This evaluation type aims to assess whether the program is operating as intended and achieving its goals according to established standards while promoting continuous improvement (2-4).

The defined competencies address the needs of patients, societal expectations, and the healthcare system. They encompass areas such as clinical skills, communication, professionalism, ethics, teamwork, leadership, and ongoing learning (5). Numerous global competency frameworks outline the essential characteristics of a competent general practitioner (6-9). Typically, the evaluation in CBME relies on five core components: outcome-based competencies, sequenced advancement, personalized learning experiences, instruction that emphasizes competencies, and systematic program assessment (10). In recent years, medical education has undergone a significant shift towards implementing CBME (11,12).

Despite advances at other universities, the medical education program in Iran has not yet shifted significantly to a competency-based curriculum. The current curriculum remains outdated. According to the competency framework issued by Iran's Ministry of

Health, a graduating general practitioner must possess essential competencies to perform their role effectively in the workplace. These competencies are organized into seven domains, each with its respective subdomains. The seven domains are:

1. Clinical Skills
2. Communication Skills
3. Patient Care (including Diagnosis, Treatment, and Rehabilitation)
4. Health Promotion and Prevention within the Healthcare System
5. Personal Development and Continuous Learning
6. Professional Commitment
7. Decision-Making, Reasoning, and Problem-Solving Skills.

In recent years, no studies have assessed the extent to which medical students at Mashhad University of Medical Sciences (MUMS) have achieved the required competencies. While there is an acknowledgment of the need for revisions and reforms to the curriculum, insufficient action has been taken to address this issue, and the measures implemented thus far have not led to significant improvements. Many studies discuss the anticipated challenges of the CBME curriculum, but there is a lack of research focused on the actual difficulties faced by institutions during its implementation (13). This study contributes by providing empirical evidence on the outcomes (competency acquisition) of the current non-CBME curriculum, thereby indirectly revealing implementation challenges. Thus, the study aims to evaluate, for the first time, the extent to which medical graduates (from the graduates' and interns' perspectives, which constitute the study's primary data source) from MUMS have acquired the necessary competencies during their general medicine program.

Materials and Methods

Study design

This cross-sectional study was conducted at MUMS during 2023 and 2024. The study population included all general medicine graduates and medical interns from the Faculty of Medicine over the past two years. Participants were selected using convenience sampling. The final sample size (n = 367) was determined through convenience sampling; it reflected the number of available students and graduates who completed the questionnaire during the study period. The research involved a researcher-developed questionnaire informed by a comprehensive literature review, primarily drawing on the Association of American Medical Colleges (AAMC) questionnaire. To support the questionnaire's development, interviews were conducted with general medical students and faculty members from the Educational Development Office (EDO) at Mashhad Faculty of Medicine. The validity of the questionnaire was confirmed through content validity (n = 85, CVI = 0.78), while its reliability was assessed using Cronbach's alpha coefficient (Cronbach's alpha for the overall questionnaire was 0.6, and the coefficients for the subscales ranged from 0.6 to 0.77). The questionnaire link was distributed to MUMS graduates via virtual groups.

Data collection

The study tool was divided into two sections. The first section collected demographic information and confounding variables related to the clinical competence acquired by graduates preparing to begin general medical practice. The demographic and confounding variables collected in the first section included age, gender, marital status, academic performance (educational grade), and training level (intern vs. recent graduate), as these factors may potentially influence self-reported clinical competency. Although these variables were recorded to identify potential sources of variability, no statistical adjustment was made because the study employed a descriptive design. The second section of the questionnaire focuses on the main study variables from the graduates' perspective. This part collected responses regarding the alignment of basic science course content with the needs of general practitioners, the level of clinical competency of graduates at the start of their medical practice, and the content validity of various examinations throughout the program. Graduates' responses in this section were categorized using a four-point Likert scale (excellent, good, moderate, poor) based on a global rating.

Statistical analysis

All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 16. The normality of the data was assessed by the Kolmogorov-Smirnov test. Quantitative variables were expressed as mean ± standard deviation or median (interquartile range), while qualitative data were described as frequencies (percentages).

Results

A total of 367 medical interns and graduates from the previous two years at Mashhad University of Medical Sciences participated in this study. The questionnaire response rate was 97%, indicating high participant engagement. The mean age of participants was 25.62 ± 2.14 years, comprising 174 females (47.4%) and 193 males (52.6%). 22.6% of participants were married, and 35% had an educational attainment above grade 17(Table 1).

The overall self-reported competency among participants was 79.02% (Table 2). In addition, approximately 62% of graduates reported feeling adequately prepared for independent medical practice.

Analysis of competency across different subdomains of general medical practice showed that history taking, commitment to medical values and ethics, and effective

Table 1. Demographic characteristics of the study participants

Variable	Value
Age (SD)	25.62 ± 2.14
Sex (%male)	193 (52.5%)
Marriage (%yes)	83 (22.6%)
Educational grade	16.47 ± 1.14
Educational grade (>17)	129 (35%)

communication with patients, companions, and colleagues received the highest proportions of "good" and "very good" performance ratings (Table 2).

In contrast, rational drug prescribing, working with information technology and artificial intelligence, and documentation of clinical exposures and patient records were identified as the weakest competency areas, with the lowest percentages of "good and better" responses (Table 2).

Self-reported evaluations of competence in identifying the most common outpatient problems across hospital wards are presented in Table 3. According to students and graduates, the highest levels of competence ("good and better") were observed in the cardiology (80.47%) and pediatrics (75.98%) departments. The lowest self-reported competence was reported in the ear, nose, and throat (ENT) department (56.86%) and neurology (60.57%).

Faculty members' assessments of students' and graduates' competence in identifying common outpatient problems are summarized in Table 4. From the faculty perspective, the highest competence levels were reported in the pediatrics (75.79%) and cardiology (73.05%) departments, whereas the lowest ratings were observed in the surgical, neurology, and ENT departments. Overall, faculty ratings were consistently lower than students' and graduates' self-reported ratings.

Participants' perceptions of the relevance of basic medical science courses to general physician duties are shown in Table 5. Overall, the perceived relevance of basic sciences was moderate to low. Among the basic science subjects, physiology demonstrated the highest level of perceived relevance (53.84%), followed by microbiology and virology, parasitology and mycology, and pharmacology. In contrast, medical physics, biochemistry, and histology were rated as the least relevant to clinical practice, with nearly three-quarters of respondents indicating that these subjects contributed only a "small portion" or "almost none" to their duties as general physicians (Table 5).

Discussion

The objective of this study was to assess the acquisition of competencies among medical students and graduates at Mashhad University of Medical Sciences. The results of this study indicated that over 70% of students and graduates rated their clinical skills as either good or very good. The strongest skills identified were history-taking, commitment to medical values, and effective communication with both patients and colleagues. At the same time, participants identified rational medication prescription, artificial intelligence, and clinical documentation and patient records as their weakest skills. This pattern indicates that while they excelled in communication and ethical skills, they rated themselves low in evidence-based decision-making, medication prescription, and familiarity with the health system. These weaknesses seem to reflect broader systemic and institutional barriers within MUMS rather than student-related deficiencies. Limited incorporation of digital health and IT training, insufficient practice-based learning, and a traditionally discipline-centered curriculum likely contribute to low competency in areas such as artificial intelligence and documentation. Additionally, overcrowded clinical environments, limited supervision, and inadequate technology-enhanced learning resources further restrict the development of modern medical competencies. A study conducted by Niroumand et al. (2016) found that the overall level of clinical skills among trainees and interns was satisfactory (14). However, the study also revealed weaknesses in prescribing skills (14). It highlighted issues such as inadequate patient follow-up and insufficient training on prescriptions. Possible reasons for these challenges include a lack of clinical supervision, unclear educational objectives, and insufficient clinical training spaces, which can hinder learners' ability to work independently(14). Moreover, a study by Moghadamnia et al. (2025) demonstrated that early training in pharmacological principles and drug prescription can effectively address these deficiencies (15).

In our analysis of hospital clinical internship departments, we categorized them into major and minor departments. The major departments included pediatrics, surgery, internal medicine, and gynecology, while all other departments were classified as minor. Based on self-reported data regarding the most common outpatient issues, both the cardiology and pediatrics departments received the highest ratings from students. This finding aligns with reports from studies conducted in Shiraz, Yazd, and Zahedan (16-18). However, the Yazd study identified ear, nose, and throat (ENT) as a significant department (17), which was not reflected in our findings. In contrast, the Shahrekord study reported high student satisfaction with the ENT department, while satisfaction with pediatrics was relatively low. (19) Additionally, international studies revealed that the pediatric and internal medicine departments ranked highest in terms of student ratings (20, 21). From the faculty's perspective, our findings indicated that the pediatric and cardiology departments also received high scores. Similarly, the neurology and ENT departments ranked prominently in the professors' assessment. In the Zahedan study,

Table 2. The graduates and students self-reported on the correct performance of each clinical skill

Clinical Capabilities	Very poor N (%)	Poor N (%)	Good N (%)	Very good N (%)	%Good and better
History taking (focused/comprehensive)	6 (2.47%)	2 (0.82%)	129 (53.09%)	106 (43.62%)	96.71
Commitment to medical values and ethics	1 (0.43%)	14 (5.96%)	148 (62.98%)	72 (30.64%)	93.62
Effective communication (with patient, companion, colleagues)	3 (1.27%)	18 (7.63%)	142 (60.17%)	73 (30.93%)	91.10
Request and interpret diagnostic and screening tests	6 (2.52%)	17 (7.14%)	162 (68.07%)	53 (22.27%)	90.34
Physical and psychological examinations	8 (3.36%)	17 (7.14%)	153 (64.29%)	60 (25.21%)	89.50
Diagnosing and treating common emergency problems	2 (0.84%)	24 (10.13%)	165 (69.62%)	46 (19.41%)	89.03
Obtaining informed consent and medical laws	4 (1.70%)	28 (11.91%)	136 (57.87%)	67 (28.51%)	86.38
Prioritization for differential diagnoses	6 (2.50%)	27 (11.25%)	159 (66.25%)	48 (20.00%)	86.25
Personal development and continuous learning	2 (0.85%)	33 (13.98%)	157 (66.53%)	44 (18.64%)	85.17
Inpatient and Outpatient Separation	6 (2.53%)	29 (12.24%)	158 (66.67%)	44 (18.57%)	85.23
Mental skills related to diagnosis and decision-making (clinical reasoning)	4 (1.70%)	36 (15.32%)	153 (65.11%)	42 (17.87%)	82.98
Constructively dealing with medical ethics challenges	6 (2.55%)	40 (17.02%)	139 (59.15%)	50 (21.28%)	80.43
Providing primary and preventive health care	7 (2.99%)	39 (16.67%)	144 (61.54%)	44 (18.80%)	80.34
Communicating in difficult situations	8 (3.38%)	40 (16.88%)	137 (57.81%)	52 (21.94%)	79.75
Clinical question design and evidence search	6 (2.53%)	44 (18.57%)	150 (63.29%)	37 (15.61%)	78.90
Handing over/taking responsibility for the patient	5 (2.10%)	48 (20.17%)	142 (59.66%)	43 (18.07%)	77.73
Teamwork in the hospital	6 (2.55%)	49 (20.85%)	132 (56.17%)	48 (20.43%)	76.60
Treatment designer for common problems	9 (3.80%)	48 (20.25%)	144 (60.76%)	36 (15.19%)	75.95
Preventing health service risks	6 (2.55%)	59 (25.11%)	144 (61.28%)	26 (11.06%)	72.34
Performing general physician procedures	11 (4.64%)	55 (23.21%)	129 (54.43%)	42 (17.72%)	72.15
Performing other physician roles (educator, researcher, health management…)	13 (5.60%)	54 (23.28%)	138 (59.48%)	27 (11.64%)	71.12
Documenting clinical exposures and patient records	7 (2.97%)	63 (26.69%)	137 (58.05%)	29 (12.29%)	70.34
Understanding the country's health system and providing feedback	18 (7.69%)	72 (30.77%)	115 (49.15%)	29 (12.39%)	61.54
Information Technology and Artificial Intelligence	24 (10.21%)	67 (28.51%)	105 (44.68%)	39 (16.60%)	61.28
Rational drug prescription	20 (8.47%)	84 (35.59%)	106 (44.92%)	26 (11.02%)	55.93
Overall			-		79.02

Note: The total N for each item may vary because some participants did not respond to all questions. Percentages in the "Good and better" column were calculated based on the actual number of responses for each item; "Overall" is the average of "good and better" across all rows.
"Good" + "Very Good"

Table 3. The self-reported competence of graduates and students in identifying the most common outpatient issues

Hospital Wards	Very poor (%)	Poor (%)	Good (%)	Very good (%)	%Good and better
Cardiac department	10 (3.98%)	39 (15.54%)	180 (71.71%)	22 (8.76%)	80.47
Pediatric department	9 (3.54%)	52 (20.47%)	160 (62.99%)	33 (12.99%)	75.98
Psychiatry department	13 (5.14%)	55 (21.74%)	155 (61.26%)	30 (11.86%)	73.12
Gynecology department	14 (5.49%)	59 (23.14%)	160 (62.75%)	22 (8.63%)	71.38
Internal department	20 (7.72%)	55 (21.24%)	155 (59.85%)	29 (11.20%)	71.05
Surgical department	19 (7.48%)	67 (26.38%)	144 (56.69%)	24 (9.45%)	66.14
Infectious disease department	17 (7.42%)	73 (31.88%)	120 (52.40%)	19 (8.30%)	60.70
Neurology department	22 (8.94%)	75 (30.49%)	130 (52.85%)	19 (7.72%)	60.57
Ear, nose, and throat department	7 (3.55%)	78 (39.59%)	85 (43.15%)	27 (13.71%)	56.86
Overall			-		68.81

Note: The total N for each item may vary because some participants did not respond to all questions. Percentages in the "Good and better" column were calculated based on the actual number of responses for each item; "Overall" is the average of "good and better" across all rows.

however, gynecology and internal medicine achieved the highest scores, indicating a statistically significant difference in opinions between students and faculty .(18) Additionally, the discrepancies observed between student and faculty ratings may partly reflect self-reporting bias, particularly among junior trainees. Students may

Table 4. The competence of graduates and students in identifying the most common outpatient issues from the faculty's perspective

Hospital Wards	Very poor (%)	Poor (%)	Good (%)	Very good (%)	%Good and better
Internal department	24 (9.30%)	81 (31.40%)	118 (45.74%)	35 (13.57%)	59.31
Pediatric department	15 (5.86%)	47 (18.36%)	153 (59.77%)	41 (16.02%)	75.79
Gynecology department	23 (9.06%)	62 (24.41%)	140 (55.12%)	29 (11.42%)	66.54
Surgical department	60 (23.44%)	92 (35.94%)	88 (34.38%)	16 (6.25%)	40.63
Psychiatry department	20 (7.78%)	50 (19.46%)	158 (61.48%)	29 (11.28%)	72.76
Cardiac department	18 (7.03%)	51 (19.92%)	162 (63.28%)	25 (9.77%)	73.05
Neurology department	34 (13.88%)	73 (29.80%)	117 (47.76%)	21 (8.57%)	56.33
Infectious disease department	21 (9.13%)	65 (28.26%)	120 (52.17%)	24 (10.43%)	62.60
Ear, nose, and throat department	33 (16.58%)	53 (26.63%)	93 (46.73%)	20 (10.05%)	56.78
Overall			-		62.98

Note: The total N for each item may vary because some participants did not respond to all questions. Percentages in the "Good and better" column were calculated based on the actual number of responses for each item; "Overall" is the average of "good and better" across all rows.

Table 5. The relevance of basic medical sciences content to general physician duties

Subject	Almost all content	Most content	Small portion of content	Almost none	% High Relevance
Physiology	21 (13.46%)	63 (40.38%)	44 (28.21%)	28 (17.95%)	53.84%
Microbiology & Virology	15 (9.55%)	55 (35.03%)	56 (35.67%)	31 (19.75%)	44.58%
Parasitology & Mycology	13 (8.23%)	57 (36.08%)	57 (36.08%)	31 (19.62%)	44.31%
Pharmacology	15 (9.43%)	55 (34.59%)	50 (31.45%)	28 (17.61%)	44.02%
Pathology	14 (8.81%)	53 (33.33%)	61 (38.36%)	31 (19.50%)	42.12%
Social Medicine	17 (10.76%)	47 (29.75%)	60 (37.97%)	34 (21.52%)	40.51%
Medical Ethics	18 (11.61%)	44 (28.39%)	51 (32.90%)	42 (27.10%)	40.00%
Immunology	10 (6.29%)	49 (30.82%)	59 (37.11%)	41 (25.79%)	37.11%
Anatomy	20 (12.12%)	39 (23.64%)	67 (40.61%)	39 (23.64%)	35.76%
Genetics	26 (16.67%)	26 (16.67%)	63 (40.38%)	57 (36.54%)	33.34%
Nutrition	14 (8.86%)	38 (24.05%)	68 (43.04%)	38 (24.05%)	32.91%
Biostatistics & Epidemiology	10 (6.41%)	39 (25.00%)	65 (41.67%)	42 (26.92%)	31.41%
Histology	14 (8.97%)	34 (21.79%)	66 (42.31%)	42 (26.92%)	30.76%
Biochemistry	11 (6.96%)	32 (20.25%)	56 (35.44%)	59 (37.34%)	27.21%
Medical Physics	8 (5.03%)	33 (20.75%)	54 (33.96%)	64 (40.25%)	25.78%
Overall			-		37.57%

"Overall" is the average of "good and better" across all rows.
"Almost all content" + " Most content"

overestimate their competence due to limited clinical experience, limited exposure to real-world complexity, or social desirability tendencies. In contrast, faculty assessments are informed by direct observation of clinical performance, which may explain the lower competency ratings reported by professors. This difference highlights an inherent limitation of relying solely on self-reported measures when evaluating clinical skills.

In our study, medical students identified physiology, microbiology, parasitology, and pharmacology as the most beneficial courses for their basic science education, while biochemistry, medical physics, and histology were viewed as the least relevant for clinical internships. In our review of the studies, we noted that the findings from Yazd and Shiraz were in agreement with ours, identifying biochemistry as the least relevant course (16, 17). However, they had differing views regarding the relevance of microbiology and parasitology (16, 17). Interestingly, these studies emphasized that the anatomy course had the highest relevance (16, 17). The studies conducted in Birjand and Shiraz indicated that the quality of educational objectives and strategies outlined in the curriculum was generally positive (22, 23). In the study conducted by Chan et al., (20) Physiology and pharmacology were identified as the most valuable basic science courses. However, students reported genetics, biochemistry, and ethics as the three most important pre-medical courses (20). Differences in students' preferences for prerequisite general medicine courses may stem from variations in educational curricula across countries, as well as cultural factors and educational challenges. Weaknesses in the basic sciences curriculum

may undermine general practitioners' diagnostic and therapeutic skills, possibly increase medical errors, and harm public health. The finding that nearly 75% of respondents rated biochemistry and medical physics as contributing "almost none" or "a small portion" to their clinical practice highlights a significant gap between basic science education and clinical relevance. Several structural factors within MUMS appear to contribute to this disconnect, including limited case-based clinical teaching, faculty shortages, especially those with clinical backgrounds, and poor alignment between basic science content and clinical rotations. These issues collectively reinforce students' perceptions that basic sciences have limited practical value.

Limitation

This research has several limitations. First, the use of convenience sampling is a significant limitation that may introduce selection bias and reduce the representativeness of the sample, thereby limiting the generalizability of the findings to all medical graduates and interns. Additionally, using self-reported measures exposes the findings to potential recall errors and social desirability influences, which could compromise the precision of the competency assessments. Moreover, due to the study's cross-sectional design, causal inferences cannot be drawn, and the results reflect competency acquisition at a single point in time. Future longitudinal studies are recommended to better assess trends and changes in competency development. Therefore, conducting longitudinal studies is recommended to review and enhance the program for building capabilities.

Conclusion

In areas where quality has declined due to weaknesses, the educational programs and schemes should be upgraded to implement a competency-based curriculum. This approach aims to develop a comprehensive course plan, conduct exams, and create a joint document that aligns with general practitioner competency courses. The goal is to address common educational challenges effectively.

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Competing Interests

None to declare.

Ethical Approval

This study was approved by the Ethics Committee of Mashhad University of Medical Sciences (IR.MUMS.REC.1402.199), and written informed consent was obtained from all participants.

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References

1. Vasquez JA, Marcotte K, Gruppen LD. The parallel evolution of competency-based education in medical and higher education. The Journal of Competency-Based Education. 2021;6(2):e1234. doi:10.1002/cbe2.1234
2. Alharbi NS. Evaluating competency-based medical education: a systematized review of current practices. BMC Med Educ. 2024;24(1):612. doi:10.1186/s12909-024-05609-6
3. Giancola SP. Program evaluation: Embedding evaluation into program design and development: Sage Publications; 2025.
4. Van Melle E, Frank JR, Holmboe ES, Dagnone D, Stockley D, Sherbino J. A Core Components Framework for Evaluating Implementation of Competency-Based Medical Education Programs. Acad Med. 2019;94(7):1002–9. doi:10.1097/acm.0000000000002743
5. Bhattacharya S. Competency-based medical education: An overview. Annals of Medical Science & Research. 2023;2(3):132-8. doi:10.4103/amsr.amsr_27_23
6. Frank JR, Danoff D. The CanMEDS initiative: implementing an outcomes-based framework of physician competencies. Med Teach. 2007;29(7):642–7. doi:10.1080/01421590701746983
7. Simpson JG, Furnace J, Crosby J, Cumming AD, Evans PA, Friedman Ben David M, et al. The Scottish doctor--learning outcomes for the medical undergraduate in Scotland: a foundation for competent and reflective practitioners. Med Teach. 2002;24(2):136–43. doi:10.1080/01421590220120713
8. Swing SR. The ACGME outcome project: retrospective and prospective. Med Teach. 2007;29(7):648–54. doi:10.1080/01421590701392903
9. Zaini RG, Bin Abdulrahman KA, Al-Khotani AA, Al-Hayani AM, Al-Alwan IA, Jastaniah SD. Saudi Meds: a competence specification for Saudi medical graduates. Med Teach. 2011;33(7):582–4. doi:10.3109/0142159x.2011.578180
10. Chaney KP, Hodgson JL. Using the Five Core Components of Competency-Based Medical Education to Support Implementation of CBVE. Front Vet Sci. 2021;8:689356. doi:10.3389/fvets.2021.689356
11. Kiguli S, Mubuuke R, Baingana R, Kijjambu S, Maling S, Waako P, et al. A consortium approach to competency-based undergraduate medical education in Uganda: process, opportunities and challenges. Educ Health (Abingdon). 2014;27(2):163–9. doi:10.4103/1357-6283.143774
12. McKenzie-White J, Mubuuke AG, Westergaard S, Munabi IG, Bollinger RC, Opoka R, et al. Evaluation of a competency based medical curriculum in a Sub-Saharan African medical school. BMC Med Educ. 2022;22(1):724. doi:10.1186/s12909-022-03781-1

13. Soundariya K, Nishanthi A, Mahendran R, Vimal M. Evaluation of Competency-Based Medical Education (CBME) curriculum implementation for Phase II Medical undergraduates: A qualitative study. J Adv Med Educ Prof. 2025;13(1):36–48. doi:10.30476/jamp.2024.104312.2052
14. Niroumand E, Sepahi V, Khazaei MR, Vaziri S, Khazaei M. The state of ambulatory education from the viewpoint of externs and interns students at Kermanshah University of Medical Sciences. Educational Development of Judishapur. 2016;7(4):286–97.
15. Mostafazadeh-Bora M, Rafati Rahimzadeh M, Moghadamnia AA. The Effect of an Early Exposure Training Course on Pharmacology Principles and Prescription Writing on the Satisfaction and Knowledge Level of Pre-clerkship Students. Babol-Jbums. 2025;27(0):e4. doi:10.22088/JBUMS.27.SUPPLEMENT_1,_MEDICAL_EDUCATION,_.4
16. Amini M, Ghanavati S, Sagheb M-M, Kojuri J, Dehghani M-R, Nabeiei P, et al. Evaluation of general medicine course from graduated medical students'point of view based on AAMC. Educational Development of Judishapur. 2016;7(3):240–6.
17. Mirmohammadi S, Mehrparvar A, Bahaloo M, Davari M. Satisfaction of Shahid Sadoughi University of Medical Sciences' alumni about the quality of medical education. The Journal of Medical Education and Development. 2013;8(2):36-46.
18. Sargolzaie N, Sarhadi S, Moulaei N, Nikbakht J. Investigating the quality of clinical teaching in major wards of educational hospitals from the perspectives of faculty members and students. Future of Medical Education Journal. 2023;13(4):21–5. doi:10.22038/fmej.2023.72888.1544
19. Zamanzad B, Mazi M, Shirzad H. Rate of satisfaction and evaluation of medical students (interns and externs) from the quality of clinical education in the Shahre-kord university of medical sciences-2005. koomesh. 2007;9(1):13-20.
20. Chan WP, Wu TY, Hsieh MS, Chou TY, Wong CS, Fang JT, et al. Students' view upon graduation: a survey of medical education in Taiwan. BMC Med Educ. 2012;12:127. doi:10.1186/1472-6920-12-127
21. Sherer R, Dong H, Yu F, Fan J, Li J, Jiang I, et al. A survey of graduates' perceptions on a Chinese medical school's traditional and reform curricula. Perspect Med Educ. 2016;5(4):244–52. doi:10.1007/s40037-016-0282-4
22. Ramazanzade K, Ahmadi Darmian M, Farrokhfall K. An Evaluation of the Quality of Curriculum Implementation of Basic Medical Sciences from the View of Students at Birjand University of Medical Sciences. IJME. 2024;24(0):90-9. doi:10.48305/24.0.90
23. Shahidi F, Saqeb MM, Amini M, Avand A, Dowlatkhah HR. Qualitative Evaluation of General Practitioner Training Program as Viewed by Graduates from Shiraz, Fasa and Jahrom Medical Universities. J Adv Med Educ Prof. 2015;3(3):142–9.