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Competency-Based Medical Education: An Analysis of Implementation Challenges in Resource-Limited Settings

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ABSTRACT

Competency-Based Medical Education (CBME) employs a systematic outcome-based strategy to enhance the practical and clinical competencies of the graduates. CBME faces challenges particularly in low-resource areas due to differences in faculty and institutional support, as well as institutional and learning resource availability. **Objective:** To determine the conditions that affect CBME readiness among academic staff and to determine what may obstruct its effective execution. **Methods:** A cross-sectional study was completed over 6 years (September 2024 - January 2025) with a total of 110 faculty members.The participants were divided into 2 groups using a validated assessment tool aimed at targeted differences in CBME readiness.Subjects filled out questionnaires which were analyzed through chi-squar and independent t-tests. **Results:** The factors affecting readiness towards CBME age, faculty experience, and student-patient ratios were not significant. Access to digital resources, government funding, and institutional support were significantly associated with higher levels of readiness. Faculty who participated in the simulation-based training and the competency evaluation showed higher levels of readiness for CBME. The training of faculty members did not impact the level of readiness to any significant degree, which points to the necessity of continuous mentoring and practical work. **Conclusions:** For the adoption of CBME, institutional support, the presence of digital tools, and access to competency-based evaluations are essential.All three of these factors can enhance faculty's willingness to participate and subsequently improve the effectiveness of medical education. Investing in structured faculty training and technological resources will help a smoother transition to CBME.

INTRODUCTION

Medical faculties have undergone a change in recent times with the introduction of Competency Based Medical Education (CBME). This approach is more focused on ensuring that the medical graduates have the requisite skills, knowledge and other associated attributes [1, 2]. Compared to previous educational systems, CBME does not concentrate on learning within specific boundaries or theoretical knowledge. It rather focuses on the formation of skills and their application in practice and in outcomes-based education this method integrates the offer of a theory and practical components with a practice which is adequate for independent competent clinical work, patient management, and clinical decision making. Moving from conventional modalities of instruction to CBME systems offers certain benefits, but there are also difficulties faced in less developed countries which have inadequate funding, technology, and faculty development opportunities [3]. In order for any institution to be successful, it is necessary that they include crucial resources such as faculty readiness, supportive institutional infrastructure, and the supporting digital, as well as, physical learning resource materials for efficient

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implementation of CBME [4]. The teachers are responsible for medical education as they administer the program, assess the students, and manage the clinical classes. The success that can be achieved in the CBME implementation process will be determined by the measures of CBME 'willingness' and 'readiness' of the school or institution. There are many apprehensions such as opposition to change, insufficient programs for professional development, and lack or poor quality of the infrastructure to support it, which can impede the transition [5]. Research suggests that simulation laboratories, the training of faculty members, and the availability of clinical cases impact the implementation of CBME [6, 7]. Countries that have established faculty development training systems and provided faculty with modern instructional tools tend to make better transitions to CBME. Additionally, the presence of investment policies as well as funding medical education systems is critical for the successful implementation of CBME programs [8]. Despite its advantages, implementation of CBME in developing regions is still highly variable across medical schools as a result of differing institutional policies, funding, and faculty engagement.

This study aimed to assess the factors influencing CBME readiness among faculty members. The analysis of systematic barriers and enabling factors of CBME implementation pertain to the level of the faculty member's preparedness, the availability of guides and resources, and the institutional support. The results are useful in planning evidence-based interventions to improve the faculty engagement in CBME of medical education.

METHODS

A cross-sectional study was conducted at Rawal Institute of Health Sciences six months' duration from August 2024 to January 2025. The study aimed to evaluate CBME adoption and identify barriers and determinants influencing its implementation in a low-resource setting. A stratified random sampling method was used to ensure fair representation across faculty ranks and student levels. The sample size was determined using G*Power 3.1, with parameters: Effect size (w) = 0.3 (medium), Power (1 - β) = 0.80 (80%), Alpha (α) = 0.05, Minimum required sample = 88 and Final recruited sample = total of 110 participants. A post-hoc power analysis was conducted to evaluate the statistical power for detecting small differences in variables where no significant associations were found (age, faculty experience, and student-to-patient ratio). The results showed low statistical power (<10%), indicating that even with a larger sample size, these variables were unlikely to show significant differences due to their inherently small effect sizes (Cohen's d < 0.11). This suggests that the lack of statistical significance is due to minimal practical differences rather than an inadequate sample size. Ethical approval was granted by the Institutional Review Board (IRB) of Rawal Institute of Health Sciences ref no RIHS/IRB/26/2024. Written informed consent was obtained from all participants. Confidentiality was ensured by anonymizing responses and encrypting electronic records. Participants included faculty members and medical students actively involved in CBME-based teaching and learning. Inclusion Criteria were faculty teaching within CBME programs. Medical students who had prior exposure to CBME training before the study period, including those in programs integrating CBME principle. Participants provided informed consent. Exclusion Criteria were faculty or students not involved in CBME. Individuals on academic leave or with minimal CBME exposure. The study was guided by Rogers' Diffusion of Innovation (DOI) model, which explains how new educational models spread [8]. CBME implementation was examined through DOI's categories: Innovators (early adopters): Faculty already trained in CBME. Early majority: Faculty and students gradually adopting CBME. Laggards: Those with barriers to adoption (lack of resources). A CBME Readiness Assessment Scale was adapted from Harden's CBME framework and guidelines from the Royal College of Physicians and Surgeons of Canada (RCPSC) [9]. The scale evaluated: Exposure to competency-based assessments. Utilization of simulation labs. Access to diverse clinical case studies. Availability of digital learning resources. Faculty training in CBME. A median split method was used to classify participants into high and low CBME readiness groups. A structured questionnaire (25 items) was developed, covering: Demographic data (age, gender, faculty experience, education level). CBME-related factors (clinical case diversity, digital learning, simulation labs, assessment methods). Reliability (Cronbach's Alpha = 0.78) ensured internal consistency. Content Validity was verified by three senior medical educators. Construct Validity was confirmed via Principal Component Analysis (PCA). Data were analyzed using IBM SPSS Statistics version 26.0. Descriptive Statistics: Used for age, faculty experience, and student-to-patient ratio. Independent t-tests: Compared continuous variables (age, faculty experience) between high and low CBME readiness groups. Chi-Square Tests: Examined categorical associations (gender, education level, digital access, government funding, simulation labs, clinical case diversity, assessment methods). Chi-Square Tests: Examined categorical associations (gender, education level, digital access, government funding, simulation labs, clinical case diversity, assessment methods). The assumptions for the Chi-Square test were checked to ensure that at least 80% of expected cell counts were ≥5. For variables where any

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expected cell count was <5, Fisher's Exact Test was used as an alternative. This ensures robust statistical comparisons without violating test assumptions Effect Sizes (Cramer's V): Measured strength of associations for significant categorical variables. Potential confounding factors, including institutional support, digital access, and government funding, were considered during the study design. Since gender, educational background, and training level did not show significant associations with CBME readiness ($p > 0.05$ in univariate analysis), their influence on the final model was minimal. Multivariate analysis (logistic regression) was considered but not conducted due to the lack of significant relationships in univariate analysis. Future research with a larger sample may explore interaction effects and adjust for potential confounders using regression models. Statistical Significance: $p < 0.05$ was considered significant, with Bonferroni corrections for multiple comparisons.

RESULTS

The table shows that there were no significant differences in age, faculty experience, or student-to-patient ratios between individuals with high and low CBME readiness ($p > 0.05$ for all). A post-hoc power analysis confirmed that the study had low statistical power (<10%) for detecting small differences in these variables. The observed effect sizes (Cohen's d = 0.08 for age, d = -0.11 for faculty experience, and d = 0.00 for student-to-patient ratio) indicate that these demographic factors had minimal practical impact on CBME readiness. Thus, their non-significance was more likely due to small effect sizes rather than sample size limitation The mean age was nearly the same in both groups, with a slight difference of 0.28 years ($p = 0.664$), and the effect size (Cohen's d = 0.08) indicates a tiny practical difference. Similarly, faculty experience showed minimal variation between groups (d = -0.11, $p = 0.566$), and the student-to-patient ratio had no measurable effect (d = 0.00, $p = 1.000$).

Table 1: Comparison of Demographic Factors by CBME Readiness

Variables	High CBME Readiness (Mean ± SD)	Low CBME Readiness (Mean ± SD)	Mean Difference	p-Value	Cohen's d	Power
Age (Years)	33.26 ± 3.18	32.98 ± 3.47	0.28	0.664	0.08	0.07
Faculty Experience (Years)	11.94 ± 5.08	12.51 ± 5.32	-0.57	0.566	-0.11	0.09
Student-to-Patient Ratio	2.37 ± 0.36	2.37 ± 0.36	0.00	1.000	0.00	0.05

The table 2 shows that gender ($p = 0.339$), educational background ($p = 0.071$), and training level ($p = 0.353$) were not significantly associated with CBME readiness, indicating that these demographic factors did not play a major role in determining preparedness. However, internet access and government funding were highly significant predictors of CBME readiness ($p < 0.001$ for both). Internet and Digital Access had a moderate-to-strong association (Cramer's V = 0.510), with participants having reliable Internet access being 76.9% in the high CBME readiness group, compared to only 25.9% among those with limited access. Government Funding and Support showed a strong association (Cramer's V = 0.683), as 100% of participants with adequate financial support were in the high CBME readiness group, while 73.3% of those lacking funding were in the low readiness category.

Table 2: Distribution of Demographic and Resource Factors by CBME Readiness

Variables	High CBME Readiness (%)	Low CBME Readiness (%)	Chi-Square Value	p-Value	Effect Size (Cramer's V)
Gender					
Female	54.2%	45.8%	0.914	0.339	-
Male	45.8%	54.9%			
Educational Background					
Bachelor's	38.6%	61.4%	5.298	0.071	-
Master's	51.3%	48.7%			
PhD	66.7%	33.3%			
Training Level					
Continuing Education	64.7%	35.3%	2.080	0.353	-
Postgraduate	43.9%	56.1%			
Undergraduate	50.0%	50.0%			
Internet and Digital Access					
Limited	25.9%	74.1%	28.594	0.000	Moderate-Strong (0.510)
Available	76.9%	23.1%			

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Government Funding and Support					
Adequate	100.0%	0.0%	51.333	0.000	Strong (0.683)
Insufficient	26.7%	73.3%			

The table shows that faculty training in CBME (p = 0.223) and student satisfaction (p = 0.797) were not significantly associated with CBME readiness, indicating that these factors did not play a major role in determining preparedness. However, clinical case diversity, simulation lab usage, and assessment methods were found to be highly significant predictors of CBME readiness (p < 0.001 for all). Clinical Case Diversity had a strong association (Cramer's V = 0.694), where participants with moderate clinical exposure were 88.0% in the high CBME readiness group, compared to only 18.3% among those with limited exposure. Use of Simulation Labs had the strongest association (Cramer's V = 0.930), where all participants who rarely used simulation labs fell in the low CBME readiness category (100%), while 93.2% of those who frequently used simulations were in the high CBME readiness group. The strength of this association was quantified using Cramer's V, which was found to be 0.400, indicating a moderate effect size.

Table 3: Distribution of Educational and Training Factors by CBME Readiness

Variables	High CBME Readiness (%)	Low CBME Readiness (%)	Chi-Square Value	p-Value	Effect Size (Cramer's V)
Faculty Training in CBME					
No	38.2%	27.3%	1.486	0.223	Not Significant
Yes	61.8%	72.7%			
Student Satisfaction					
Dissatisfied	27.3%	23.6%	0.453	0.797	Not Significant
Neutral	25.5%	30.9%			
Satisfied	47.3%	45.5%			
Clinical Case Diversity					
Limited	18.3%	81.7%	52.947	0.000	Strong (0.694)
Moderate	88.0%	12.0%			
Use of Simulation Labs					
Frequent	93.2%	6.8%	95.085	0.000	Very Strong (0.930)
Rare	0.0%	100.0%			
Assessment Methods					
Competency-Based	70.4%	29.6%	17.606	0.000	Moderate (0.400)
Traditional	30.4%	69.6%			

DISCUSSION

This study highlights various determinants of faculty readiness to implement CBME at Rawal Institute of Health Sciences. While some factors significantly influenced CBME readiness, others had no measurable impact on faculty perceptions and adaptation to this educational model. The results emphasize critical priorities for successful CBME implementation, particularly in resource-limited settings. There were no significant associations between CBME readiness and age, faculty experience, and student-to-patient ratios. This suggests that having more years of experience in teaching or clinical practice does not necessarily translate into greater ability to implement CBME. These findings support previous research indicating that traditional experience does not dictate faculty adaptation to new educational frameworks [10-12]. Instead, institutional support, access to training resources, and familiarity with modern teaching methods may play a more crucial role. A key finding was the strong association between digital access and CBME readiness (Cramer's V = 0.510, p < 0.001). Faculty members with reliable internet access and digital learning resources were significantly more prepared for CBME compared to those with limited digital tools. This aligns with research emphasizing the role of technology in modern medical education, where CBME relies heavily on digital resources for assessment, feedback, and learning [13-15]. Institutions must invest in technology-driven learning environments to facilitate competency-based teaching. Government funding and institutional support also played a crucial role in CBME readiness (Cramer's V = 0.683, p < 0.001). Faculty members with strong institutional and financial support were significantly more prepared to implement CBME. Previous studies highlight that CBME requires structural and financial investments, including faculty training, simulation labs, and revised assessment strategies [16, 17]. Without adequate funding, even the most well-intentioned CBME reforms may struggle to be effective. These findings suggest that policymakers and institutional leaders must prioritize financial and administrative support to ensure CBME adoption. Interestingly, faculty training in CBME did not show a strong

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correlation with readiness levels ($p = 0.223$). While training is widely considered an essential part of transitioning to CBME, these results suggested that attending training sessions alone is insufficient. Some research indicates that faculty members often complete CBME training without fully integrating the concepts into their teaching practices [18, 19]. Effective faculty development requires structured, ongoing programs incorporating mentorship, peer collaboration, and hands-on experience, rather than relying solely on theoretical instruction. Student satisfaction did not show a significant association with faculty CBME readiness ($p = 0.797$). While CBME aims to enhance student-centered learning, faculty preparedness alone does not necessarily correlate with student satisfaction. This suggests that factors such as curriculum design, assessment methods, and institutional policies play a larger role in shaping student experiences. Similar findings have been reported where faculty members believed they were implementing CBME effectively, but students still expressed dissatisfaction with the learning process [20]. These results highlight the need for alignment between faculty training and student engagement strategies to optimize CBME implementation. A significant relationship was found between clinical case diversity and CBME readiness (Cramer's $V = 0.694$, $p < 0.001$). Faculty members with exposure to a variety of clinical cases felt significantly more prepared to implement CBME. This supports research indicating that competency-based learning requires exposure to diverse patient cases, as CBME emphasizes skill acquisition over passive knowledge transfer [21]. Institutions must ensure that faculty and students engage in broad clinical exposure to strengthen CBME implementation. Another key finding was that faculty members who actively used simulation labs were significantly more CBME-ready (Cramer's $V = 0.930$, $p < 0.001$) than those who did not. Simulation-based learning is a critical component of CBME, as it provides students with hands-on experiences in a controlled environment. This aligns with existing literature identifying simulation training as essential for medical education reform [22, 23]. Institutions that invest in well-equipped simulation centres are more likely to see greater faculty engagement and better learning outcomes for students. Assessment methods also played a crucial role in CBME readiness. Faculty members using competency-based assessment methods (workplace-based evaluations, OSCEs, continuous feedback) were significantly more prepared for CBME than those relying on traditional assessments. This reinforces the need for a shift toward formative, skill-based evaluation methods in CBME implementation. Research suggests that institutions adopting continuous evaluation and formative assessments experience greater success in implementing CBME principles [24, 25]. This study presents critical recommendations for institutions implementing CBME. Investment in digital infrastructure is essential to ensure faculty readiness, alongside internet access and simulation technology. Institutional and government support plays a major role in determining faculty preparedness. For long-term adaptation, CBME must be backed by sustained funding for training, curriculum design, and assessment innovations. While this study accounted for confounding variables, multivariate analysis (logistic regression) was not conducted due to the lack of significant associations in univariate analysis. Future research should explore interaction effects and adjust for potential confounders. Additionally, since this study was conducted in a single institution, the findings may not be fully generalizable. Expanding research to multiple institutions with diverse faculty and student populations will provide stronger external validity and a more comprehensive understanding of CBME implementation challenges.

CONCLUSIONS

This study demonstrated that CBME readiness is influenced more by institutional resources, technological support, and assessment methods than by faculty characteristics or years of experience. The research highlights the importance of investing in digital infrastructure, government funding, and simulation-based learning to enhance CBME adoption. By focusing on quality training, hands-on learning, and assessment reforms, medical education systems can successfully transition to CBME and improve the overall quality of healthcare training. Institutions implementing CBME must prioritize structured faculty development, competency-based assessments, and technological advancements to maximize CBME's benefits for both faculty and students.

Authors Contribution

Conceptualization: ZA
Methodology: HA SS, NJ, NG, KA
Formal analysis: NJ, ZA
Writing, review and editing: ZA, HA SS, NJ, NG, KA

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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REFERENCES

[1] Bhattacharya S. Competency-based medical education: An overview. Annals of Medical Science &

DOI: https://doi.org/10.54393/pjhs.v6i3.2857

Research.2023Sep;2(3):132-8.doi:10.4103/amsr.amsr_27_23.

[2] Zaga FR. Transformando la educación médica del siglo XXI: el rol de la educación médica basada en competencias: Transforming medical education in the 21st century: the role of competency-based medical education.Revista de la Facultad de Medicina Humana.2024Apr;24(1).doi:10.25176/RFMH.v24i1.5950.

[3] Penrabel RP, de Oliveira Bastos PR, Biberg-Salum TG. The perspectives and challenges of the competency-based curriculum in medical education: A literature review. Creative Education.2022Oct;13(10):3191-203. doi: 10.4236/ce.2022.1310203.

[4] Cheung WJ, Hall AK, Skutovich A, Brzezina S, Dalseg TR, Oswald A *et al*. Ready, set, go! Evaluating readiness to implement competency-based medical education. Medical Teacher.2022Aug;44(8):886-92.doi:10.1080/0142159X.2022.2041585.

[5] Schultz KW, Kolomitro K, Koppula S, Bethune CH. Competency-based faculty development: Applying transformations from lessons learned in competency-based medical education.Canadian Medical Education Journal.2023Nov;14(5):95-102.doi:10.36834/cmej.75768.

[6] Enyoojo SF, Ijah CE, Etukudo EM, Usman IM, Ezeonuogu CS, Adaramati T *et al.* Satisfaction and learning experience of students using online learning platforms for medical education.BioMed Central Medical Education.2024Nov;24(1):1398.doi:10.1186/s12909-024-06411-0.

[7] Aikat A. Navigating the transition: Implementing competency-based medical education in medical curriculum in India. Asian Journal of Medical Sciences. 2024 Jun; 15(6): 145-50. doi: 10.71152/ajms.v15i6.532.

[8] Rogers E. Diffusion of innovations, 5th edn Tampa. FL: Free Press [Google Scholar].2003 Aug.ISBN9780 203 887011.

[9] Frank JR, Snell LS, Cate OT, Holmboe ES, Carraccio C, Swing SR *et al.* Competency-based medical education: theory to practice. Medical Teacher.2010 Aug;32(8):638-45.doi: 10.3109/0142159X. 2010.501190.

[10] McCullough M. Competency Based Education in Low Resource Settings: Design and Implementation of a Novel Surgical Training Program (Master's thesis, University of Southern California).2018Mar;42(3):646-651. doi: 10.1007/s00268-017-4205-2.

[11] Sahadevan S, Kurian N, Mani AM, Kishor MR, Menon V. Implementing competency-based medical education curriculum in undergraduate psychiatric training in India: Opportunities and challenges.Asia-Pacific Psychiatry.2021Dec;13(4):e12491.doi:10.1111/appy.12491.

[12] Yi V, Duong K, Prom V, Thao T, Tran L, Vu MP *et al.* Enhancing Medical Education in Resource-Limited Settings: A Pilot Virtual Faculty Development Program in Cambodia. Available at SSRN 4997923.2024 Oct.

[13] Nagai M, Oikawa M, Komagata T, Basuana JD, Ulyabo GK, Minagawa Y *et al.* Clinical competency of nurses trained in competency-based versus objective-based education in the Democratic Republic of the Congo:a qualitative study. Human Resources for Health.2024 Jun; 22(1): 38. doi: 10.1186/s12960-024-00921-0.

[14] Sirili N, Mloka D, Mselle L, Kisenge R, Mbugi E, Russa D *et al.* Opportunities and Challenges for Implementation of Harmonized Competence-Based Curricula in Medicine and Nursing Programmes in Tanzania: Experiences of Biomedical Sciences' Stakeholders. Advances in Medical Education and Practice.2023Dec:487-98.doi:10.2147/AMEP.S381242.

[15] Shanmugam J, Ramanathan R, Kumar M, Gopalakrishna SM, Palanisamy KT, Narayanan S. Perspectives of teachers at medical colleges across India regarding the competency based medical education curriculum-A qualitative, manual, theoretical thematic content analysis. Indian Journal of Community Health.2023Mar;35(1): 32-7.doi:10.47203/IJCH.2023.v35i01.007.

[16] Nachinab GT and Armstrong SJ. Unveiling how clinical nursing education can be improved in Northern Ghana: The perspectives of key informants.SAGE Open Nursing.2022 May;8:23779608221097162.doi: 10.1177/23779608221097162.

[17] Matlhaba KL and Nkoane NL. Factors influencing clinical competence of new graduate nurses employed in selected public hospitals of North West Province: Operational Managers' perspectives. International Journal of Africa Nursing Sciences.2024 Jan; 20: 100683. doi: 10.1016/j.ijans.2024.100683.

[18] Caverzagie KJ, Nousiainen MT, Ferguson PC, Ten Cate O, Ross S, Harris KA *et al.* Overarching challenges to the implementation of competency-based medical education. Medical Teacher.2017Jun;39(6):588-93. doi: 10.1080/0142159X.2017.1315075.

[19] Gopalakrishnan S, Catherine AP, Kandasamy S, Ganesan H. Challenges and opportunities in the implementation of competency-based medical education-A cross-sectional survey among medical faculty in India.Journal of Education and Health Promotion.2022Jan;11(1):206.doi:10.4103/jehp.jehp_1130_21.

[20]Yassin A. Integration of simulation-based medical education: Student satisfaction and self-confidence at Faculty of Medicine, Jazan University, Saudi Arabia. Saudi Journal for Health Sciences.2024Sep;13(3):249-57. doi: 10.4103/sjhs.sjhs_113_24.

DOI: https://doi.org/10.54393/pjhs.v6i3.2857

[21] Hammad N, Ndlovu N, Carson LM, Ramogola-Masire D, Mallick I, Berry S *et al.* Competency-based workforce development and education in global oncology. Current Oncology.2023Feb;30(2):1760-75.doi:10.3390/curroncol30020136.
[22] Salifu DA, Heymans Y, Christmals CD. A simulation-based clinical nursing education framework for a low-resource setting: A multimethod study.InHealthcare 2022Aug;10(9):1639.doi:10.3390/healthcare10091639.
[23] Oo YM and Nataraja RM. The application of simulation-based medical education in low-and middle-income countries; the Myanmar experience. InSeminars in Pediatric Surgery.2020Apr;29(2):150910.doi:10.1016/j.sempedsurg.2020.150910.
[24] Mukurunge E. An assessment approach for competency-based nursing education in a low-income country (Doctoral dissertation, University of the Free State).2025Jan:82:104240.doi:10.1016/j.nepr.2024.104240.
[25] Shilkofski N, Crichlow A, Rice J, Cope L, Kyaw YM, Mon T *et al.* A standardized needs assessment tool to inform the curriculum development process for pediatric resuscitation simulation-based education in resource-limited settings.Frontiers in Pediatrics. 2018 Feb; 6: 37. doi: 10.3389/fped.2018.00037.