

<https://doi.org/10.48047/AFJBS.6.14.2024.8517-8521>



African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>



Research Paper

Open Access

Core Components Framework for Assessing the Implementation of Competency-Based Medical Education

Dr Khurram Naushad¹, Dr Asma Azam², Dr Uzma Siddique^{3*}, Dr Mushyyada Durrani⁴,
Dr Muhammad Shoaib⁵, Dr Sobia Haris⁶

¹Lecturer, Department of Medical Education, Khyber Girls Medical College (KGMC), Peshawar Pakistan

²Lecturer, Institute of Health Professions Education and Research, KMU, Peshawar Pakistan

³Lecturer, Department of Health Professions Education and Research (DHPER), Peshawar Medical College, PMC, Peshawar

⁴Assistant Professor, Department of Dental Education Peshawar Dental College, PDC, Peshawar Pakistan

⁵Assistant Professor, Department of Biochemistry, Gajju Khan Medical College, Swabi Pakistan

⁶Associate Professor Department of Medical Education, Nowshera Medical College, Nowshera, Pakistan

***Corresponding Author:** Dr Uzma Siddique; Email: uzmafaisal141@gmail.com

volume 6, Issue 14, 2024

Received: 15 June 2024

Accepted: 25 July 2024

Published: 15 Aug 2024

doi: [10.48047/AFJBS.6.14.2024.8517-8521](https://doi.org/10.48047/AFJBS.6.14.2024.8517-8521)

ABSTRACT

Background: Competency-Based Medical Education (CBME) has emerged as a transformative approach in medical training, focusing on outcomes and learner competencies rather than traditional time-based models. The effectiveness of CBME hinges on its implementation, necessitating a robust evaluation framework. This study aims to develop and validate a core components framework for evaluating the implementation of CBME at Khyber Medical University, Peshawar. **Methodology:** A descriptive study design was utilized, involving 100 participants including faculty and students at Khyber Medical University. Data collection involved structured surveys and interviews, and data analysis was performed using descriptive statistics and inferential tests, including p-value calculations to assess significance.

Results: The study revealed a high level of satisfaction with the CBME framework among faculty and students. Key components of successful implementation included clear competency definitions, effective assessment methods, and robust feedback mechanisms. Tables illustrate the distribution of responses and statistical significance.

Conclusion: The core components framework provides a comprehensive tool for evaluating CBME implementation. The findings underscore the importance of structured evaluations and continuous feedback to enhance medical education.

Keywords: Competency-Based Medical Education, Evaluation Framework, Medical Training, Implementation, Khyber Medical University.

Introduction

Competency-Based Medical Education (CBME) represents a significant shift from traditional time-based models to a framework focused on achieving specific competencies^{1,2}. This approach emphasizes the need for medical graduates to demonstrate their ability to perform essential tasks and make clinical decisions based on their skills and knowledge^{3,4}. The underlying philosophy of

CBME is that medical education should be tailored to the individual learner's pace and progress, ensuring that all graduates meet the required competencies before completing their training (Frank et al., 2024) ⁵.

In recent years, CBME has gained traction due to its potential to improve educational outcomes and better prepare students for real-world medical practice ^{6 7}. Unlike traditional methods, which often emphasize time spent in training rather than the acquisition of skills, CBME focuses on outcomes and ensures that learners are competent in various domains of medical practice. This shift aligns with global trends towards more personalized and performance-oriented education systems (sherbano et al., 2023) ⁸.

The successful implementation of CBME requires a robust evaluation framework to ensure that it meets its objectives effectively. Key components of such a framework include clear competency definitions, effective assessment methods, and continuous feedback mechanisms. Evaluating these components is crucial for identifying strengths and areas for improvement in the CBME program, which can lead to enhanced educational experiences and outcomes for students (Cantillon & Jones, 2022) ^{9 10}.

Despite the promising benefits of CBME, its implementation presents several challenges. These include the need for faculty development, the integration of new assessment tools, and the alignment of educational objectives with competency requirements. Addressing these challenges requires a comprehensive understanding of the core components that contribute to successful CBME implementation and a structured approach to evaluation (ten Cate, 2023) ¹⁰.

This study aims to develop and validate a core components framework for evaluating the implementation of CBME at Khyber Medical University, Peshawar. By focusing on key elements of the CBME program, this framework seeks to provide actionable insights and recommendations for enhancing the effectiveness of medical education at the institution.

Methodology

This descriptive study was conducted at Khyber Medical University, Peshawar. The study involved 100 participants, including both faculty members and medical students engaged with the CBME program.

The sample size was determined using standard statistical methods for estimating proportions in a finite population. A confidence level of 95% and a margin of error of 5% were used to ensure the sample was representative of the population.

Participants included in the study were faculty members and students actively involved in the CBME program. Exclusion criteria were applied to those not directly engaged with the CBME curriculum or those unable to provide informed consent.

Data were collected through a combination of structured surveys and semi-structured interviews. Surveys included questions designed to assess various aspects of CBME implementation, such as competency definitions, assessment methods, and feedback processes. Interviews provided qualitative insights into participants' experiences and perceptions.

Data were analyzed using descriptive statistics to summarize participant responses. Inferential statistical tests, including chi-square tests and t-tests, were performed to determine the significance of the findings. p-values were calculated to assess the statistical significance of the results.

Results

The evaluation of the Competency-Based Medical Education (CBME) implementation at Khyber Medical University yielded insights into several critical aspects, including competency definitions,

assessment methods, and feedback mechanisms. The findings highlight areas of strength as well as opportunities for improvement in the CBME framework.

Participants expressed strong agreement with the clarity and relevance of competency definitions used in the CBME program. Specifically, 60% of respondents strongly agreed that the competency definitions were clear and well-articulated, while 25% agreed with this assessment. Only 3% disagreed, and 2% strongly disagreed. The p-value of 0.01 indicates a statistically significant positive response regarding the clarity of competency definitions. This result suggests that clear competency definitions are a key strength of the CBME implementation.

Table 1: Distribution of Responses on CBME Competency Definitions

Competency Component	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	p-value
Clear Definitions	60%	25%	10%	3%	2%	0.01
Relevance to Practice	55%	30%	10%	4%	1%	0.03

The high level of agreement on the relevance of competency definitions (p-value of 0.03) further underscores the effectiveness of clearly articulated competencies in aligning educational objectives with practical medical practice.

The effectiveness of assessment methods used in the CBME program was another focus of the study. A significant majority found formative assessments to be effective (70%), with 20% finding them somewhat effective, and 10% considering them ineffective. Summative assessments were deemed effective by 65% of participants, while 25% viewed them as somewhat effective. The p-values for formative and summative assessments were 0.02 and 0.05, respectively, indicating that these methods are statistically significant in their effectiveness.

Table 2: Effectiveness of Assessment Methods

Assessment Method	Effective	Somewhat Effective	Ineffective	p-value
Formative Assessment	70%	20%	10%	0.02
Summative Assessment	65%	25%	10%	0.05

These results suggest that both formative and summative assessments are valued components of the CBME program, contributing positively to the evaluation of student competencies.

Feedback mechanisms were also evaluated, with 75% of participants expressing satisfaction with the frequency of feedback and 70% with the quality of feedback. These findings are supported by p-values of 0.01 and 0.02, respectively, indicating a statistically significant positive reception of feedback mechanisms.

Table 3: Feedback Mechanisms Satisfaction

Feedback Mechanism	Satisfied	Neutral	Unsatisfied	p-value
Frequency of Feedback	75%	15%	10%	0.01
Quality of Feedback	70%	20%	10%	0.02

The high satisfaction levels with feedback mechanisms highlight their importance in supporting learner development and guiding improvements in the CBME program.

Overall satisfaction with the CBME implementation was assessed, with 80% of faculty and 75% of students reporting high levels of satisfaction. These findings are statistically significant, with p-values of 0.01 and 0.03 for faculty and students, respectively.

Table 4: Overall Satisfaction with CBME Implementation

Satisfaction Level	High	Moderate	Low	p-value
Faculty Satisfaction	80%	15%	5%	0.01

Student Satisfaction	75%	20%	5%	0.03
----------------------	-----	-----	----	------

The positive feedback from both faculty and students indicates a successful implementation of CBME, though there is room for continuous improvement based on the feedback received.

The analysis of the data reveals that the CBME implementation at Khyber Medical University is generally well-received. The significant positive responses regarding the clarity and relevance of competency definitions suggest that these components are effectively communicated and aligned with practical medical needs. The effectiveness of assessment methods, both formative and summative, is supported by high satisfaction rates, indicating that these tools are successfully measuring the competencies of medical students.

Feedback mechanisms, which play a crucial role in guiding student progress and program improvements, are also positively evaluated. The high levels of satisfaction with feedback frequency and quality suggest that these mechanisms are well-integrated into the CBME program and contribute to its overall effectiveness.

Overall, the findings from the study highlight the strengths of the CBME program at Khyber Medical University and provide valuable insights into areas where further enhancements can be made. The statistically significant results underscore the effectiveness of the CBME components and their positive impact on medical education.

Discussion

The results of this study reveal that the participants generally view the implementation of CBME at Khyber Medical University positively. Faculty and students reported high levels of satisfaction with various aspects of the CBME program, including competency definitions, assessment methods, and feedback mechanisms. This positive feedback suggests that the CBME framework is well-received and effectively addresses the educational needs of the participants (Frank et al., 2022; Holmboe et al., 2023) ^{5 8 11}.

The statistical significance of the findings, as indicated by the p-values, underscores the effectiveness of the implemented CBME components. Clear definitions of competencies and effective assessment methods were particularly highlighted as strengths. This aligns with recent research that emphasizes the importance of well-defined competencies and reliable assessment tools in the success of CBME programs (Cantillon & Jones, 2022; ten Cate, 2023) ^{10 12}.

The study also identified areas for improvement, particularly in enhancing feedback mechanisms and ensuring their alignment with educational objectives. Continuous feedback is crucial for supporting learner development and refining the CBME program. Recent literature supports the need for regular feedback and ongoing evaluation to address implementation challenges and enhance educational outcomes ^{13 14}.

Overall, the findings contribute to the growing body of research on CBME by providing a practical framework for evaluating its implementation ¹⁵. This framework can serve as a model for other institutions looking to adopt or refine CBME practices, ensuring that they effectively meet educational goals and standards (Frank et al., 2022) ^{5 16}.

Conclusion The core components framework developed in this study offers a comprehensive tool for evaluating the implementation of CBME. By focusing on essential elements such as competency definitions, assessment methods, and feedback mechanisms, the framework provides valuable insights into the effectiveness of CBME practices at Khyber Medical University. The positive feedback from participants highlights the success of the current implementation and points to areas where further improvements can enhance the overall educational experience.

References

1. Van Melle E, Frank JR, Holmboe ES, et al. A core components framework for evaluating implementation of competency-based medical education programs. *Academic Medicine* 2019;94(7):1002-09.
2. Chaney KP, Hodgson JL. Using the five core components of competency-based medical education to support implementation of CBVE. *Frontiers in Veterinary Science* 2021;8:689356.
3. Soundariya K, Kalaiselvan G, Rajalakshmi M, et al. Implementation and evaluation of competency-based medical education in phase I of undergraduate medical curriculum. *Journal of Advances in Medical Education & Professionalism* 2022;10(4):228.
4. Danilovich N, Kitto S, Price D, et al. Implementing competency-based medical education in family medicine: a narrative review of current trends in assessment. *Family Medicine* 2021;53(1):9-22.
5. Frank JR, Karpinski J, Sherbino J, et al. Competence By Design: a transformational national model of time-variable competency-based postgraduate medical education. *Perspectives on Medical Education* 2024;13(1):201.
6. Richardson D, Kinnear B, Hauer KE, et al. Growth mindset in competency-based medical education. *Medical Teacher* 2021;43(7):751-57.
7. Ma TP. Considerations for implementation of a competency-based education program for preclerkship courses. *Fundamentals and Frontiers of Medical Education and Decision-Making: Educational Theory and Psychological Practice* 2024:37.
8. Sherbino J, Regehr G, Dore K, et al. Tensions in describing competency-based medical education: a study of Canadian key opinion leaders. *Advances in Health Sciences Education* 2021;26(4):1277-89.
9. ALKHIYAMI DIW. PERCEPTIONS OF PHARMACY STUDENTS AND CLINICAL PRECEPTORS ON FEEDBACK DURING EXPERIENTIAL LEARNING. 2024
10. Ten Cate O, Khursigara-Slaterry N, Cruess RL, et al. Medical competence as a multilayered construct. *Medical Education* 2024;58(1):93-104.
11. de Heer MH, Driessen EW, Teunissen PW, et al. Lessons learned spanning 17 years of experience with three consecutive nationwide competency based medical education training plans. *Frontiers in medicine* 2024;11:1339857.
12. Penrabel RPM, de Oliveira Bastos PRH, Biberg-Salum TG. The Perspectives and Challenges of the Competency-Based Curriculum in Medical Education: A Literature Review. *Creative Education* 2022;13(10):3191-203.
13. Hamed R, Banks TM, Mahoney D, et al. A Call to Shift to Competency-Based Education. *The American Journal of Occupational Therapy* 2023;77(6):7706347010.
14. Zetkovic M, Moriarty JP, Amin A, et al. Exploring Competency-Based Medical Education Through the Lens of the UME–GME Transition: A Qualitative Study. *Academic Medicine* 2024;99(1):83-90.
15. Yilmaz Y, Chan M-K, Richardson D, et al. Defining new roles and competencies for administrative staff and faculty in the age of competency-based medical education. *Medical Teacher* 2023;45(4):395-403.
16. Ai Li E, Wilson CA, Davidson J, et al. Exploring perceptions of competency-based medical education in undergraduate medical students and faculty: A program evaluation. *Advances in Medical Education and Practice* 2023:381-89.