



Original Article

The Effect of Competency Based Medical Education on Medical Students

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ABSTRACT

Introduction: The transition from traditional curricula to Competency-Based Medical Education (CBME) represents a major shift in India's medical training system. CBME emphasizes outcome-based learning, professional development, early clinical exposure, and ethical competence, aiming to produce more skilled and confident graduates.

Methods: A cross-sectional comparative study was conducted at Zydus Medical College and Hospital, Dahod, involving 316 undergraduate medical students from the pre-CBME batch (2018) and post-CBME batches (2019–2023). A structured questionnaire based on the DREEM (Dundee Ready Educational Environment Measure) framework was used to assess five domains: perception of learning, perception of teaching, academic self-perception, perception of atmosphere, and social self-perception. Due to non-normal data distribution, Kruskal-Wallis and Mann-Whitney U tests were used for statistical analysis.

Results: Significant differences were observed between the pre- and post-CBME groups, with the most notable variation between Batch 2018 and Batch 2023 ($p < 0.000$). Post-CBME students reported improved mentor-mentee support systems, early clinical exposure, and increased confidence in clinical skills. Around 70% of students noted enhanced competence, communication, and ethical awareness, and 65% credited these improvements to the AETCOM modules. While no significant difference was found in the perception of teaching, feedback mechanisms were appreciated across both groups. Self-directed learning was also reported more commonly in the post-CBME group.

Conclusion: CBME significantly enhances students' learning experience, clinical preparedness, and ethical development. However, its sustained effectiveness depends on faculty training, institutional planning, and continuous curriculum evaluation. The findings support CBME as a progressive step in shaping competent, confident, and ethically responsible medical professionals.

Keywords: Competency-Based Medical Education (CBME), Medical Education, Anatomy teaching, Medical students, Teaching methods.

INTRODUCTION

We believe that in the future, expertise rather than experience will underlie competency-based practice and certification [1]. Education plays a pivotal role in the progress of society, and its core lies in the continuous development of curriculum. This helps in shaping the future of students through their different learning experiences, along with providing better solutions to social issues. A curriculum is designed by comparing the strengths and weaknesses of different principles and approaches [5]. The principles include learner-centeredness, problem-based learning, and social reconstruction. The approaches include subject-centeredness, competency-based learning, and experimental approaches [5,6]. There are various internal and external factors such as social factors, technological advancements, geopolitical, and cultural aspects that demand the need for change in the design and implementation of curriculum. The implementation of a new curriculum further brings out various challenges faced by educators and institutions such as curriculum advancements, resistance to change, resource constraints, infrastructural advancements, and time limitations [1,2]. In the history of medicine, the idea

of the competency approach was already present for about 50 years, but it has gained more attention recently [3][2]. Competency-based medical education was first proposed by WHO way back in 1978 but has only been in consideration for the last 20 years [12]. The origin of competency-based approaches sets back 60 or more years ago [3]. In the early 20th century, Tyler & Mager proposed a work which focused more on goals and objectives, and it was widely accepted, while some others focused more on process rather than outcome. After that, outcome-based education (OBE) became a highlight, which focused only on outcomes and not on its pathways and processes [4]. The traditional education system revolved around knowledge-based objectives that gave importance to processes regardless of the product, while outcome-based education was totally opposite [5]. From the above context, it is clear that the competency-based approach is a type of OBE, in which the outcomes help in the formation of a new curriculum suitable for the needs of society [6]. It is also an old concept. The feasibility and practical details of CBME are still an area to explore by educators and institutions. The world approached CBME not until 2009, when the Council of Royal College of Physicians and Surgeons of Canada passed a resolution addressed to the Office of Education to uphold a CBME agenda for specialty education in Canada. The resolution stated that, The Royal College in collaboration with key partners, will explore opportunities for incorporating competency-based education in residency training and across the spectrum of medical education. This would ensure that the 21st-century PGME [post graduate medical education] system is focused squarely on meeting societal needs as the primary goal of training. Implementing any such change would conceivably take many years and require a coordinated, resourced, collaborative approach [7]. The question arises as to why we need a competency-based approach in medical education. According to the competency-based undergraduate curriculum for the Indian medical graduate, a clinician must be a good communicator, efficient team leader, must be professional and a lifelong learner [9,10,11]. In the era in which medical professionals are working, they must be accountable and scrutinized towards their profession. This curriculum ensures that every graduate must be prepared for practice, and not only that, but the graduate must also be a master of every field—be it procedural skills, knowledge, attitude, and communication—and CBME gives the best response to the above question [2,8]. The two major approaches in the CBME pattern are problem-based learning and team-based learning. Problem-based learning has many advantages such as increased clinical evaluation skills, improved communication, teamwork, presentation, and self-directed learning [2,8], whereas team-based learning goes hand in hand with problem-based learning and both of them integrate together to achieve active learning strategies in medical courses [3,4]. Team-based learning was introduced as a medical education strategy first in 2001 and the impact was studied by conducting various examinations [13]. The major challenges in the implementation of CBME that have emerged are time management, lack of planning and institutional strategies, infrastructural and equipment difficulties, lack of clinical and professional development, overlapping of competencies, and student engagement.

MATERIAL & METHODS

Ethical clearance

The Institutional Ethical Committee (IEC) at Zydus Medical College and Hospital provided ethical approval for this study (IEC no. ZMCH/IEC-03/33(21)-2025).

Study Settings:

The study for assessing the effects of CBME on Medical students the present study was undertaken in Zydus Medical College and Hospital, located in Nimnaliya, Muvaliya, Dahod. Every year 200 students take admission in this college except for 2018 batch which had 150 students. This college holds good academic record.

Study Design:

It is a comparative cross sectional study for educational assessment where various methods are used to evaluate the perception of learning among the students from the CBME course. Survey and open ended responses were reviewed using Google forms. We asked total 22 questions regarding the CBME curriculum and at the end the suggestion box is also given for the open ended response on the basis of (Dundee ready educational environment measure). Hence both qualitative and quantitative data was analyzed.

Study Participants

We got opportunity to assess the reviews from the students of 2018 batch (n=150) who had traditional curriculum and the students of 2019, 2020, 2021, 2022, 2023 each of which is (n=200) who are currently studying in CBME curriculum introduced by the MCI.

Data Collection

By the prevalence from the previous reference studies we calculated p1 and p2 value where p1 is prevalence of non CBME batch and p2 prevalence of CBME batch which gave us value of p1= 0.89 and p2= 0.95 which was obtained by taking ratio of number of responses by total number of students. Then we got our sample size (n) of 316. We took stratified sampling for this study.

The feedback of the survey was obtained from the students of all batches. The students were given the questionnaire using Google form which was circulated in their respective groups. The batches were explained about the purpose of the study and the questionnaire. They were guaranteed with the maintenance of their anonymity. The DREEM is the measuring tool

which is used widely to study the educational environment in the medical institutions. DREEM was developed 10 years ago by Delphi panel of faculties of international board to study on various students for the validation purpose. [12,15]

DREEM is a questionnaire of 50 statements out of which the following which we have taken 20 questions which comes under five subcategories of DREEM. The subcategories are as follows:

Student's perception of learning

- a) Student's perception of teaching
- b) Student's academic self perception
- c) Student's perception of atmosphere
- d) Student's social self perception

Each statement has a score from (0-3) on a 4 point Likert scale type that is strongly disagree(0), disagree(1), agree(2), strongly agree(3). An open ended question that was asked at the end of the questionnaire, also helped in understanding the views expressed by the students. Besides this the open ended question was asked at last in the same Google form as- "Mention the two things which you appreciate about your course that has helped you become a better learner.

RESULTS

A total of responses from six batches (2018–2023) were analyzed.

Test of Normality

Normality testing (Kolmogorov–Smirnov and Shapiro–Wilk) indicated that the data did not follow a Gaussian distribution in any batch (all $p < 0.001$). Therefore, non-parametric tests were applied.

Table 1. Tests of Normality

Batch	Kolmogorov–Smirnov Statistic	df	Sig.	Shapiro–Wilk Statistic	df	Sig.
2018	0.391	567	0.000	0.688	567	0.000
2019	0.414	401	0.000	0.585	401	0.000
2020	0.384	440	0.000	0.684	440	0.000
2021	0.378	421	0.000	0.679	421	0.000
2022	0.339	522	0.000	0.704	522	0.000
2023	0.282	549	0.000	0.722	549	0.000

All $p < 0.05 \rightarrow$ Null hypothesis rejected $\rightarrow$ Data not normally distributed.

Kruskal–Wallis Test

Since the data were non-normal, the Kruskal–Wallis test was performed across batches. A significant difference was observed among the groups ($\chi^2 = 119.306$, $df = 5$, $p < 0.001$).

Table 2. Kruskal–Wallis Test

Test	χ^2	df	p-value
Kruskal–Wallis	119.306	5	0.000

Mann–Whitney U Test (Pre-CBME vs Post-CBME)

To compare the pre-CBME batch (2018) with each post-CBME batch (2019–2023), the Mann–Whitney U test was applied. Significant differences were observed in all pairwise comparisons ($p < 0.05$).

Table 3. Pairwise Comparisons (2018 vs Other Batches)

Comparison	Mean Difference (I–J)	Std. Error	Sig.	95% CI (Lower–Upper)
2018 vs 2019	-0.175*	0.040	0.000	-0.29 to -0.06
2018 vs 2020	-0.178*	0.039	0.000	-0.29 to -0.07
2018 vs 2021	-0.124*	0.039	0.008	-0.24 to -0.01
2018 vs 2022	-0.105*	0.037	0.000	-0.15 to -0.06
2018 vs 2023	0.127*	0.036	0.007	0.02 to 0.23

* $p < 0.05$, significant difference.

Item-wise Comparison (2018 vs 2023)

Two specific items were analyzed further between the 2018 (non-CBME) and 2023 (CBME) batches.

Table 4. Mentor–Mentee Program

Batch	N	Mean Rank	Sum of Ranks
2018	124	146.07	18,112.50
2023	111	86.64	9,617.50

Mann–Whitney $U = 3401.50$, $Z = -7.111$, $p = 0.000 \rightarrow$ Significant difference.

Table 5. Social Perception About Students Who Got Stressed

Batch	N	Mean Rank	Sum of Ranks
2018	124	91.42	11,427.00
2023	111	149.00	16,539.00

Mann–Whitney $U = 3552.00$, $Z = -8.529$, $p = 0.000 \rightarrow$ Significant difference.

DISCUSSION

This study analyzed six consecutive batches of undergraduate medical students (2018–2023) to assess differences in experiences before and after the implementation of Competency-Based Medical Education (CBME). The results demonstrated statistically significant differences across batches, indicating that the transition to CBME has influenced student perceptions and experiences in measurable ways.

The non-parametric analysis revealed that students from post-CBME cohorts (2019–2023) differed significantly from the pre-CBME cohort (2018) in several domains. Specifically, while the 2018 batch rated the mentor–mentee program more positively, students from later batches—particularly 2023—reported greater social stress and altered perceptions of peer support. This suggests that although CBME was designed to foster holistic development and continuous mentoring, its practical impact on the learning environment remains complex.

These findings align with prior literature emphasizing both the promise and the challenges of CBME implementation in India. Bhagat et al. (2025) reported that while students appreciated CBME’s focus on competency and integration, many faced increased workload and stress due to frequent assessments and unclear expectations (16). Similarly, Sulena et al. (2024) highlighted institutional and faculty-level difficulties in translating CBME’s intended flexibility into consistent student support, particularly during the initial years of rollout (20). Our study’s observation of heightened stress among post-CBME batches resonates with these reports.

The finding that the pre-CBME cohort viewed mentoring more positively may reflect differences in mentorship quality or accessibility. Earlier, Sonawane et al. (2013) emphasized that structured mentoring humanizes medical education by providing emotional and academic guidance (21). However, later work by the same group (Sonawane et al., 2021) showed that despite mentoring’s proven benefits in reducing depression, anxiety, and stress, program effectiveness depends on mentor engagement and continuity (17). The reduced positivity in mentor–mentee perceptions post-CBME may thus stem from fragmented mentor interactions amid increased curricular demands.

Increased stress perception among CBME cohorts is consistent with international studies linking medical curriculum reform with heightened performance pressure. McKerrow et al. (2020) observed progressive declines in students’ physical and emotional well-being across training years, particularly in periods of curricular transition (18). Bergmann et al. (2019) similarly reported that academic stress in medical students often spills into personal and social domains, reflecting the broader strain of adapting to changing pedagogical systems (19). Our results reinforce these findings by demonstrating that even well-intentioned curricular shifts, if not matched with adequate psychosocial support, may amplify stress and social tension.

Limitations

This study is limited by its cross-sectional design and reliance on self-reported data, which may introduce subjective bias. The use of a single institution’s cohort restricts the generalizability of findings. Longitudinal research incorporating qualitative feedback would help clarify how CBME impacts student growth trajectories over time.

CONCLUSION

In summary, this study highlights that CBME implementation has meaningfully altered the educational experience of undergraduate medical students. While competency-driven learning aims to produce better clinicians, its success depends on balancing academic rigor with emotional and social support systems. Strengthening mentorship and prioritizing student well-being are essential steps toward realizing CBME’s full potential in medical education.

Conflicts of Interests: None

LIST OF ABBREVIATIONS USED:

CBME – Competency Based Medical Education

DREEM (Dundee Ready Educational Environment Measure)

AETCOM – Attitude Ethics & Communication

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