Original Article

Pedagogical shift or status quo? Medical trainee evaluation of competency-based medical education (CBME) in pharmacology at a tertiary care teaching institution in West Bengal

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Abstract

Background: Competency-based medical education (CBME) in India aims to align undergraduate medical training with observable competencies, clinical application, and professional behaviours. Pharmacology is central to rational prescribing, medication safety, and practical therapeutic skills. This study assessed students' perceptions of CBME-oriented pharmacology teaching and identified perceived implementation challenges to examine whether the approach represented a pedagogical shift or retained elements of the status quo. **Material and Methods:** A cross-sectional study was conducted among Phase II (second-year) MBBS students at a tertiary care teaching institution in West Bengal. Of 100 students in the cohort, 87 were present and completed a semi-structured questionnaire. Five-point Likert-scale items assessed teaching-learning methods, applied pharmacology competencies, assessment, and implementation challenges. **Results:** Small-group discussions were considered useful by 68/87 students (78.2%), while 64/87 (73.6%) endorsed self-directed learning. Prescription-writing exercises were considered useful for future practice by 75/87 (86.2%), and 72/87 (82.8%) viewed formative assessment favourably. However, 57/87 (65.5%) reported that reduced teaching time could limit adequate coverage, and 49/87 (56.3%) considered logbook documentation and related workload burdensome. Overall, 66/87 students (75.9%) were classified as having a positive perception according to the study's scoring criteria. **Conclusion:** Students generally valued clinically oriented and applied pharmacology activities, particularly prescription writing, dose calculation, and practical demonstrations. Continued curriculum evaluation should combine student feedback with direct assessment of prescribing and other clinical competencies.

Keywords: Competency-based medical education, undergraduate medical education, pharmacology, student perceptions, curriculum implementation.

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Introduction

Medical education has increasingly shifted from time- and subject-based instruction towards approaches that define learning in terms of competencies and expected performance. Competency-based medical education (CBME) emphasises learning outcomes, learner-centred activities, integration of knowledge with skills and attitudes, and assessment that supports progressive development rather than relying exclusively on end-point examinations.[1,2] In India, the National Medical Commission's (NMC) competency-based undergraduate curriculum provides a structured framework for competencies, early clinical exposure, integration, skills training, and attitude, ethics and communication (AETCOM).[3]

Pharmacology is central to the safe and rational use of medicines. Medical graduates need to interpret drug information, select appropriate therapy, calculate doses, write complete prescriptions, counsel patients, recognise adverse drug reactions, and apply medication-safety principles.[4,5] A curriculum combining lectures with small-group discussions, case-based learning, self-directed learning, prescription exercises, pharmacovigilance, and practical demonstrations can help learners connect foundational mechanisms with clinical decisions.[6] Reviews and empirical studies have described the potential of CBME-oriented pharmacology teaching while identifying continuing concerns about curricular time, teaching resources, and adequate practical exposure.[7]

Student feedback helps identify learning activities perceived as meaningful and aspects requiring refinement. Nevertheless,

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perceptions alone do not establish competence or improved patient outcomes.[8,9] Studies of Indian medical students have reported varied views on integrated teaching, self-directed learning, logbooks, and assessment, while recent research has highlighted implementation challenges related to reduced teaching hours and faculty capacity.[10,11] Institution-specific feedback is therefore important for translating broad curricular goals into actionable improvements in applied pharmacology teaching.[12] This study assessed students' perceptions of CBME-oriented pharmacology teaching and the implementation challenges they reported, with a view to examining whether the approach represented a pedagogical shift or retained elements of the status quo.

Materials and Methods

Study design and setting: This cross-sectional, questionnaire-based study was conducted at a tertiary care teaching institution in West Bengal, from July to December 2025. The institution is a tertiary care teaching hospital with an annual MBBS intake of 100 students. Data were collected from Phase II MBBS students who were present and participated during the survey period.

Study population and eligibility: The study population comprised Phase II (second-year) MBBS students receiving pharmacology teaching under the CBME curriculum. The cohort included 100 students, of whom 87 were present and completed the questionnaire. Responses were collected from participating students without recording personally identifying information.

Questionnaire and study tool: The semi-structured questionnaire covered four domains. The first recorded basic characteristics, including age group and gender, using non-identifying categories. The second assessed teaching-learning methods, including lectures supported by slides and board work, small-group discussions, self-directed learning, tutorials, and case-based learning. The third addressed applied pharmacology competencies, including prescription writing, personal-drug selection, dose calculations, drug-information appraisal, adverse drug reaction reporting, dosage forms, routes of administration, and patient counselling. The fourth covered assessment and implementation, including formative assessment, multiple-choice questions, objective structured practical examination (OSPE), logbooks, perceived adequacy of teaching time, and suggestions for improvement.

Closed-ended items used a five-point Likert scale: strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree. An optional open-text item invited students to provide recommendations. Responses were collected and analysed in accordance with the questionnaire domains.

Outcome variables and operational definitions: The primary outcome was the proportion of students classified as having a positive overall perception of CBME-oriented pharmacology teaching. Positively worded Likert items were scored from 1 (strongly disagree) to 5 (strongly agree), and negatively worded items were reverse-scored. The total score was expressed as a percentage of the maximum possible score; scores greater than 60% were classified as positive, scores from 40% to 60% as neutral, and scores below 40% as negative. Secondary outcomes included the proportions agreeing or strongly agreeing with individual teaching and competency items, perceived adequacy of teaching time, views on assessment, and suggestions for improvement.

Sample size and sampling: The Phase II MBBS cohort comprised 100 students. A total of 87 students were present and completed the questionnaire; therefore, the analysis was based on these 87 responses.

Data collection procedure: A self-administered questionnaire was completed once following a scheduled large-group teaching activity and the relevant pharmacology teaching activities. Students were informed about the purpose of the study and invited to participate. Written informed consent was obtained, and students were assured that their responses would remain anonymous. Where feasible, data collection was kept separate from staff responsible for grading to minimise perceived coercion.

Data analysis: Data were analysed using IBM SPSS Statistics, version 30. Categorical variables were summarised as frequencies and percentages. Overall perception was dichotomised as positive versus neutral/negative and compared by gender using Pearson's chi-square test or Fisher's exact test, as appropriate. The proportion with positive perception was reported with a 95% Wilson confidence interval (CI). An exact binomial test compared the observed proportion with a 50% reference value. All tests were two-sided, and $P < 0.05$ was considered statistically significant.

Results

Among the 87 participants, 48 (55.2%) were aged 20–21 years, while 39 (44.8%) were aged 22 years or older. Females constituted 45 (51.7%) participants, compared with 42 (48.3%) males. All 87 participants completed the questionnaire. [Table 1]

Table 1: Characteristics of the participants (n = 87)

Characteristic	Category	n (%)
Age	20–21 years	48 (55.2)
	22 years or older	39 (44.8)
Gender	Female	45 (51.7)
	Male	42 (48.3)
Survey participation	Present and represented in the study	87 (100.0)

Student endorsement was highest for demonstrations of dosage forms and routes of administration (87.4%), followed by prescription-writing exercises (86.2%) and dose-calculation exercises (83.9%). Case-based learning and patient counselling exercises were endorsed by 81.6% and 82.8% of participants, respectively. Self-directed learning received the lowest endorsement (73.6%), followed by the appropriateness of OSPE (77.0%). Overall, the findings

indicated favourable student perceptions of clinically oriented pharmacology teaching methods and applied competencies. [Table 2]

Table 2: Student endorsement of teaching-learning methods and applied competencies

Item	Agree/strongly agree, n (%)
Small-group discussions support understanding	68 (78.2)
Self-directed learning supports independent learning	64 (73.6)
Case-based learning improves application of knowledge	71 (81.6)
Prescription-writing exercises are useful for future practice	75 (86.2)
Personal-drug selection promotes rational prescribing	70 (80.5)
Dose-calculation exercises are important	73 (83.9)
Adverse drug reaction reporting should be taught practically	69 (79.3)
Demonstrations of dosage forms and routes are useful	76 (87.4)
Patient counselling exercises are relevant	72 (82.8)
Formative assessment supports learning	72 (82.8)
OSPE is an appropriate practical assessment method	67 (77.0)

Overall perception was positive among 66 (75.9%) participants, while 18 (20.7%) reported neutral perceptions and 3 (3.4%) reported negative perceptions. The most commonly reported implementation challenge was the need for more clinical examples and prescription practice (72.4%), followed by the need for additional feedback after formative assessments (66.7%) and concerns about reduced teaching time (65.5%). More than half (56.3%) also perceived logbooks and documentation as an additional workload. [Table 3]

Table 3: Overall perception and perceived implementation challenges

Measure	n (%)
Positive overall perception (>60% of maximum score)	66 (75.9)
Neutral overall perception (40–60% of maximum score)	18 (20.7)
Negative overall perception (<40% of maximum score)	3 (3.4)
Reduced teaching time may limit adequate coverage	57 (65.5)
Logbooks/documentation may add workload	49 (56.3)
More clinical examples and prescription practice are needed	63 (72.4)
More feedback after formative assessments is needed	58 (66.7)

Overall, 66 of 87 students were classified as having a positive perception (75.9%; 95% Wilson CI, 65.9%–83.6%). An exact binomial test comparing this proportion with a 50% reference value yielded $P < 0.001$. The 50% reference was an analytical benchmark rather than a threshold derived from prior evidence. In the gender cross-tabulation, positive perception was reported by 35/45 women (77.8%) and 31/42 men (73.8%). Pearson's chi-square test showed no statistically significant association between gender and perception category ($\chi^2 = 0.19$, df = 1, $P = 0.666$); Fisher's exact test was also non-significant ($P = 0.803$). [Table 4]

Table 4: Association between gender and overall perception category

Gender	Positive perception, n (%)	Neutral/negative perception, n (%)	Test of significance
Female	35 (77.8)	10 (22.2)	Pearson's $\chi^2 = 0.19$, df = 1, P = 0.666; Fisher's exact P = 0.803
Male	31 (73.8)	11 (26.2)	
Total	66 (75.9)	21 (24.1)	

Discussion

This study found that students generally valued applied, clinically oriented pharmacology activities while also expressing concerns about time allocation and the administrative workload associated with curricular documentation. This pattern aligns with the rationale for CBME, which emphasises performance and the integration of knowledge, skills, and professional behaviours.[2] The National Medical Commission's undergraduate framework provides a policy basis for competency mapping, skills training, integration, and AETCOM; however, local implementation requires ongoing evaluation rather than an assumption that curricular change automatically produces competence.[3]

The favourable ratings for prescription writing, personal-drug selection, and dose calculations highlight the practical importance of rational prescribing. Shah and colleagues described how CBME principles can be applied to pharmacology, including the relationship between competencies and real-world therapeutic decisions.[4] Previous student-feedback studies have also emphasised practical and clinically relevant teaching, alongside preferences for integrated and varied teaching methods.[5,6] However, endorsement of a teaching activity does not establish that it improves performance. This requires direct assessment, such as a structured prescription-writing station or an observed skills checklist.

Students rated small-group discussions and self-directed learning favourably, findings that can be considered alongside published studies of learner perspectives. Research has reported generally favourable views of selected CBME elements but more mixed ratings for self-directed learning, logbooks, reflection, and integrated teaching.[9,10] Such differences may reflect

institutional resources, facilitation methods, the availability of protected learning time, and the quality of feedback. Student opinion should therefore be interpreted in context and should not be used as the sole measure of curriculum quality.

Concerns about reduced teaching hours are particularly relevant to pharmacology, where students need sufficient opportunities to connect mechanisms, indications, contraindications, dose selection, adverse effects, and patient counselling. Recent research on CBME implementation in pharmacology has documented concerns about shortened course duration, reduced teaching hours, and difficulties in delivering small-group and other interactive activities.[11] A mixed-methods study of implementation barriers across Indian institutions also identified faculty capacity, infrastructure, and coordination as factors influencing CBME delivery.[12] The present findings reinforce the importance of monitoring local implementation and addressing barriers that may limit the intended benefits of competency-oriented teaching.

Formative assessment and OSPE provide structured opportunities to identify learning gaps, clarify expectations, and assess observable performance. Nevertheless, favourable perceptions of assessment do not establish its reliability, validity, or fairness. Curriculum evaluation should examine blueprint coverage, station design, examiner training, feedback quality, and consistency across assessors. Research on simulation-based teaching of intravenous drug administration suggests that students may value hands-on practice, while checklist-based assessment can identify specific skill deficits that self-report alone may miss.[13]

An important implication of this study is the value of linking learner feedback with clearly defined questionnaire domains, operational definitions, denominators, descriptive results, and appropriately cautious interpretation. The findings also highlight the distinction between learner satisfaction and implementation fidelity. Further evaluations could combine student feedback with examination performance, direct observation of prescribing skills, faculty interviews, and review of teaching schedules. Such triangulation would help determine whether favourable perceptions correspond to demonstrable competence and whether barriers arise from curricular design, organisational constraints, or session delivery. Published studies of broader CBME implementation likewise emphasise the importance of considering student and faculty perspectives together.[14]

This study had several limitations. It was conducted in a single institution and included only students who were present and participated, which may limit generalisability and introduce attendance-related selection bias. The questionnaire relied on self-reported perceptions, which may be influenced by recall and social desirability. The overall-perception categories were based on operational scoring thresholds, and the scale had not undergone formal validation. The cross-sectional design also precluded causal inferences. Finally, perceptions were not paired with direct measures of prescribing performance or other clinical competencies; future studies should incorporate objective assessments and, where feasible, follow-up measurements.

Conclusion

Students generally viewed CBME-oriented pharmacology teaching favourably, particularly activities that supported practical application, rational prescribing, and patient counselling. At the same time, concerns about reduced teaching time and documentation workload indicated that implementation challenges remained. These findings suggest that the perceived value of CBME can be strengthened by protecting time for applied learning, providing timely feedback, and streamlining documentation. Student feedback should be complemented by objective assessment of competencies and periodic review of curriculum delivery to determine whether positive perceptions translate into improved performance.

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Conflicts of interest

There are no conflicts of interest.

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