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REVIEW ARTICLE

Competency-Based Medical Education in India Under the National Medical Commission: A Systematic Review of Strengths, Limitations, and Future Directions

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ABSTRACT

Medical education in India underwent a landmark structural transformation when the National Medical Commission (NMC) replaced the Medical Council of India's conventional curriculum with a Competency-Based Medical Education (CBME) framework in 2019. The reform requires Indian Medical Graduates (IMGs) to demonstrate measurable competencies across clinical care, communication, professionalism, and lifelong learning. To systematically evaluate the salient features, documented strengths, implementation challenges, and priority improvement areas within the NMC-CBME framework, with a focus on Indian evidence. A systematic narrative review was conducted following PRISMA 2020 guidelines. PubMed/MEDLINE, Scopus, Google Scholar, and ERIC were searched from January 2010 to December 2024 using relevant MeSH terms. Official NMC policy documents and peer-reviewed Indian and international studies were included. Thematic synthesis was applied across heterogeneous study designs. The NMC-CBME curriculum incorporates ten defining structural features including outcome-oriented competency mapping, horizontal and vertical integration, early clinical exposure (ECE), the Foundation Course, the Attitude, Ethics and Communication (AETCOM) module, skills laboratory training, self-directed learning (SDL), and formative assessment. Indian studies consistently document improvements in student engagement, procedural preparedness, and professional awareness. However, critical implementation gaps persist: faculty unpreparedness, infrastructure inequity, inconsistent and non-authentic assessment practices, administrative overburden, and wide inter-institutional variability in execution quality across India's diverse medical education landscape. CBME represents a scientifically sound and urgently needed reform. Its full transformative potential requires sustained faculty development, programmatic assessment reform, infrastructure investment, and rigorous, continuous curriculum evaluation grounded in Indian evidence.

Keywords: Competency-Based Medical Education; National Medical Commission; Indian Medical Graduate; AETCOM; Undergraduate Medical Education; Faculty Development; Formative Assessment; Curriculum Reform; Simulation; Assessment

INTRODUCTION

Medical education worldwide has undergone sustained transformation over the past three decades, shifting away from time-fixed, discipline-compartmentalised instruction toward frameworks anchored in demonstrable graduate outcomes and real-world clinical competence [1]. This transition reflects a growing recognition that the mere accumulation of biomedical knowledge does not reliably predict clinical performance, effective patient communication, or sound professional conduct [2]. The Flexnerian model of 1910, though historically important in standardising medical training, entrenched the primacy of basic science instruction at the expense of early clinical integration, communication skills, and professional formation [3]. Critics subsequently identified this as a structural mismatch between curriculum design and the actual functional demands of medical practice.

International reform frameworks have progressively redefined the purposes of medical education. The CanMEDS model articulated graduate physician competencies across seven professional roles [4], while the Accreditation Council for Graduate Medical Education (ACGME) operationalised six core competency domains, tying accreditation to measurable educational outcomes [5]. The landmark Lancet Commission report of 2010 called for a third generation of health professions education centred on systems-thinking, interprofessional collaboration, and explicit social accountability [5]. These frameworks collectively shifted global medical education toward outcome-based models that CBME now represents.

In India, undergraduate medical education was historically governed by the Medical Council of India (MCI), which enforced a knowledge-intensive, examination-driven curriculum offering limited emphasis on integrated teaching, communication, or professional formation [6-9]. Graduates were frequently critiqued as examination-ready but not practice-ready a distinction with direct implications for patient safety and healthcare quality [9]. Critical appraisals of the MCI curriculum highlighted its failure to systematically develop clinical reasoning, ethics, or communication skills relevant to India's diverse healthcare environments [9].

Recognising these systemic deficiencies, the National Medical Commission (NMC), which superseded the MCI under the National Medical Commission Act of 2019, introduced a comprehensively redesigned CBME curriculum for the MBBS programme [7]. The framework envisions the IMG fulfilling five integrated professional roles: clinician, communicator, leader and member of the healthcare team, lifelong learner, and professional. This role-based orientation substantially broadens the educational mandate beyond biomedical knowledge acquisition [7,8]. Structural innovations include early clinical exposure (ECE), horizontal and vertical curricular integration, the Attitude, Ethics, and Communication (AETCOM) module, a Foundation Course, skills laboratory and simulation-based training, SDL, and formative assessment strategies.

Despite its progressive conceptual design, implementation across India's network of over 700 medical colleges has encountered substantive challenges. Indian studies have documented faculty unpreparedness, infrastructure deficits, inconsistent assessment practices, and wide inter-institutional variability in educational quality [10-13]. The gap between curricular intent and lived educational experience constitutes a critical area warranting rigorous and systematic scholarly scrutiny [9].

India produces approximately 100,000 MBBS graduates annually, and the quality of that training has direct implications for national and global health systems [14]. The present systematic review was therefore conducted to synthesise available evidence on the features, strengths, limitations, and reform priorities of the NMC-CBME curriculum, with a specific focus on Indian empirical evidence. These findings are intended to inform policymakers, medical educators, curriculum planners, and institutional leaders engaged in the ongoing development and refinement of undergraduate medical education in India.

MATERIALS AND METHODS

Study Design: A systematic narrative review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines [1]. Given the heterogeneous nature of CBME literature spanning qualitative studies, cross-sectional surveys, institutional reports, and policy analyses thematic synthesis was selected as the primary method for integrating findings across diverse study designs.

Search Strategy and Sources: A comprehensive electronic search was conducted across PubMed/MEDLINE, Scopus, Google Scholar, and ERIC. Search terms included: "competency-based medical education," "CBME India," "NMC undergraduate curriculum," "AETCOM module," "early clinical exposure India," "Indian Medical Graduate," "undergraduate medical education reform India," and "outcome-based medical education." Official publications from the NMC, MCI, World Health Organization, and World Federation for Medical Education were additionally retrieved. Reference lists of all included articles were manually searched for further relevant sources.

Eligibility Criteria: Studies were eligible if they: (i) were published in English (ii) addressed competency-based or outcome-oriented education at the undergraduate medical level; (iii) were conducted in India or evaluated frameworks directly applicable to the Indian context; and (iv) were peer-reviewed articles or official policy documents. Studies restricted exclusively to postgraduate training, unsupported opinion pieces, or non-English publications were excluded.

Data Extraction and Thematic Synthesis: A structured extraction framework captured study design, educational setting and phase, key findings, identified challenges, and proposed recommendations. Data were iteratively coded into descriptive categories and refined into four higher-order thematic domains: (1) salient curriculum features; (2) documented strengths; (3) implementation limitations; and (4) scope for improvement and future directions. Findings were triangulated with international CBME literature to contextualise Indian evidence within a global framework.

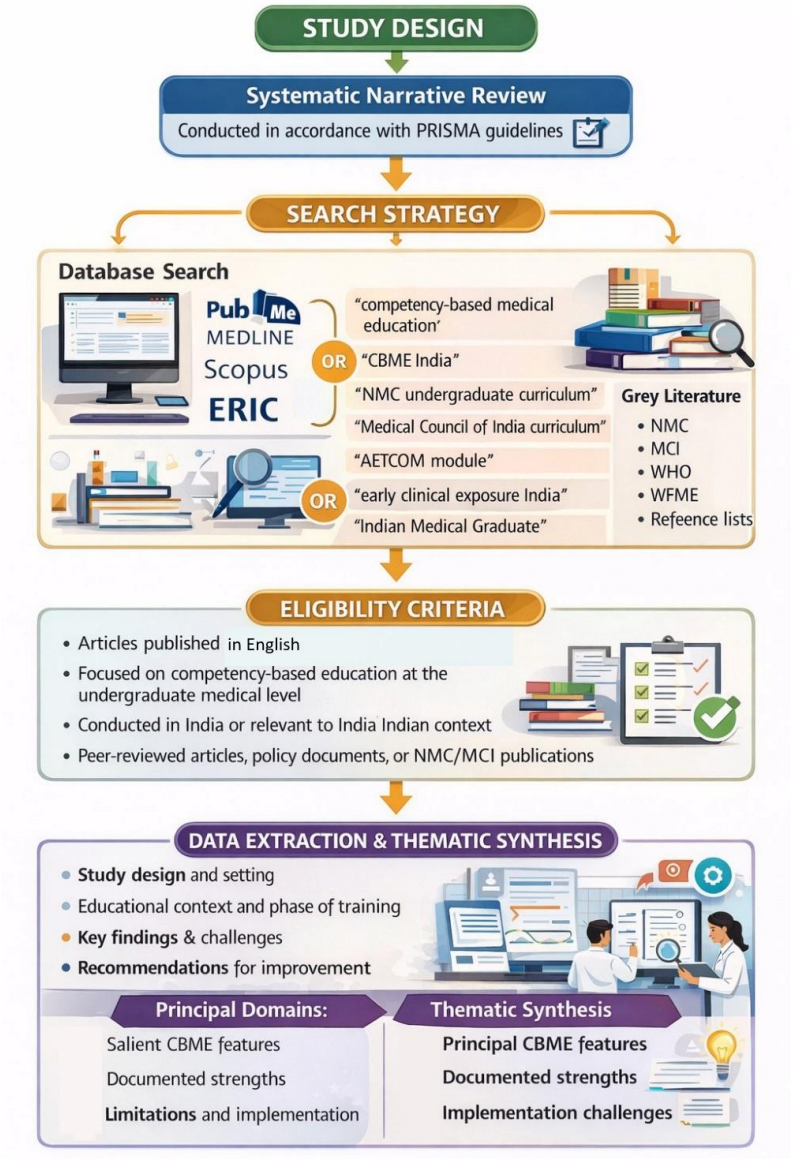

Figure 1. *Study flow according PRISMA guidelines*

RESULTS

Salient Features of the NMC-CBME Curriculum: The NMC-CBME curriculum represents a theoretically grounded departure from the time-based model that previously governed Indian MBBS training [7]. Rather than equating duration of training with competence, CBME mandates demonstrable achievement of predefined, role-aligned competencies [8].

Ten structural/cardinal features define the current framework:

Outcome-Oriented Framework and Role-Based Graduate Attributes: The curriculum specifies that the IMG must demonstrate competencies across five professional roles. This reorients educational focus from content coverage to measurable graduate performance, improving curricular transparency and professional relevance [7,8].

Horizontal and Vertical Curricular Integration: Horizontal integration connects related disciplines taught within the same phase, while vertical integration bridges preclinical knowledge with clinical application. This approach reduces knowledge fragmentation and reinforces contextual understanding of foundational sciences [1].

Early Clinical Exposure (ECE): ECE places students in patient care environments during the initial year of training. By situating biomedical learning within real illness experiences, ECE improves motivation, accelerates professional identity formation, and reduces the gap between preclinical and clinical education [7,8].

Foundation Course: A structured transitional module bridges school education and professional medical training. It addresses professional values, communication, digital literacy, stress management, and learning strategies domains conspicuously absent in the prior MCI curriculum [7,9].

AETCOM (Attitude, Ethics, and Communication) Module: The AETCOM module is a landmark curricular innovation addressing competencies historically underemphasised in Indian medical training. It systematically develops doctor-patient communication, empathy, informed consent, ethical reasoning, teamwork, and reflective professional practice [10, 15,16]

Skills Laboratory and Simulation-Based Training: The curriculum mandates competency attainment at the 'shows how' and 'does' levels of Miller's pyramid. Skills laboratories enable repetitive, error-tolerant practice, build procedural confidence, and enhance patient safety awareness before real patient contact [17].

Self-Directed Learning (SDL): SDL is embedded throughout the curriculum to cultivate autonomous learning habits, critical evidence appraisal, and professional self-reflection all indispensable in an era of rapidly evolving medical knowledge [1,8].

Formative and Continuous Assessment: The curriculum promotes a shift from exclusive reliance on summative examinations toward ongoing, competency-aligned formative evaluation. This approach supports early gap identification, enables targeted remediation, and reduces dependence on memory-based high-stakes testing [18, 19].

Logbooks, Portfolios, and Longitudinal Tracking: Structured documentation tools provide longitudinal evidence of competency progression, promote learner accountability, and facilitate mentoring dialogue. Portfolios, implemented genuinely, function as instruments for professional reflection and growth [7,8].

Competency Mapping and Structured Learning Objectives: CBME replaces vague topic lists with specific, phase-wise competencies and sub-competencies per subject. This enables systematic curriculum planning, creates clear learning expectations, and facilitates institutional identification of curricular gaps and redundancies [7,8].

Documented Strengths of the Current CBME Framework

Thematic synthesis identified eight well-evidenced strengths of the NMC-CBME framework:

Shift from Information Accumulation to Competence Development: CBME corrects the traditional system's overemphasis on declarative knowledge recall. By anchoring training in observable, measurable outcomes, the curriculum creates a more direct pathway between education and clinical performance the fundamental purpose of medical training [2,8].

Improved Clinical Practice Alignment: The curriculum is aligned with professional responsibilities graduates encounter in outpatient clinics, inpatient wards, emergency care, and community settings. Graduates are expected to be practice-ready, not merely examination-competent a distinction of direct consequence for patient safety in India [7,9].

Enhanced Clinical Reasoning through Integration and ECE: Integration and ECE together challenge students to apply foundational knowledge to clinical problems from early training, fostering diagnostic thinking and problem-solving both essential for safe clinical practice in resource-variable settings [6,7].

Table 1. Salient Features of the NMC-CBME Curriculum: Pedagogical Rationale and Expected Graduate Outcomes

Curricular Feature	Pedagogical Rationale	Expected Graduate Outcome
Outcome-oriented competency framework	Aligns education with professional role expectations [7]	Practice-ready, role-competent graduates
Horizontal & vertical integration	Reduces subject-level fragmentation across phases [1]	Coherent conceptual understanding; applied reasoning
Early Clinical Exposure (ECE)	Contextualises preclinical learning in patient care [7]	Improved motivation and clinical reasoning from Year 1
Foundation Course	Bridges school education and professional culture [7,9]	Better adjustment, orientation, and professional identity
AETCOM module	Develops communication, ethics, and professional attitudes [10,16]	Empathetic and ethically grounded clinical practice
Skills laboratory training	Structured psychomotor and procedural skill development [17]	Competent, safety-conscious procedural performance
Self-Directed Learning (SDL)	Fosters autonomous learning and evidence appraisal [1,8]	Lifelong learning and professional self-regulation
Formative and continuous assessment	Identifies learning gaps and enables remediation [18, 19]	Sustained academic and clinical improvement
Logbooks and portfolios	Longitudinal competency documentation & reflection [7]	Accountable, reflective professional development
Competency mapping	Transparent, structured learning objectives per subject [8]	Systematic planning and identification of curricular gaps

Systematic Professionalism Development via AETCOM: The AETCOM module provides, for the first time in Indian MBBS training, a formal framework for developing communication skills, ethical reasoning, and professional attitudes. Indian studies have reported improved student awareness of doctor-patient communication and informed consent practices following AETCOM exposure [10, 15,16].

Promotion of Active and Reflective Learning: Small-group case discussions, SDL, simulation, and reflective journaling shift learners from passive lecture attendance toward active knowledge construction and professional self-awareness pedagogically superior approaches to the predominantly passive pre-CBME model [1,8].

Formative Assessment and Early Remediation: Continuous assessment enables faculty to detect learning deficiencies early and institute remediation before they become entrenched, reducing the personal and educational cost of discovering failure only at high-stakes terminal examinations [18, 19].

Improved Procedural Preparedness and Patient Safety: Supervised competency certification in skills laboratories prior to patient procedures improves procedural preparedness and strengthens learner confidence a meaningful advance over the previous model in which students frequently performed procedures without structured prior training [17].

Alignment with National Healthcare Priorities and Global Standards: The CBME framework incorporates primary care, preventive medicine, community health, ethics, and social accountability competencies essential for India's diverse, resource-variable healthcare environments while simultaneously aligning with international benchmarks such as CanMEDS and ACGME [4,5,7].

Limitations and Implementation Challenges

Despite its conceptual rigour, Indian studies consistently document a substantive divergence between CBME's design intent and its implementation realities across India's heterogeneous medical education landscape [11,12,13].

Inadequate Faculty Preparedness: The most consistently documented barrier in Indian studies is the limited pedagogical readiness of faculty. Many staff, trained in conventional systems, lack preparation in competency-aligned curriculum planning, small-group facilitation, structured feedback delivery, and educational technology. Single orientation workshops the predominant faculty preparation strategy are insufficient for meaningful change. One multi-institutional Indian study found that 80% of faculty considered their institution's preparation inadequate for CBME implementation [11, 20, 21].

Administrative Overburden and Documentation Fatigue: Logbooks, checklists, and portfolios pedagogically designed as reflective instruments frequently devolve into compliance-driven administrative exercises. Indian faculty and students commonly report that documentation requirements generate mutual frustration without commensurate educational benefit, undermining the developmental purpose these tools were designed to serve [12,13].

Infrastructure Inequity Across Indian Institutions: Effective CBME requires skills laboratories, simulation equipment, digital learning systems, and favourable faculty-to-student ratios. These remain unevenly distributed across India's medical colleges, with acute deficits in resource-constrained government institutions. This structural inequity perpetuates unequal graduate preparedness and directly contradicts the stated goal of standardising national competency outcomes [11,14].

Table 2. Comparative Overview of Documented Strengths and Limitations of the NMC-CBME Curriculum

Domain	Documented Strengths	Documented Limitations
Curriculum design	Outcome-oriented, role-based, structured framework [7,8]	Complex to operationalise; variable institutional fidelity [11]
Teaching-learning	Promotes integration, active learning, and SDL [1,6]	Lecture dominance persists; integration often superficial [13]
Clinical training	ECE bridges theory-practice gap from Year 1 [7]	Clinical exposure quality varies widely across colleges [20]
Professionalism	AETCOM builds ethics and communication systematically [10,15,16]	Hidden curriculum may contradict formal professionalism goals [23]
Skills training	Simulation builds procedural competence and safety [17]	Infrastructure deficits limit delivery in many institutions [11]
Assessment	Encourages formative and competency-aligned evaluation [18,19]	Standardisation and authentic tools remain largely absent [12]
Student development	Promotes reflection, SDL, and lifelong learning [1,8]	Cognitive overload and assessment fatigue widely reported [12,13]
Faculty engagement	Curriculum envisions facilitation and mentorship roles [20]	Faculty training and protected educational time inadequate [11,21]
Documentation	Logbooks support longitudinal competency tracking [7]	Records frequently reduced to bureaucratic compliance [12,13]
Equity	Establishes national competency standards for all colleges [7]	Implementation quality varies substantially across India [11,14]

Assessment Variability and Inauthenticity: Assessment remains the most inadequately implemented component of curricular reform in India. Most institutions continue relying predominantly on conventional written examinations, with limited systematic use of OSCEs, mini-CEX, DOPS, or workplace-based observation. Absence of standardised rubrics and inconsistent internal assessment practices undermine reliability and educational credibility [12, 18, 22].

Cognitive Overload and Assessment Fatigue: Indian students frequently report being overwhelmed by the breadth of required competencies, frequency of internal assessments, and contradictory expectations across departments. Poorly coordinated CBME paradoxically amplifies learner stress rather than supporting meaningful learning consolidation [12,13].

Table 3. Identified Implementation Gaps and Evidence-Based Recommendations for the NMC-CBME Curriculum

Domain	Identified Gap	Evidence-Based Recommendation
Faculty development	Limited, non-sustained pedagogic training [11,14,24]	Longitudinal, institutionally embedded faculty development
Assessment	Variable, fragmented; non-authentic evaluation [12,15]	Programmatic, workplace-based, and blueprinted assessment
Documentation	Compliance-driven; deficient in reflective value [12,13]	Digital e-portfolios with feedback and mentoring integration
Student support	Absence of structured mentoring and wellness systems [16]	Formalised mentorship and academic well-being programmes
Curriculum load	Overloaded content; redundant internal assessments [12]	Competency prioritisation and assessment rationalisation
Integration	Superficial; timetable-level scheduling only [11,13]	Coordinated interdepartmental curriculum planning and co-assessment
Skills training	Variable simulation access across Indian colleges [17]	Expanded and diversified simulation-based training
Technology	Underutilised or adopted without pedagogical rationale [21]	Purposeful LMS, e-portfolios, and blended learning
Student feedback	Unsystematic; rarely actioned at institutional level [12]	Structured, anonymised, regularly actioned feedback cycles
Education research	Limited institutional evaluation of reform outcomes [21,22]	Medical education research units and scholarly dissemination

Superficial Curricular Integration: Although integration is a foundational curricular principle, operationalisation in many Indian institutions extends no further than timetable adjustments or token interdisciplinary sessions. True integration requires shared planning, common learning outcomes, and collaborative assessment elements that remain difficult to sustain in most Indian medical colleges [11,13].

Figure 2. *Scope for Improvement and Future Directions*

The Hidden Curriculum: Formal curricular reforms are vulnerable to systematic erosion by the hidden curriculum the informal values and professional behaviours students observe in clinical environments. When students witness disrespectful communication or ethically compromised conduct in wards, the intended gains of AETCOM and professionalism training are materially undermined, regardless of formal curriculum quality [23].

Uneven Inter-Institutional Implementation: Variation in institutional leadership, faculty engagement, funding, and academic culture produces major disparities in CBME delivery across India. Students in different colleges experience

nominally the same curriculum very differently, resulting in substantially variable graduate competency standards a serious equity concern in a system serving a 1.4-billion population [11,13,14].

DISCUSSION

The evidence synthesised in this review confirms that the NMC-CBME curriculum is a structurally sound and educationally progressive reform in Indian undergraduate medical training. Its core premise that graduates must demonstrate observable, role-appropriate competencies rather than merely accumulate knowledge over a fixed period is strongly supported by established CBME frameworks internationally [4,5,6] and by critical appraisals of the preceding MCI model within India [9].

Faculty preparedness emerges from Indian literature as the single most consequential determinant of implementation fidelity [11,20,21] CBME demands from educators a substantively different skill set than conventional didactic teaching encompassing facilitation, workplace-based assessment, structured feedback, and reflective mentoring. Without sustained institutional support, the risk is that CBME is implemented in name only, with traditional lecture-based methods continuing under revised curricular terminology. This phenomenon a form of cosmetic curricular compliance has been described across multiple Indian institutional reports and represents a critical threat to the reform's educational integrity [11,13].

Assessment reform is the second major structural weakness in Indian implementation. Miller's pyramid of clinical competence provides an unambiguous framework: authentic assessment must progress from declarative knowledge ('knows') through applied knowledge ('knows how'), demonstration ('shows how'), to real-world clinical performance ('does') [17]. Yet Indian evidence indicates that most institutional assessment continues to operate predominantly at the 'knows' level through conventional written examinations, with limited systematic use of OSCEs, mini-CEX, DOPS, or workplace observation [12, 18]. The programmatic assessment model advocated by Van der Vleuten and colleagues in which multiple low-stakes assessments are aggregated longitudinally to generate holistic judgements about learner progress represents the most educationally sound and internationally adopted alternative [19]. Indian medical institutions should be structurally and financially supported to adopt this model.

The AETCOM module occupies a particularly important position in the curriculum. Its explicit focus on communication, ethical reasoning, and professional behaviour represents a landmark innovation in Indian medical training, addressing a historically critical gap [10,15,16]. However, AETCOM's effectiveness is demonstrably vulnerable to the hidden curriculum the informal values and professional behaviours students observe and internalise through clinical experiences, often in direct contrast to formal teaching [23]. When students regularly observe disrespectful communication, inadequate consent-taking, or ethically compromised conduct in Indian wards and outpatient settings, the intended gains of AETCOM are materially diminished. Addressing this requires not merely curricular design but a deliberate, sustained programme of clinical cultural change a more complex institutional undertaking than curriculum revision alone.

The documented infrastructure disparities between well-resourced private colleges and under-funded government institutions constitute a structural challenge that NMC policy must explicitly acknowledge and address [11,14]. Skills laboratories, simulation equipment, digital platforms, and adequate faculty-to-student ratios are not optional enhancements but essential prerequisites for meaningful CBME delivery. Without targeted and equity-conscious investment, the risk is that CBME's benefits accrue disproportionately to already-advantaged institutions, further widening the quality gap in graduate standards across India's heterogeneous medical education landscape.

India's specific demographic realities more than 700 medical colleges, marked variation in institutional quality, and the imperative to train graduates equipped for both tertiary hospitals and primary care in rural settings mean that CBME implementation cannot be treated as a uniform, top-down regulatory exercise [7, 14]. What is required is a coherent, multi-level, sustained reform strategy that simultaneously addresses faculty development, assessment redesign, infrastructure investment, clinical cultural change, student support, and systematic evidence-based curriculum evaluation [11, 12, 22, 24, 25]. Piecemeal interventions in any single domain, while individually beneficial, are unlikely to achieve the systemic transformation that the vision of the Indian Medical Graduate demands.

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CONCLUSION

The NMC-CBME curriculum represents a landmark, evidence-informed reform in Indian undergraduate medical education. Its transformative potential, however, remains constrained by persistent gaps in faculty preparedness, assessment authenticity, and infrastructure equity across India's diverse medical colleges. Realising the vision of a competent, ethical, and practice-ready Indian Medical Graduate demands sustained, multi-level reform encompassing programmatic assessment, longitudinal faculty development, and rigorous, continuous curriculum evaluation grounded in Indian evidence.

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Conflict of Interest

The author is the Editor of the journal. To prevent any conflict of interest, the author had no role in thereview or decision-making process for this manuscript, which was handled independently by the editorial board.

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