

Implementing competency-based medical education in post-graduate ophthalmology training: Understanding key concepts and methodologies and overcoming challenges

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The National Medical Council (NMC) has mandated that all post-graduate training shall be competency-based, following the principles of Competency Based Medical Education (CBME). This aims to serve the dual purpose of standardizing ophthalmology post-graduate training and to overcome the shortcomings of the traditional curriculum by employing innovative and interactive teaching-learning and assessment techniques to produce competent ophthalmologists well equipped with clinical, surgical, and professional skills relevant to current times. CBME marks a paradigm shift from traditional curriculum methodologies and involves the introduction of several new concepts. This article aims to highlight the key principles of CBME and the various teaching-learning and assessment technique methodologies which can be employed for post-graduate training. It also highlights the various challenges that are likely to be faced in its implementation and measures to overcome them.

Key words: Competency Based Medical Education, National Medical Council, post-graduate ophthalmology teaching

“Change is the only constant.” This age-old adage holds true in current times more than ever before. Rapid changes in the field of medicine not only in research and technology but also in the availability and dissemination of information have made access to knowledge and concepts more dynamic than ever. However, post-graduate training in India has not kept pace with these sweeping changes and largely remains steeped in the traditional methods of teaching.^[1] The traditional method of teaching has rightly been described by Gogate *et al.* as the “Gurukul” method of teaching rather than curriculum-based teaching. Where there is a curriculum, there is a discrepancy in the followed curriculum and the laid-down curriculum.^[2] Although these methodologies are time-tested and have produced great ophthalmologists over the years, they are woefully inadequate for training ophthalmologists well equipped with the necessary knowledge and skills appropriate not just for the current times but also to equip them with learning skills which make them lifelong learners so that they remain relevant in ever changing scenarios.

Conventional post-graduate training comprising non-standardized method of teaching with no clear guidelines about teaching learning, assessment, and expected outcomes. This has led to significant inter-individual variability in the extent of clinical, surgical, and research exposure. In a study performed by Biswas *et al.*,^[3] it was found that this inter-individual variability existed in the training programs in the 20th century and has persisted in the 21st century.

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A substantial number of these reported no skill transfer of some of the most essential clinical and basic surgical skills. This study also highlighted the marked inter-institute variability, with some institutes giving excellent surgical training but some not exposing the students to surgery at all.^[2] One aspect of this could be attributed to a student's inherent surgical or clinical skill in him/her being more favored in the organization, but one cannot overlook the fact that there is also marked inter-teacher variability in the opinion regarding the surgical exposure a trainee should receive. Additionally, the learning of different sub-specialties was also variable with the teaching-learning and assessment methodologies left largely to the discretion of individual teachers themselves.^[4] Because of these reasons along, with the increasing number of medical colleges, with many of them offering post-graduate ophthalmology teaching, there was an urgent need felt by both the teachers and trainees to standardize ophthalmology residency training in order to ensure that all post-graduate students are competent in specified well-defined outcomes at the end of their training.^[2-4]

It is in view of these considerations that the National Medical Council has stated that all post-graduate training shall be competency-based, following the principles of competency-based medical education (CBME) as stated in “The

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Postgraduate Medical Education Regulations, 2021.”^[5] This is in tune with medical curricula being followed in many parts of the world.^[6] CBME marks a paradigm shift from traditional curriculum methods. It aims to overcome the shortcomings of the traditional curriculum by employing innovative and interactive teaching–learning techniques and introducing key new concepts relevant to medical education in current times.^[7,8]

This article aims to highlight the rationale and key concepts of adopting CBME in ophthalmology. It explains some important teaching, learning, and assessment methods relevant to CBME post-graduate teaching and suggests how these may be incorporated in the ophthalmology teaching curriculum. It also highlights the various challenges likely to be faced in this transition and how they may be overcome.

Key Concepts

The key word in CBME is “competency.” What is a competency? Competency is the ability of a health professional which can be observed. It encompasses various components such as knowledge, skills, values, and attitudes, and an individual who is able to do so is considered competent.^[9-11] Hence, it does not consist of only one aspect (domain) of learning but a combination of aspects of knowledge which are required to know a particular topic in a wholesome manner.^[12,13]

For example, a student who is competent on the topic of cataract would not just be well versed with cataract surgery but with the relevant anatomy and pathophysiology of cataract formation, clinical examination, pre-operative assessment and counseling, consent taking, surgical skills, post-operative assessment, and care. Hence, it involves not just theoretical knowledge but also clinical and surgical skills, communication skills, ethics, and attitude, which are equally important in clinical care. The student is also assessed on these different aspects. This marks a paradigm shift from conventional teaching, where although each of these skills may have been taught, it was usually performed in a piecemeal fashion and each of them may not have been given adequate importance. Hence, the aim of CBME is to provide wholesome knowledge of a particular topic encompassing the different domains of the learning–cognitive domain, affective domain, and psychomotor domain.

The other key features of CBME are the following.^[6,8,12,14]

- 1. Outcome-based:** Conventionally, our teaching has been input-based, that is, the curriculum is planned according to the input. For example, lecture/clinical case discussion. This often results in marked inter-student variability in understanding of the topic. CBME methodologies are outcome-based, that is, the “desired minimum outcome” is clearly defined for the teaching session planned and should be achieved by all students, and the teaching is focussed on achieving that particular outcome.
- 2. Student as an active learner and teacher as a facilitator:** Teaching should not be a one-way street. Interactive teaching–learning methods are employed, which ensure that the student is no longer a passive participant in the teaching, and the teacher is now a “facilitator” guiding the student in the process of gaining knowledge.
- 3. Self-directed learning (SDL):** CBME mandates that conventional didactic lectures should constitute less than 20% syllabus and up to 25% learning should be self-directed learning (SDL). This means that the student is given a particular topic, say dry eye, and is asked to read up about it. Relevant resource materials and reference books may be shared. She is also encouraged to look up journals and latest research on the topic. This is then discussed in the class with doubts cleared and key points re-emphasized. The aim is to inculcate the habit of SDL to make the trainees become “lifelong learners” so that they are able to upgrade their skills and maintain scientific temper even later in their professional life. Several studies have demonstrated readiness among trainees for SDL.^[15,16]
- 4. Feedback:** Feedback is an essential part of CBME for both the students and the teachers.^[17] Regular feedback, as a part of assessment or otherwise, is given to the students so that they are aware of their specific shortcomings and can improve upon them. This is usually performed as a part of formative assessment.^[18,19] Regular feedback regarding the teachers and teaching–learning process also should be taken, and improvisations should be made accordingly. However, it should be ensured that it is performed in a non-intimidating way or anonymously so that genuine issues may be addressed.
- 5. Assessment as a learning tool:** Assessments should be used not only as a tool of evaluation but also as a means of learning by using innovative assessment methods.^[19] CBME emphasizes the importance of work place-based assessments (WPBA). They should be frequent in the form of formative assessments and term end assessments (summative assessments) and should adequately assess the different skill sets from all the domains (cognitive domain, affective domain, and psychomotor domain).^[20] Feedback should be an essential part of the assessment.^[21]
- 6. Interactive teaching–learning methods:** The various skill sets and outcomes that the student should be equipped with cannot be achieved with the conventional teaching methodologies. CBME suggests various interactive teaching–learning and assessment techniques which may be employed by the teachers to achieve the desired outcomes. These are discussed subsequently. However, flexibility has been given to the teachers to plan their sessions according to their group size, faculty, and resources available and whichever methodology according to them would achieve the particular learning objective.
- 7. Emphasis on AETCOM (Attitude Ethics and Communication).** For becoming a competent ophthalmologist, one requires not just clinical and surgical acumen but also several other skills, such as communication, which are essential inter-colleagues, with the hospital staff, and so on.^[22,23] Also, doctor–patient communication and instilling faith in the patient are vital in the current times. The CBME curriculum devotes a stipulated time to the teaching and development of these skills by employing methodologies such as role play and so on, creating specific hypothetical case scenarios which an ophthalmologist may encounter in his practice. For example, a role play may be performed enacting a scenario wherein a post-operative surgical complication has occurred and how the doctor communicates this with the patient and relatives in an empathetic and ethical manner. These are domains which were hitherto not taught in the curriculum and were largely inculcated in the students by observing their peers and seniors.

Proposed Methodologies for Interactive Teaching–Learning Methods in Clinical Scenarios [Table 1]

Post-graduate training is largely work place-based [out-patient department (OPD), in-patient department (IPD), or operation theater]. Suggested interactive teaching–learning methodologies in these clinical settings include the following:

1. **OMP “One-minute Preceptor”**: This is a widely accepted teaching model for clinical case discussion that may be performed in OPD or wards. This method consists of five tasks or micro-skills that the teacher tries to accomplish when discussing a clinical case being presented by a trainee. The micro-skills are as follows: (1) Get a commitment, that is, after the case presentation, the student commits to a particular probable diagnosis; (2) probe for supporting evidence: Here, the student summarizes the points which made him reach this diagnosis; (3) teach general rules: The teacher summarizes the important points of that particular case; (4) the teacher reinforces what the student did correctly; and (5) correct mistakes: The teacher informs the student of the mistakes and what should actually have been performed. For example, while presenting a case of presenile cataract, if the student did not perform a thorough posterior segment evaluation, the teacher points that out.^[24]
2. **SNAPPS (Summarize, Narrow differential, Analyze, Probe preceptor, Plan management, and Select-case directed learning)**: In this method of case discussion, the student takes a pro-active role by presenting, analyzing, reasoning, questioning, and follow-up. It consists of six steps: **Summarize**: The student provides a brief, concise summary of the history and findings of a particular case. **Narrow differential**: The student presents two to three differentials for the case. **Analyze differential**: The student analyzes differentials by comparing and contrasting the choices and determines the most likely diagnosis. The teacher can assess the student’s clinical reasoning during this section. **Probe preceptor**: Students use preceptors (teacher) as a knowledge resource and clear their doubts, discuss possible alternative approaches, and ask the teacher to give clinical pearls. **Plan management**: The student discusses a management plan with reinforcement/input from the preceptor. **Select case-directed learning**: The student self-identifies a learning need related to the case and later discusses findings with the teacher.^[25]
3. **DOAP (Demonstration–Observation–Assistance–Performance)**: This methodology is used for teaching of procedural or clinical skills. It involves a stepwise approach to learning of the skill. Initially, the students observe a demonstration of the procedure, then assist the performer, then perform in a simulated environment, and then finally perform under supervision or independently.^[26–28] This method can be employed for various OPD (applanation tonometry, indirect ophthalmoscopy, etc.) and surgical procedures such as pterygium excision, cataract surgery, and so on. It ensures a stepwise approach to learning and also that the student is reasonably familiar with the procedure before she is allowed to perform independently/under supervision.

Table 1: List of Suggested teaching-learning methodologies in clinical settings

OMP (One-minute Preceptor)
SNAPPS: Summarize, Narrow differential, Analyze, Probe preceptor, Plan management, and Select case-directed learning
DOAP (Demonstration-Observation-Assistance-Performance)
Skill Labs

Table 2: List of suggested interactive teaching-learning methodologies for class room teaching

Breaking the class into smaller groups
Quizzes and short answers
Cliff hanger cases and brainstorming sessions
Simulations and role plays
Multi-media and other audio-visual aids
Flipped classroom

Interactive, Classroom-Based Teaching [Table 2]

The conventional lectures, seminars, symposia, and journal clubs may be modified to make them more interactive. Several innovative methods have been described. These include the following:

- a. **Breaking the class into smaller groups**: The topic can be broken down into sub-topics, and each group has to present that subtopic;^[29] for example, the topic of retinal vascular occlusions can be broken down into pathophysiology, demographics, clinical picture, diagnosis, and treatment, and each group presents one topic. This ensures participation of the whole class and better attentiveness.
- b. **Quizzes and short answers**: They may be used at the beginning or end of a class to ensure that the key points have been learnt.
- c. **Cliff hanger cases and brainstorming sessions**: A complex clinical situation may be presented in the class, and an active discussion about different management scenarios may be discussed,^[30] for example, management options in a steroid responder with chronic uveitis, non-responding corneal ulcer, and so on.
- d. **Simulations and role plays**: These may be employed to teach situations related to AETCOM, where students enact a likely situation,^[31] for example, dealing with an aggressive patient in the OPD, and inputs from the other trainees can be taken on how the situation should be handled so that if such a situation ever does arise, he/she is well prepared to deal with it in a mature and responsible manner.
- e. **Multi-media and other audio-visual aids**: These should be utilized as much as possible to keep the classroom teaching engaging, for example, by showing surgical or case videos, engaging immersive technology such as virtual reality, mobile-based apps, integrated simulators, and so on.^[32]
- f. **Flipped classroom**: This involves a video lecture about a topic shared by the teacher prior to the allocated class. The students watch the lecture and study the topic, and the allotted class time is then used for interactive discussion, exercises, and so on.^[33,34] For example, a video lecture on surgical options in glaucoma, their indications, and

complications may be shared, and then discussion on this including latest surgical techniques and modifications may be held during the class.

Skill lab: These may be employed by the institute where the trainee can get a hands-on training in simulated eyes or animal eyes and familiarize them with the handling of instruments in the eye. These are especially valuable for institutes where the patient load is less and trainees may be given exposure to surgical techniques in a safe simulated environment.^[26]

Various studies have also identified students to have these as preferred methodologies as compared to conventional didactic lectures.^[35,36]

Assessments

Assessments should be in the form of formative assessments and also at the end of a semester (**Summative Assessments**). In order to be “authentic,” assessments should be conducted in the clinical settings including in-patient, out-patient, and emergency departments (WPBA). This helps in assessing the trainee in real-life settings where they are eventually expected to practice their skills. They should be frequent, should be conducted by different faculty members, and should include feedback.^[12,37,38]

Various Methods of Work Place-Based Assessments can be Employed [Table 3]

1. Mini CEX (Mini Clinical Examination): In this method of assessment, the post-graduate trainees perform clinical tasks, such as taking a focused history or relevant aspects of the physical examination, after which they provide a summary of the patient encounter along with probable clinical diagnosis and suggested management. The parameters evaluated include interviewing skills, physical examination, professionalism, clinical judgement, counseling, organization and efficiency, and overall competence. Each of the aspects of the case presentation, that is, history taking, examination, clinical judgement, counseling, and communication skills, is separately evaluated and given a score by the faculty member (a 9-point scoring scale where 1–3 is unsatisfactory, 4–6 is satisfactory, and 7–9 is superior), and a subsequent feedback is provided to the trainee.^[39] This may be used for long cases such as cataract, retinal detachment, uveitis, and so on. A similar method of assessment is the **Clinical encounter cards (CEC)**, which score the trainee on similar sub-headings, on a 6-point rating scale, but also includes written feedback.^[40] Multiple such case presentations should be taken during the training by different faculty members and in different clinical settings.

2. Direct Observation of Procedural Skills (DOPS): This assessment method is ideal for assessing the trainee in various procedural skills that she is expected to perform by the end of the residency. This entails that the trainee performs the procedure under direct observation of the faculty member and is scored using a 6-point rating scale. The advantage of this method is that the trainee is being observed directly while performing the procedure; thus, feedback regarding specific shortcomings and suggested improvisation can be given simultaneously.^[41,42] The various procedures including OPD procedures, for example, retinoscopy, gonioscopy, applanation tonometry, and so on, minor OT procedures such as chalazion removal, and major OT procedures such as cataract surgery may be assessed using this method.

3. Case-based discussion (CbD): In this method, the trainee studies the case file of a previously admitted/managed case and various aspects including differential diagnosis/alternative lines of management are then discussed and evaluated. This method is suitable for cases which may have presented a diagnostic dilemma or management challenge choroiditis or proliferative diabetic retinopathy and so on.

Several other methods for “work place-based assessments” have been described. These include **Clinical work sampling (CWS)**, in which the different domains of learning, for example, communication skills by observing the trainee while making the admission file, clinical examination skills in the OPD, and inter-personal behavior with colleagues and other hospital staff, are observed and assessed.

4. 360-degree assessment (Multi-source feedback): To become a competent professional, good inter-personal relationship skills as essential as for the trainee as he/she has to perform as a member/leader of a team to deliver optimum output. The various stakeholders with whom the trainee interacts including peers [**mPAT (Mini peer assessment tool)**], consultants, and nursing and paramedical staff are given structured questionnaires which include categories such as good clinical care, maintaining good clinical practices, attitude toward patients and staff, and so on. This is then analyzed graphically, and a feedback is given. This helps the trainee and the teachers to focus on any specific communication/attitude skills which she may need to improve upon.^[43,44]

5. Log book and e-portfolio

The log book provides a record of the various procedures performed by the trainee. In the e-portfolio, in addition to this, reflections of the trainee on his/her performance are also included, which help on introspection and professional development.^[45] This is periodically reviewed by faculty, and feedback is given. It gives a longitudinal record of the learning process as recorded by the trainee.^[46]

Table 3: List of suggested assessment methodologies in clinical settings (WPBA)

Mini CEX (Mini Clinical Examination)
Clinical encounter cards (CEC)
Direct Observation of Procedural Skills (DOPS)
Case-based discussion (CbD)
Clinical work sampling (CWS)
360-degree assessment (Multi-source feedback)
Log book and e-portfolio

Challenges

1. Sensitization of students and faculty: CBME implementation, as is true of any transformational concept, is likely to face initial resistance because of unfamiliarity of the concept. All the stakeholders need to be sensitized to the underlying principles of CBME for effective implementation. Regular faculty development programs need to be conducted by the Medical Education Unit of the respective colleges to “Hand-Hold” them, especially through the initial stages.

Workshops may be organized to teach the various CBME methodologies with college medical education experts to provide guidance and clear doubts. Support may also be provided for curriculum planning, such as “**curriculum implementation support program**” (CISP).^[47,48] The faculty should be encouraged to enrol for medical education courses such as Advanced Course in Medical Education conducted by the National Medical Council. This is a course of 1-year duration (combined offline and online mode) conducted at designated nodal centers.^[49] Similarly, an induction course may be conducted for new trainees to familiarize them with the new concepts and methodologies.^[50,51]

2. Shortage of faculty and the lack of infrastructure: CBME is “labor-intensive” as most of the teaching involves small groups; hence, there is a need for more facilitators for the same number of students. This, along with limited support staff and infrastructure, puts a stress on limited resources, especially in newly established medical colleges. Hence, these requirements need to be addressed, and appropriate facilities need to be provided by the institutional authorities.
3. Adaptability to the Indian scenario: Most of the concepts of CBME have been described in Western scenarios. Their feasibility in our clinical setting may require certain modifications, for example, 360-degree feedback, which includes taking feedback from colleagues and paramedical staff, and even patient relatives might face initial resistance. However, over a period of time, they are likely to gain acceptance/may be modified to suit our specific clinical settings.

Conclusion

The adoption of the CBME curriculum aims to serve the dual purpose of standardizing post-graduate residency programs and also to bring our training methodologies up to date with current times and in tune with worldwide teaching patterns in medical education. Although several teething problems and challenges are likely to be faced in its complete implementation, CBME will eventually help in training our post-graduates to become thorough professionals armed with all the appropriate skills necessary to excel in an exceedingly dynamic and competent world.

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Conflicts of interest

There are no conflicts of interest.

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