

Emerging responsibilities of the anaesthesiologist in competency-based undergraduate medical education

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ABSTRACT

The competency-based medical education (CBME) curriculum for undergraduate medical education recently rolled out by the regulating body gives the much-needed importance to the subject of Anaesthesiology, which in the earlier traditional curriculum was unappreciated. The contributions of the Anaesthesiology faculty to the new curriculum include the conduct of basic life support sessions in the foundation course followed by the teaching of 46 stand-alone, subject-specific topics and 17 integrated topics in the next 54 months. The anaesthesiologists will play a vital role in sensitising the 1st-year students to the hospital environment during early clinical exposure sessions by facilitating their visits to operation theatres and critical care areas. Anaesthesiologists are the leaders in the establishment and maintenance of the skill laboratories and in imparting simulation-based training for teaching crisis management, patient management in pandemics and lifesaving skills; nevertheless, there is a definite scope for further enhancement of the anaesthesiologist's role in the CBME.

Key words: Anaesthesia, competency-based medical education, simulation training, undergraduate

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INTRODUCTION

The traditional undergraduate (UG) medical curriculum advocated till recently by the regulating body to produce doctors had not given sufficient emphasis on the subject of Anaesthesiology, as a result of which a fresh medical graduate did not have adequate exposure to resuscitation manoeuvres. Their experience with medical and surgical emergencies along with the critical care of such scenarios was usually only during the period of the compulsory internship.^[1] Anaesthesiology received meagre academic time in comparison to other subjects; the importance it received during the MBBS examinations was also very minimal. The general feeling students developed was that anaesthesia could easily be ignored as a subject.^[2] However, some recognition has been given to the subject of Anaesthesiology in

the recently rolled out competency-based medical education (CBME) curriculum of the National Medical Commission (NMC) for UG medical education.

What is Competency-based medical education (CBME)?

Competency-based training has its roots in the industrial and business sector in the United States. It started in the 1920s as a way of imparting specific

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knowledge and skills to employees to produce specified standardised products.^[3] CBME has been doing its rounds in the realms of medical learning for over five decades now.^[4] Over the past decade, efforts have been made in India to update the medical curriculum, keeping in mind the changing needs of healthcare in our country. The Academic Cell of the Medical Council along with subject experts and the Reconciliation Board Members of the Council have been responsible for reorganising and updating the Indian Medical Curriculum.^[5]

CBME is a flexible learning experience wherein knowledge and skills are assessed all along the continuum of learning. Knowledge is not just acquired with the intention of passing exams but is imparted in such a manner as to make the student a self-directed lifelong learner. Assessment methods are of the formative type, providing instant feedback, instead of being summative. They help to distinguish between knowledge and skills that a student already has and identify areas in which the student needs more training. Evaluation is done on how students apply knowledge in clinical situations that they face. In CBME, efforts are taken to ensure that disciplines are not compartmentalised, and it is expected that the student should acquire a holistic approach to a disease and develop a unified view of the topic.^[6] This is done with the help of 'alignment' and 'integration'. Alignment means teaching similar systems/topics in different subjects separately but during the same phase and in the same time frame. Integration means that the concepts related to a topic that are similar are merged into a single teaching session in which subject demarcations are removed. Integration can be across disciplines in a given phase of the course (horizontal) or across different phases of the course (vertical).^[7]

Rationale for implementing CBME

The curriculum has been traditionally subject-centred and time-based. Critics of the older knowledge-based medical education system pointed out that the fresh medical graduates lacked competencies to address the healthcare needs of the community. The medical graduates produced by this system are busy preparing for super-speciality courses without even bothering to acquire practical or analytical skills nor the desired competency to tackle real-life clinical scenarios in a primary care area. Nevertheless, society needs not just knowledgeable medical graduates but those enriched with an ability to communicate, develop relationships

and maintain ethics with an eye towards professional behaviour.

Keeping these issues in mind, CBME has come into the limelight. The principles of CBME include tailor-made training of students individually to make them acquire measurable competencies and continuous formative assessment with on-site feedbacks. The goal is to produce an Indian medical graduate who is a clinician, a leader of the healthcare team, a communicator and a life-long learner committed to excellence.^[5,8] The cycle of teaching-learning-assessment is aimed towards developing competencies and continues till such desired competency is achieved. Formative assessments are frequent and feedback is incorporated into the process of training. Real-life medical practice is always the focus of the CBME process.^[9] The CBME is thus an outcome-driven, learner-centred curriculum conforming to global standards.

Emerging roles of the Anaesthesiology department in the new CBME

Foundation course

A foundation course of one-month duration is conducted for the newly admitted MBBS students as soon as they secure admission to the course and before the start of the first year basic sciences programme. The course is meant to sensitise the students with the knowledge and skills that will assist them in adapting to the new professional environment. Teaching basic life support (BLS) to first-year medical students gives them the real feel of the practice of medicine and a high motivation to learn the lifesaving skill that is necessary to be possessed by any medical graduate.^[10] Nevertheless, the knowledge and awareness of BLS among medical students is very poor as per the results of several studies and surveys conducted time and again.^[11] The BLS training includes introducing the students to the importance and need for BLS in adults, children and infants followed by a demonstration with appropriate videos followed by hands-on training on a mannequin.^[12] The Department of Anaesthesiology in every medical college gets the honour and dons the responsibility of conducting this session because anaesthesiologists are experts in resuscitation. Under the initiation of the Indian Society of Anaesthesiologists, The Indian Resuscitation Council (IRC) aims to train all the citizens of our country, especially the students of schools and colleges in BLS. The curriculum to teach resuscitation in the foundation course is the one advocated by the IRC.^[13]

Teaching of anaesthesia-related topics including competencies related to Anaesthesiology

The UG student of today is also expected to achieve several competencies in the topic of Anaesthesiology and its allied and interdependent areas. The subject of Anaesthesiology in the CBME curriculum has got better weightage than in the older curriculum.^[7,14] In the subject of Anaesthesiology, ten topics including 46 competencies are to be taught over a total period of 20 hours in the form of ten didactic lectures, ten small group teaching and three self-directed learning sessions. These include Anaesthesiology as a speciality, cardiopulmonary resuscitation, preoperative evaluation and medication, general anaesthesia, regional anaesthesia, post-anaesthesia recovery, intensive care management, pain and its management, fluids, and patient safety.^[14]

Many of the topics of Anaesthesiology are vertically integrated with those of the departments of Physiology, Human Anatomy, Pharmacology, and Forensic medicine and horizontally integrated with the topics of the departments of Orthopaedics, General Medicine, and General Surgery. These include topics such as pre-hospital care and casualty management of trauma victim, resuscitation of polytrauma victim, narcotics in cancer pain alleviation, care and management of elderly patients undergoing surgery, principles of preoperative assessment/general anaesthesia/regional anaesthesia/local anaesthesia, maintenance of airway in a mannequin, post-operative and chronic pain management, steps in BLS, the transport of an injured patient in a simulated environment, anaesthetic/operative deaths, neuromuscular blocks and skeletal muscle relaxants/local anaesthetics/general anaesthetics.^[7]

Early clinical exposure (ECE) including visits of UGs to intensive care units (ICUs) and operation theatres (OTs)

ECE is an important component of the CBME curriculum. ECE of UG students to the OT and ICU can pave the way for horizontal and vertical integration of knowledge acquired in basic sciences with surgery, anaesthesia and medicine simultaneously. Anaesthesiologists play a vital role during these visits by consolidating and enhancing the student's clinical knowledge domain in cardiac, respiratory, neuromuscular physiology and crisis management.^[15,16] ECE visits enable the students to achieve real-time visualisation and recollection of their knowledge of anatomy and physiology; for

instance, demonstration of tidal volume, vital capacity breaths and minute ventilation can be shown during preoxygenation which creates a greater impact than memorising the numbers. Observing the use of muscle relaxants, evaluation of the depth of blockade by neuromuscular monitoring and reversal of blockade at the end of surgery helps the student in understanding the physiology behind neuromuscular transmission and the pharmacology of drugs.

ECE to the ICU helps the UG students to learn beyond signs and symptoms. It helps in the smooth transition from being a basic science student to becoming a medical professional with clinical and social responsibilities. Exposure to the ICU also opens up knowledge on biomedical sciences and technology, which can further facilitate self-directed learning and research. Setlur *et al.*^[2] reported overwhelming participation and eagerness to learn airway management skills and resuscitation among students in their Anaesthesiology rotation.

OT is an environment that demands teamwork, strict adherence to protocols and guidelines related to infection control, medication management, surgical safety check-list and waste management. The safety of patients is dependent on the existence and implementation of infrastructural safety norms such as fire, electrical and radiation safety. Exposure and sensitisation of the UGs to the above during the grand rounds in the operation theatre can instil a sense of responsibility and accountability right from their early days of medical education. Observing the communication, teamwork and leadership exhibited by anaesthesiologists in the OT and ICU can impart non-technical skills to the student, which is crucial for any doctor irrespective of the speciality chosen in the future.

Development of skill laboratories in medical colleges and simulation-based UG training

The CBME UG curriculum focuses on competencies-based outcomes along with an emphasis on skill development. It lists 46 subject competencies of Anaesthesiology as prerequisites for graduation of the Indian Medical Graduate including BLS and intravenous line insertion.^[5] These skills are to be acquired to attain the predefined level of competence of 'Shows How' or 'Perform' by the student in a simulated environment. Therefore, it is essential for Anaesthesiology departments to develop skill sessions in which these desirable and certifiable skills are taught and assessed. The development of skill

training modules for various competencies requires faculty training and time. By imparting practical skills in the simulation laboratory, OT or ICU, and by laying more stress on the acquisition of practical knowledge and skills rather than on theory lectures, anaesthesia can be made into a very exciting subject for the UGs.^[2] Skills sessions for these competencies should cover cognitive skills that teach the basic knowledge and its application, psychomotor or procedural skills that require manual dexterity, coordination, leadership, communication skills and team skill.^[17] A skill laboratory for a simulation session may be used to impart these skills training as it provides a safe training environment in which a learner can perform tasks repetitively under supervision till the desired level of competency is achieved. The effective teaching-learning method for psychomotor skills of BLS is the demonstration-observation-assistance-performance (DOAP) technique. BLS is ideally taught in a simulated environment where the student watches videos to create interest and then has interactive lectures on BLS. The student then observes the skills on a mannequin in which the trainer deconstructs, describes the steps and demonstrates the skill. The student is then assisted to perform on a mannequin to acquire these skills and then practises and performs individually on a mannequin, and finally, performs as a part of a team to attain this competency.

Simulators present in a skill laboratory may be low-fidelity low-cost part trainers, full-body task trainers or high-fidelity simulators. Part task trainers are extremely useful for simulation and teaching simple skills to UGs. Intravenous line insertion is ideally taught using a part-task trainer. Simulation-based training is also effective for teaching crisis management and ensuring the adherence to protocols such as management of an unconscious patient or transport of a critically ill patient. Communication skills are ideally taught by role-plays.

It is mandatory for all medical colleges to develop a skill laboratory for teaching procedural skills to the UGs for the implementation of the CBME. Anaesthesiologists are the leaders in establishing and maintaining these skill laboratories in most institutions and their advice is sought in this regard by the institute administration. The skill laboratory provides an environment for medical students to learn and practise psychomotor skills on a simulator without any potential harm to an actual patient. It can also be used for assessment purposes, and the students can be observed performing

these skills without the actual use of the clinical case, which may not be feasible because of repetition due to the sheer number of students. The NMC has made available on its website a detailed document as guidelines for developing skill laboratories for interested institutions.

Several minimum requirements must be fulfilled for skill laboratories as per the CBME UG curriculum. These include 4–8 examination rooms housing simulated patients with the facility for recording and reviewing of videos, skill demonstration room for a small group, debriefing area, appropriately sized cubicles for practising skills individually or in groups, mannequins/simulators required to acquire skills defined in the CBME UG syllabus, adequate space for storage of equipment, and rooms for faculty coordinator and support staff. One room in the skill laboratory is allotted to the Department of Anaesthesiology.

Institutions may develop more sophisticated laboratories in addition to these minimum requirements. More than one institution in the same geographical area and under the same governance can share the facility and/or resources to make it economical.^[17,18]

Pandemic management

The pandemic management module of the CBME is structured to teach the student to acquire competencies in handling the medical, legal and social issues related to the outbreak of diseases such as coronavirus disease-19 right from the foundation course till the final year in the form of a continuous loop. The module provides opportunities for the anaesthesiologists to make specific contributions right from the foundation course up to phase III, part 2. In addition, the module specifically demands integrated teaching sessions of Anaesthesiology with the departments of General Medicine and Pulmonary Medicine on care of patients during the pandemic, emergency procedures, death-related management, communications and media management, intensive care management and palliative care during the pandemic.^[19]

Need for improvement of the role of the anaesthesiologist in the CBME

The professional activities performed by an anaesthesiologist in day-to-day life fall into four major domains, namely teaching, patient care, research and administration. Ronald Harden in the year 2000 described the twelve roles of a medical teacher, which

were grouped in six areas:(1) information provider, (2) role model, (3) facilitator, (4) student assessor, (5) curriculum/course planner, and (6) resource material creator.^[20] Some of these roles (1 and 6) require more medical expertise (subject knowledge) whereas others (2,3,4 and 5) require more educational expertise (teaching methodology and educational technology) for effective enactment. For the effective implementation of the new CBME curriculum, not much needs to be done for roles requiring more medical expertise as anaesthesiologists possess adequate medical expertise and this was already applied in the traditional curriculum. Roles that require educational expertise need to be strengthened through faculty development programmes.

As per the assessment module of the CBME curriculum, there is no separate assessment for the subject of Anaesthesiology in the UG curriculum. In the final professional examination conducted by the university as the third professional part II exam, questions related to General Surgery allied subjects (Orthopaedics, Dentistry, Anaesthesiology and Radiodiagnosis) constitute 25% of the total theory marks and will be incorporated as a separate section in paper II of General Surgery.^[21] The weightage for Anaesthesiology-related questions in the clinical/practical part of the final professional examination in General Surgery is unclear. There will be a minimum of two tests for internal assessment in the subject of General Surgery in the second, third and fourth phases. These internal assessment marks for General Surgery will be out of 200 marks each for theory and clinical. Further, 25% of weightage in the theory tests is given to the allied four subjects of which Anaesthesiology is one. This means that the scope for the subject of Anaesthesiology in a theory question paper is restricted to only four short-answer questions of 3marks each, which by any standards is a very low weightage for a clinically important and rapidly advancing subject like Anaesthesiology. We hope this discrepancy shall be addressed in future curricular revisions.

Methods to strengthen the educational expertise or expand the role of the teacher in Anaesthesiology for imparting CBME

The roles can be further expanded or improved by bridging the gaps between CBME and the traditional curriculum. The NMC has rolled out competency-based curricula both for UG and PG medical training and is transitioning to an 'outcome-based education'. As competencies (as outcomes) are difficult to measure,

the competencies have been divided into milestones and entrustable professional activities to facilitate assessment. The progress and success of students throughout the course is measured through continuous, precise and in-depth, formative assessments. The confines of the time-based residency have to be relaxed. Core Anaesthesiology faculty need to be identified as 'trained observers' of the learners' progress. Teachers must learn to accept both extremes of learners viz. fast learners (achieve 'expert' status earlier than the required time) and slow learners (struggle to achieve acceptable status, who require additional education time), without judgment. Innovative novel educational opportunities need to be created for fast learners. Finally, it will be equally important to convince the learners to accept this change. The management will have to face the logistic challenges that are already ensuing.^[16] Both the student and the teacher will play important roles in adapting to these changes.^[22]

The skills laboratory has to function hand-in-hand or in tandem with medical education units; this opens the doors of opportunities for the anaesthesiologist for getting trained and mastering to teach and assess various skills (apart from BLS) to other departmental fraternities (e.g.comprehensive trauma life support, paediatric advanced life support, neonatal advanced life support etc.).

As per NMC guidelines, both formative and summative assessments have to be conducted. The maintenance of the logbook is mandatory, and a portfolio is desirable. The psychomotor skills module taught by the anaesthesia faculty can be documented in the logbook to assess how the student has achieved the competency.^[23] Online teaching and assessment of UGs have gained importance during these pandemic times. Assessment can be done before the lecture by using short quizzes or tests to get an idea of the baseline knowledge and skills of the student. Assessment techniques (while teaching) such as polls, muddiest-point or one-minute paper can be used to help assess knowledge, recall and understanding. Newer work-place-based formative assessment methods can be used after teaching and as part of practical exams for internal assessment. Online formative assessments can be done with multiple choice questions, short answer questions, online polls and picture-based questions based on audio-visual clues, electronic patient management problems, objective structured video examination, virtual objective structured clinical examination, reflections and

e-portfolios.^[24] Nevertheless, the anaesthesia faculty will have to familiarise themselves with these modern concepts and master the newer teaching-learning and assessment methods; nonetheless, they will have to be smart in choosing the right assessment tool. Furthermore, blended teaching-learning sessions with the integration of classroom face-to-face learning and online learning will soon become very common and hence, we anaesthesiologists, too, will have to develop blended learning modules for our topics.^[21]

Ample opportunities exist to get involved in qualitative/educational research, including action research for developing new educational strategies and approaches to curriculum development, as there is a definite lack of evidence for the outcome of the CBME. We need a collaborative approach to create the evidence required to implement CBME wisely and cost-effectively to have positive impacts on patients, trainees, and healthcare systems.^[25]

'Electives' are a part of the CBME UG curriculum. Palliative care and critical care have been suggested as topics for electives and UG students can be posted in the Department of Anaesthesiology to work on these topics. Newer topics for electives such as perioperative care, pain management and trauma management can be added and anaesthesiologists can guide these topics.

In the Attitude, Ethics and Communication (AETCOM) module of the CBME UG curriculum, Module 2.6 is on bioethics related to case studies on autonomy and decision-making, including 'Do not Resuscitate' and 'Withdrawal of Life Support' to be taught in the second professional year.^[26] Anaesthesiologists being both intensivists and palliative care physicians would be ideally suited to teach this, and they should be given the responsibility of teaching this; however, currently, this module is being taught by other departments. Furthermore, though Anaesthesiology is currently integrated with other departments, there is more scope for alignment and integration with other departments. Moreover, anaesthesiologists possess lifesaving skills and hence, their role in the foundation course can be expanded by giving them the responsibility of teaching the management of medical, environmental and injury-related emergencies.

SUMMARY

Though Anaesthesiology as a subject has now gained more importance in the UG curriculum in our country,

there is a need for Anaesthesiology to get more weightage and anaesthesiologists to become more involved in the mainstream UG teaching activities; nevertheless, this transition has to occur stepwise. This is because, for a department that has been involved more in postgraduate teaching, it will certainly take a little more effort and practice to adapt to the UG level of teaching. The success of the CBME programme lies in the ability of the teacher and college/institute administration to cooperate and adapt to the changes in teaching and assessment methodologies in addition to student involvement.

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Conflicts of interest

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