Original Research Article

Competency based Medical Education: An overview and application in Pathology

Abstract

Introduction: The Competency-based curriculum is the turning point in medical education and holds much potential in the current trends of medical transformation in India. It provides an outcome-based approach with the integration of knowledge, skills, attitude, values, and ethics. In comparison to the older curriculum, it differs in clarity, cohesion and has a comprehensive approach.

Methods: The study aims to discuss and evaluate in detail the process and establishment of a competency-based medical curriculum in the pathology department and highlights the ups and downs of the experience. It was set up following the guidelines provided by NMC under competency-based undergraduate curriculum for the Indian medical graduate, state university guidelines references from the internet, and peer review from other institutions.

Results: The new curriculum has bought many positive changes and requires a radical change in the approach of faculty, institution, and students.

Discussion: General preparedness, outgoing and flexible attitude, consistency, and long-term commitment to a transformation from being a facilitator will be the prime needs to make the new "Indian medical graduate."

Key word: Medical Education, Pathology, medical graduate, Lecture preparation, caregiver

Introduction:

The Indian medical education dates back to 1835, when two new institutions of modern medical education began in India: one in then Calcutta as a medical college and the other in Madras as Medical school. In 1845 the prestigious Grant Medical College of Bombay came in existence and then in 1850 Madras medical school became a college. In 1857, with East India Company settling in: three medical colleges were established with two separate degrees- licentiate and doctorate. The bachelor's degree which later became MBBS was added in the ensuing decades. In 1900 the licentiate degree was cancelled and MBBS degree was introduced, followed by which the All India Medical Council- the latter day MCI was established in 1930 [1]. In time the country getting independence, the concept of *"uniform standard of education"* for the country was advocated which stated that all doctors should have a single basic degree and there should be no hierchy, also it was decided that by the medical council of India to discontinue the concept of medical school and convert all to medical colleges [2,3]. So in 1946 Bhore committee recommended amendments, e.g. Byramjee Jee Jeebhoy medical school became the prestigious B J Medical college in 1946. All these changes bought a streamlining in the curriculum intending for a formal training in medicine and tailoring it from time to time to meet the various needs of the time. For example Srivastava Committee of 1970 and then changes were bought by Bajaj Committee in 1986 [4,5].

In the past 20 years since 1997- regulations on graduate medical education were not made, making it necessary to take a relook at all aspects of the various components in the existing regulations and adapt them to the changing demography, socio-economic context, perceptions, values and expectations of stake holders. Emerging health care concepts with the changing disease scenarios, impact of advances in science and technology, shorter approaches on diseases and their management also needed a review. So, taking the strong and forward looking fundamentals from 1997 regulations on graduate medical education gave birth to graduate medical education 2018 [6,7,8]. (Table 1)

Table 1: Comparative analysis of New and Old Curriculum

Vectors	New Curriculum	Old Curriculum
Domain	Cognitive, Psychomotor & Affective	Cognitive
Focus	Student	Teacher
TLM	Interactive teaching	Didactic Lectures

The term 'curriculum' and why the change: The word curriculum has been derived from the Latin word 'Currere' which means race course or a runway, on which one must run to reach the goals. Accordingly a curriculum is the instructional and the educative program following which the pupils achieve their goals, ideals and aspirations of life. It is through this that the general aims of the education received, find concrete expression. Traditionally it was subject centric and current approach is to make it student, life centric and skills oriented [5].

The new regulation mainly highlights on continuation and evaluation of thought in medical education making it learner and patient centered, gender sensitive, outcome oriented and environment friendly. This could only be accomplished by an outcome driven curriculum which confirms to the global trends. 'The salient features of revision of medical curriculum in 2019 is the emphasis on learning which is competency based, integrated and student centred, acquisitions of skills, ethical and humanistic values.'

Few of the salient highlights of GME 2018 are:

- Emphasis is more on alignment and integration of subjects both horizontally and vertically while respecting the strength and necessity based instruction and assessment. This bought the concept of broad competencies and sub-competencies.
- Significant focus has been given to outcome driven undergraduate curriculum to provide orientation and skills as a life long learner. This has been further sealed with early clinical exposure, electives and longitudinal care. 'Skill acquisition' is a necessary component in GME 2018. The experts have suggested specific skill acquisition, assessment methods, use of skill labs, stimulated and guided environments.
- The importance of ethical values, and acute responsiveness and compassion for the patient has been specially underscored so it has been provided under a longitudinal program based on AETCOM (Attitude, Ethics and Communication) competencies. Highlight has been laid on collaborative and inter-disciplinary team work, professionalism, altruism and respect in professional relationships.
- An attempt has been made to allow students from different and diverse educational streams and background to transit appropriately through a foundation course. The intent of this is to provide orientation to the carrier ahead of an Indian Medical Graduate.
- Dedicated time have been allotted to SDL, co-curricular activities and sports.
- Special emphasis has been laid on formative and internal assessments to channelize and achieve the targets of the curriculum. Minor changes have been made in the summative assessments to reflect on the evolving thoughts and the regulatory requirements [6].

Objectives:

The research work aims to discuss the challenges and highlights of setting up the new competency based medical curriculum in Pathology at Symbiosis Medical College For Women. It also focuses on discussing the assets and shortcomings of the herculean task of establishing the department from a scratch.

Materials and Methodology:

The setup of the department was done according to NMC guidelines and criteria's. The new curriculum has been laid out intricately and in detail in the Indian Medical Graduate 2018 and competency based undergraduate curriculum. Reference and review articles were taken from various sources on implementation and strategies to adopt the new curriculum [3,6-10,15]. a checklist was prepared for the salient and critical points to be focussed on preparation, so that we don't miss out anything. (Table 2) Discussions with faculties of first MBBS and other subjects of second MBBS were made, university guidelines and inputs from other institutions were also taken. The department of pathology in our institute has just been established so we had the benefit of implementing things with vivid imaginations but at the same time the drawback of bringing everything to its place was challenging. The research was conducted and compiled with the experience of faculty of department of pathology for the past 1.5 years of setting up for the first batch of MBBS students.

The new medical college was supportive and helped us in complete execution and implementation of the curriculum after multiple meetings, thorough discussions, we enlisted the important and essential needs for the competency based curriculum specific to pathology. (Table 2)

Table 2: Broad Criteria's under CBME

Criterias:

1.	Sensitization about CBME
2.	Competencies and deriving SLO's
3.	Timetable
4.	Lecture preparation and distribution of competencies
5.	Concept of vertical and horizontal integration
6.	Assessment and feedback significance
7.	Conducting practical
8.	Preparation of Log book and Practical journal
9.	AETCOM

Sensitization about CBME in pathology:

The MBBS second phase has total duration of 12 months and is broadly divided into 3 divisions of four months each [6]. To facilitate the understanding of the new curriculum, workshops were conducted as curriculum implementation support program (CISP) and revised basic medical education training organised by the regional medical education unit in collaboration with the medical education unit of our college. They helped us in transforming our approach as teachers to learning facilitators, with different roles to play as lifelong learners and facilitating the same for our students. The workshops gave us a better understanding of terms like- Domain, Core, Non-core, Cognitive and Psychomotor skills, different teaching and learning methods and approach of alignment and integration [6,11].
Being a new institute, (started in 2019 and the first batch was admitted in 2021), the admission process was still going on for the first batch. We had to set our goals with clarity so that students achieve best in pathology at the end of second MBBS. To bring this to reality, we had divided the various topics under competencies and prepared their respective SLO's, at the same time we integrated the lectures both vertically and horizontally with pre and clinical subjects. This would help the undergraduate students to co-relate, diagnose with precision and accuracy. Since, pathology is the bridging branch the essential practical skills for understanding laboratory results and management of patients was kept in foresight.

The standard references for setting up the curriculum were provided by MCI: competency based undergraduate curriculum for the Indian Medical Graduate [6]. This helped us in providing with possible vertical and horizontal integration, teaching- learning methods, cognitive and psychomotor domains, type of assessments and skill certification requirements.

Competencies and deriving SLO's:

Pathology perse has 181 competencies, which have been designed for the subject by MCI. Competency is defined as a capability to apply or use a set of relative knowledge, skills and abilities required to successfully perform 'critical work functions' or tasks in a defined work setting [13]. (Figure 1)

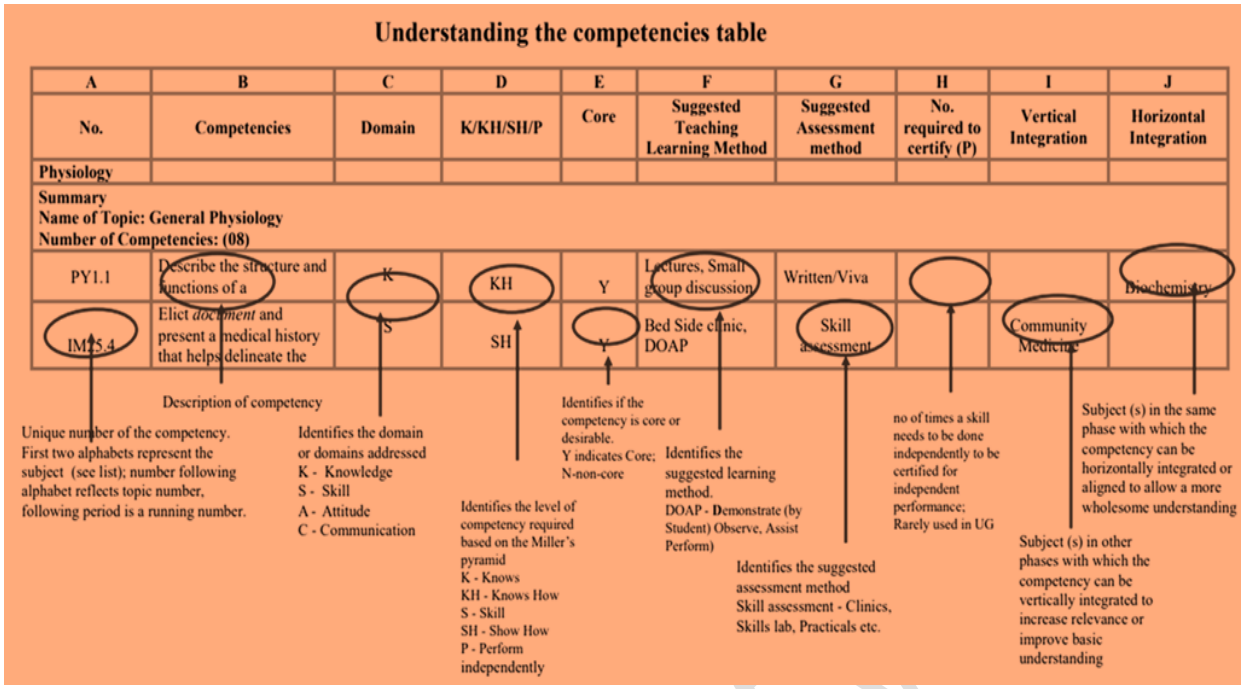

Figure 1: Understanding the competency table and its utility

The SLO's for various competencies were derived in a way that all the aspects of the competency were covered. For e.g.: Megaloblastic Anaemia (Table 3)

Competency No	**Topic**		
	SLO	Time duration	TLM
PA 15.1 Describe the metabolism of Vit B 12 and the aetiology and pathogenesis of B 12 deficiency.	PA 15.1.1 describe normal Vit B 12 metabolism, sources, absorption, transportation, storage sites and functions of Vit B 12. PA 15.1.2 describe normal folate metabolism. PA 15.1.3 describe the causes of Vit B 12 deficiency and clinical presentation.	1 hr	LGD, SGD,K, KH LGD, SGD,K,KH LGD, SGD,K,KH
PA15.2 Describe the laboratory investigations of megaloblastic anemia	PA15.2.1 Describe the causes of megaloblastic anemia PA 15.2.2 Explain folate deficiency with causes, clinical presentation, laboratory features. PA 15.2.3 Describe Vit B12 deficiency with causes, clinical features and laboratory findings. PA15.2.4 Enumerate briefly the treatment of	1 hr	LGD, SGD,K,KH LGD, SGD,K,KH LGD, SGD,K,KH LGD, SGD,K,KH

	folate deficiency and Vit B 12 deficiency		
PA 15.3 identify and describe the peripheral blood picture of macrocytic anemia	PA 15.3.1 explain morphological features of megaloblastic anemia on peripheral blood smear PA 15.3.2 explain morphological features of megaloblastic anemia on bone marrow.	2 hr	LGD, SGD,K,KH P LGD, SGD,K,KH P
PA 15.4 enumerate the differences and describe the aetiology and distinguishing features of megaloblastic and non-megaloblastic macrocytic anemia	PA 15.4.1 Enumerate the various miscellaneous causes of megaloblastic anemia. PA 15.4.2 Describe the haematological disorders presenting with megaloblastic anemia. PA 15.4.3 Define the clinical presentation of acute megaloblastic anemia	1 hr	LGD, SGD,K,KH LGD, SGD,K,KH LGD, SGD,K,KH

Table 3: Designing SLO and TLMs

LGD: Large Group Discussion; SGD: Small Group Discussions, K: Knows, KH: Knows how, P: Practical

Timetable:

The timetable for second phase MBBS was made and the teaching hours for large group discussions and small group sessions were distributed according to guidelines and norms provided by the NMC. The total number of teaching hours allotted to pathology were 92 hours for LGD while for SGD/DOAP/Seminars/Tutorials we were provided with 138 hours. The timetable also comprised of AETCOM, pandemic modules, clinical posting, sports and extra-curricular activities. We were supposed to have regular feedbacks, formative assessments and incorporate SDL sessions with lots of brainstorming, meetings and common consensus we framed the timetable with all the above said criteria's and finally got our approval from the regional NMC centres.

Lecture preparation and distribution of competencies:

The lecture preparation, was different as we had specific competencies to cover and they were further allocated as core and non-core subjects. The SLO's were defined in the competencies as per the curriculum and were taken as smaller targets to be achieved for the final goal of the particular competency. They were proportionately distributed amongst the faculty which were presented as PPT's in standard layouts for uniformity. The usual referral books specific to pathology were used. For the purpose of alignment and

integrations subject specific faculty was approached for their ideas and inputs. There were specific number of hours allotted for SDL and feedback sessions. Formative assessments were also kept intermittently. Only 30% of the portion should be covered as didatic lectures and the rest of the teaching-learning methods should comprise of interactive learning [6]. So, small group learning, clinical experiences, problem oriented approaches, case studies and many other were incorporated [14].

In all the discussions, the topic and the plan of execution was intimated well in advance so that the students could do proper justice to the topic with the available resources and faculty. Few of the teaching and learning methods that we had implemented are enlisted in (Table 4).

Table 4: Teaching and learning methods implemented

Large Group Teaching	Small Group Teaching
Didactic lectures	Quiz
Team performance	SDL
Clickers	PBL
Flipped class room	CBL
Seminar	Panel discussion
Tournament	Seminars
Chit and chats	Tutorials

Concept of vertical and horizontal integration:

The purpose of medical education is to facilitate the medical student to become a caregiver to the patients. In order to achieve this, the MBBS curriculum needed to align as many topics of different subjects at same pace with similar threads under common groups in the timetable. The concept of integration implies alignment both vertically and horizontally. (Table -5) Horizontal integration is within a phase, helps to remove redundancy and provide interconnections and vertical integration in early phase is to emphasize the applicative use of basic sciences and utilize and built on this to make a strong foundation of clinical practice. The alignment helps in the temporal co-ordination hence the timetable had to be framed in a way that various subjects of all phases of MBBS were co-related and linked according to the topics being covered. For e.g.: Tuberculosis/ Rheumatic diseases: subject focus teaching was done followed by nesting, i.e.: teacher targets within the subject a skill based approach which helps in complete understanding both conceptually and clinically the topic. Suggested topics for vertical and horizontal integration to be covered were at least 20% of all the topics [6,7].

Table 5: Vertical and horizontal Integration

Competency	Topic	TLM	Vertical Integration	Horizontal Integration
PA 8.1-8.2	Basic Diagnostic Cytology	DOAP	Gynaecology & Surgery	Microbiology

Assessment and feedback significance:

Competency based curriculum obligates a vastly different perspective on assessment. It emphasizes on longitudinal assessment for a better understanding of how much the student has perceived and absorbed. Overall, the efficacy of competency based and its implementation is critically judged on the basis of assessment. Further this can be facilitated by regular feedbacks and formative assessments. Effective feedback is of utmost importance in helping the learners to improve and helps the facilitator to recognize and take early actions to improvise. This concept helps in active involvement of the learner, creating an authentic teaching and learning atmosphere, close observations and formative feedbacks. With this we incorporated 3 forms of assessments namely formative, internal and summative assessments [6].
Formative assessments were planned at the end of topic specific competencies with the main intent to have an informal assessment at the end of completion. In the lectures, SGDs and seminars: clicker, one minute papers and muddiest points were planned. Practical's and tutorials were made interesting by use of SNAPPS and OMPs. The concerned faculty of the competency had defined these with the help from MEU.

Internal assessments were three in total, with the last one being Preliminary examinations. These exams provided for both formative and summative assessments. It focuses on psychomotor, communication and affective domains judging the content and process of learning. All the faculties were involved and we roped in experience of all.

Conducting practical's:

We were facing challenges in the way to conduct practical in new CBME. The DOAP sessions were conducted. They were enlisted and identified for topics of haematology, clinical pathology, cytology and histopathology. Possible integration was done with other departments to provide needed coordination and complete understanding of the topic. The practical rooms needed to be prepared and so we had prepared an inventory of reagents, specimens, slides and various instruments to do hands on experiments. To make things more convenient we had done demonstration exercises amongst ourselves and trained the technicians for the practical sessions. They were mainly conducted in form of OSPE and OSCE [16].

The slides for haematology (anaemia and leukaemia) were collected, stained, mounted and filed in slide boxes. The histopathology slides depending on the competencies were prepared from tissue sections obtained from routine grossing and archived specimen for the museum. Few of the slides with rare lesions were purchased from medical colleges and private practitioners. Slides for cytopathology were difficult to collect mainly because of specimen inadequacy. So we had collected soft versions for the purpose of micro teaching. Hopefully in time we'll be able to get more slides and archive a collection.

The pathology museum is a source of profound learning to the students. We had acquired a wide range of specimen from classical to rare from private practitioners and hospital around Pune. The specimens were checked and then mounted by the technical staff, also sections were taken for archival in practical classes. Catalogues of the museum were also prepared with display of relevant clinical, gross and microscopic findings. Charts and posters in reference to various topics were made to ease the process of teaching and learning. In the museum we had made arrangements for e library to demonstrate few common procedures of mounting, staining, frozen section etc. This helped further in providing a hands on training and skill acquisition.

Preparation of log book and practical journal

The uniqueness of CBME is its longitudinal nature and the measures of progression needed a good maintenance of records. We had prepared log books and practical journal according to prescribed NMC guidelines. The essential criteria for them was regularity, availability for students and documentation of approach to results (mainly as present status, feedback and suggestions for improvement). The record books were prepared well in time and the topics were divided according to the competencies covered. The mode of conduction of topics was defined as DOAP, tutorial, seminar and SGD. Integration and alignment was done, small descriptions were provided in practical books with highlights of microteachings, which were prepared by junior faculty in advance. The journal book has been introduced in CBME for documentation of skill development. The intent of the book was to provide with records and certification of skills illustrated for IMG. It also helped in maintaining records of DOAP sessions, assessments, scores of examinations, record of seminars, sessions on SDL and any other extracurricular activities.

AETCOM

Role modelling and mentoring associated with classical approach to professional apprenticeship has long been a powerful tool, but this is not sufficient for the development of medical profession. The domains of attitude and communication with a clear focus on ethics need to be incorporated directly and explicitly throughout the undergraduate curriculum. The two basic features which we needed to focus on teaching professionalism was a core cognitive based, appropriate opportunities for experimental learning and reflections. To bring this to execution we had a hybrid approach to the problem, so we incorporated role play, demonstrations and real life issues with patient scenarios. In the NMC curriculum AETCOM is a longitudinal program and we had one competency, for which we had prepared SLOs and incorporated them in the time table. To conduct the sessions we primely planned to use role play, group discussion and demonstrations.

Result and Discussion:

Competency based medical education is an approach to producing competent doctors by adoption of a framework of competencies which in turn have been carved out from the needs of the population.(17) It has an outcome based approach, where in the end results of the training, have been defined in advance and is expected that by the time a medical student completes his/ her training, they will be competent enough to play there role under the five core competencies viz. clinician, leader, communicator, lifelong learner and professional (17,18). In Indian setting CBME was accepted for the undergraduate courses from the academic year 2019-20 and it was much awaited as the last curriculum regulation had come in 1997.

There were both advantages and disadvantages in setting the new curriculum in the new department. Since, the staff who had joined the department had mixed experiences and different backgrounds, we did a small unconventional survey, via telephonic conversation and faculty discussion, we figured that various faculty and colleges had a different notion and approach to setting the new curriculum. There was a mixed approach and dilemma regarding the intended changes targeted by the curriculum. Different people had varied perspectives and approaches to take the changes suggested in the curriculum. Also, irrespective of the common background and the information provided by the NMC the interpretations and execution of competencies, SLO, and TLMs were different from other contemporaries. This further resulted in a non-uniform approach of having the basics of the new curriculum in different colleges. The practical and demonstrations were better synced as we were provided with specifications of the finest details so they were more streamlined with other colleges and departments. The assessment methods, DOAP, practical and SDL planning were more in sync with other institutions. We had a few advantages being an in process department, like framework to incorporate changes, with the experience of the faculty, explored the technology to make TLMs more innovative and a competent museum.

Few of the disadvantages, which were mostly teething troubles were reluctance of faculty to adopt new methods, inter department co-ordination for alignment and integration, slow learners were impacted as the pandemic gave us challenges which were time bound. Finally the human discretion and presentation which had wide variation and so there was no uniformity amongst the various colleges.

Conclusion:

With new approach of CBME the teaching and learning methods have also changed, its more student centric, where the student takes the onus of their learning, planning hence aims to achieve the learning outcomes. Apart from the needed knowledge, they also need to know the desired skills, attitude and an ability to integrate all for the care of patients and in turn the community. The onus of formative assessment is high and all efforts have been taken to integrate both formal and informal assessments. Also depending on the core and non-core competencies, significant emphasis has been laid for the divisions of hours and focussing. One critical and compounding factor which has been instrumental in implementation of CBME has been feedbacks, which have to been taken from students at regular intervals [19]. Feedback is critical and is personalized information based on direct observation crafted and delivered so receivers can use the information to achieve their best potential. In the medical setting, feedback extends beyond self-improvement and ultimately impacts patient care. The ability to give and receive feedback is key for trainees, as an integral component of the professionalism competency. It informs every human interaction we have in our professional and personal lives. This is true of all comers to pathology, including laboratory professionals, administrative assistants, medical students, allied health students, residents, and fellows, and is true for pathologists in all practice settings and at all experience levels. Learning is at the heart of feedback, and feedback in medical education is important. Failure to provide feedback could be dire because ‘‘...mistakes go uncorrected, good performance is not reinforced, and clinical competence is achieved empirically or not at all.’’

Consistency, change of outlook and flexibility on part of faculty are very much needed to make CBME a success. A long term commitment through the transition process from facilitators will go a long way in producing the visioned and excellent IMG.

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