



VELAMMAL MEDICAL COLLEGE
HOSPITAL AND RESEARCH INSTITUTE
MADURAI - 625009

2.6.1

Methods of Assessment of Learning Outcomes and Graduate Attributes

Prof. T. THIRUNAVUKKARASU, M.D., D.A.,
Dean
Velammal Medical College Hospital
and Research Institute
"Velammal Village"
Madurai-Tulicorin Ring Road
Anuppanadi, Madurai-625 009, T.N.



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COMPETENCY BASED UNDERGRADUATE CURRICULUM FOR THE INDIAN MEDICAL GRADUATE

Knows Knows how Shows Shows how Performs

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Demonstrate

Enumerate

Assist

Counsel

Describe

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Integrate

Guide

Communicate

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Interpret

Module 3

Critique

Assessment

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Curriculum Implementation Support Program

**Assessment Module for
Undergraduate Medical Education
2019**



**Medical Council of India
Pocket-14, Sector-8, Dwarka,
New Delhi 110 077**

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<p>How to Cite: Medical Council of India. Assessment Module for Undergraduate Medical Education Training Program, 2019: pp 1-29.</p>

Dr. Vinod K. Paul

MD, Ph.D, FASc, FNASc, FAMS, FNA

Chairman

Board of Governors in Super-session of

Medical Council of India

Sector-8, Pocket-14,

Dwarka, New Delhi-110 077

Ph: +91-11-25367039

Fax: +91-11-25367031

Website: www.mciindia.org



डॉ विनोद कुमार पॉल

एम.डी., पी.एच.डी., एफ.ए.एस. एफ.ए.एन.एस.

एफ.ए.एम.एस., एफ.एन.ए

अध्यक्ष

भारतीय आयुर्विज्ञान परिषद के

अधिक्रमण में शासी बोर्ड

सेक्टर-8, पॉकेट-14,

द्वारका, नई दिल्ली-110 077

फोन: +91-11-25367039

फैक्स: +91-11-25367031

वेबसाइट: www.mciindia.org

Foreword

A popular maxim in education is - if it is not assessed it is not learnt. The introduction of a competency based curriculum makes assessment a crucial element of learning. Indeed, the emphasis on competencies makes assessment of its attainment and maintenance a prerequisite. Assessment must serve both to provide the continued input on the progress of the learner that will allow him or her to calibrate and improve and also to ensure that only the learner with the right set of knowledge, skills and attitude is allowed to be admitted into the profession and to provide patient care.

The introduction of a competency based curriculum necessitates structured formative assessment, periodic internal assessment and end of phase summative assessment with appropriate and effective feedback built in. In addition, a mechanism to assess and document competency and skill acquisition needs to be in place. Workplace based assessments need to be introduced to the extent possible keeping in mind the roll out of the student doctor program.

The task at hand is complex and requires extraordinary collaboration between teachers, institutions and Universities. This booklet attempts to align the needs of institutions, Universities, learners and teachers with assessment of competencies in the new MBBS curriculum. It has been prepared by invited experts who have worked along with the Expert group for curriculum appointed by the Board of Governors in supersession of the Medical Council of India.

The booklet provides clarity and guidelines that will be useful in the development and implementation of assessment in the competency based environment. There is an increased emphasis on assessment of outcomes through alignment with objectives. Also provided are ideas and strategies for meaningful formative and summative assessment. Summative assessment is the domain of the Universities; however, this booklet provides some principles that Universities can adopt while aligning the examinations to the curriculum that the learners will undergo.

I am grateful to the authors and the expert group who have made this booklet possible. Suggestions for improvement are most welcome. Institutions and Universities are encouraged to share their best practices so that we can all learn together and help bring out better doctors who will be an asset to the community that they serve and to the nation as a whole.

Dr. V. K. Paul

Phone : 25367033, 25367035, 25367036
दूरभाष : 25367033, 25367035, 25367036
Fax : 0091-11-25367024
E-mail : mci@bol.net.in
Website : www.mciindia.org



पॉकेट - 14, सेक्टर - 8,
द्वारका फेस- 1
नई दिल्ली-110 077
Pocket- 14, Sector- 8,
Dwarka Phase - 1
New Delhi-110077

भारतीय आयुर्विज्ञान परिषद् MEDICAL COUNCIL OF INDIA

BOARD OF GOVERNORS
IN SUPERSESSION OF MEDICAL COUNCIL OF INDIA

Foreword

This booklet provides a suggested pattern for Competency Based Assessment for the MBBS program commencing 2019. Summative assessment is the domain of the Universities to whom medical colleges are affiliated. Some changes will be required in the way that learners are tested to meet the requirements in the competency based curriculum. In addition, Competency Based Assessment places increased emphasis on formative and internal assessment. This booklet addresses the needs of institutions, Universities and teachers and is aimed at recalibrating the approach to assessment under the auspices of the new curriculum. The booklet is in alignment with the Regulations in Graduate Medical Education, 2019 Part II document.

This booklet has been developed by experts invited by the Board of Governors in supersession of the Medical Council of India and incorporates their vast expertise and experience. The Board of Governors in supersession of the Medical Council of India acknowledges their time and effort in creating this guide that can be used by institutions to develop their own learning process and content. Appreciation is also due to the efforts of the Academic Cell and faculty at the various Regional and Nodal centres who continue to work tirelessly to ensure that the new competency based curriculum and its various unique components are implemented faithfully and flawlessly across the medical colleges in this country. This will best serve the needs of the country and the cause of medical education.

(Dr. R.K. Vats)
Secretary General

Expert Group

1. Dr. Avinash Supe

Former Director (ME & MH) and Dean, Professor,
Departments of G I Surgery and Medical Education
Seth GS Medical College and KEM Hospital, Mumbai – 400012

2. Dr. Krishna G. Seshadri

Member, Board of Management
Visiting Professor
Departments of Endocrinology, Diabetes and Medical Education
Sri Balaji Vidyapeeth, Puducherry - 607 403

3. Dr. R. Sajith Kumar

Professor and Head, Departments of Infectious Diseases and Medical Education
Convener, MCI Nodal Centre for Faculty Development
Government Medical College, Kottayam, Kerala – 686008

4. Dr. P.V. Chalam

Principal & Professor, Department of Surgery
Bhaskar Medical College, RR Dist., Telangana – 500075

5. Dr. Praveen Singh

Professor and Head, Departments of Anatomy and Medical Education
Convener, MCI Nodal Centre for Faculty Development
Pramukhswami Medical College, Karamsad, Gujarat - 388325

6. Dr. Tejinder Singh

Professor, Department of Medical Education
Sri Guru Ram Das Institute of Medical Sciences & Research, Amritsar-143501.

7. Dr. P.V. Vijayaraghavan

Convener, MCI Nodal Centre for Faculty Development,
Vice Chancellor & Professor of Orthopedics,
Sri Ramachandra Medical College & Research Institute, Porur, Chennai-600116.

8. Dr. Subir K. Maulik

Professor, Department of Pharmacology
All India Institute of Medical Sciences, New Delhi-110029

9. Dr. M Rajalakshmi

Chief Consultant, Academic Cell, Medical Council of India,
Pocket 14, Sector 8, Dwarka, New Delhi 110077.

Additional Contributors

1. Dr. Dinesh Kumar Badyal

Professor, Departments of Pharmacology and Medical Education
Convener, MCI Nodal Centre for Faculty Development
Christian Medical College, Ludhiana, Punjab – 141008

2. Dr. Mohan Khamgaonkar

Pro-Vice Chancellor,
Maharashtra University of Health Sciences
Mhasrul, Nashik-422004

Curriculum Implementation Support Program

Module - 3

Assessment

Guidelines for Assessment in Competency Based UG Curriculum

1. Objectives of the Document

To help the reader to:

- Understand the role and place of assessment in new competency based curriculum
- Understand the changes in assessment as per new curriculum.
- Understand the differences between the traditional assessment and Competency Based Assessment (CBA).
- Understand the components of competency based assessment.
- Understand the tools for competency based assessment.
- Understand the role of feedback in assessment.
- Plan, develop and implement CBA in the colleges and universities.

2. Glossary of terms used in the document

Summative assessment (University examination)	An assessment conducted at the <i>end of instruction</i> to check how much the student has learnt.
Formative assessment	An assessment conducted <i>during</i> the instruction with the primary purpose of providing feedback for improving learning.
Internal assessment	Range of assessments conducted by the teachers teaching a particular subject with the express purpose of knowing what is learnt and how it is learnt. Internal assessment can have both formative and summative functions.
Validity	Degree to which the inferences drawn from assessment are supported by empirical evidence or theoretical rationale.

Reliability	Degree of confidence that can be placed in the results. Depending on the context, it can be in terms of precision, consistency or reproducibility.
Competency	An observable activity of the health professional with a judicious and consistent mix of knowledge, skills, attitudes and communication.

3. Introduction

Competency based education has been defined as an outcome-based approach to the design, implementation, assessment and evaluation of a medical education program using an organizing framework of competencies¹. Much more than a different style of teaching, competency based curriculum obligates a vastly different perspective on assessment. It mandates greater emphasis on setting up an ongoing and longitudinal assessment so that teachers can identify the stage of the learner and decide whether they need further or different learning opportunities to acquire competency. Assessment in competency based curriculum plays a crucial role in its implementation.

Competency is not an all or none phenomenon. Rather it is incremental. The role of teachers is to help the learner acquire and improve upon the competencies. Competency based curriculum moves away from time bound education and looks at competency as the end point. Consequently, we are no longer interested in demonstration of discrete behaviours by the learners; rather we are interested in application of these in each patient context. Thus, it is more about integration of the required knowledge, skills and attitudes rather than anyone of them in isolation. Therefore, assessment in competency based curriculum should incorporate integration to the extent feasible while maintaining subject identity.

4. Purpose of assessment in competency based curriculum

While an obvious purpose of assessment in competency based curriculum is to help the teachers decide if the students have acquired the desired competencies, an equally important purpose is to help the students acquire and improve their competencies. Quality assurance also requires quality assessment.

Major characteristics of competency based assessment are their longitudinal nature, provision of developmental feedback and authentic settings, all of which result in lowering the stakes on individual assessments. This has other important implications also for assessment design. Since the stakes are low and purpose is to improve learning, high standardization and psychometric rigor is not required. Authenticity of assessment task is more important than its structure or objectivity. Expert subjective judgment plays a major role in assessment of competencies.

This difference in perspective stems from three important characteristics of competency based curriculum. First, that by definition, teaching and assessment has to be in the *context* of competencies. Second, that discrete assessment of knowledge, skills and attitudes may not always add up to a competency. Third and probably the most important, that there is a high context specificity in assessment. Performing competency 'A' well does not mean that the student can perform the competency 'B' also as well. Similarly, assessment in demonstration room may not be the same as assessment at the bedside. Moreover, many competencies like communication, team work, sincerity etc. may not be amenable to reliable assessment if done sparingly or only at summative examination. Therefore, all competencies need to be assessed multiple times and in different contexts. An implication of this is that only one summative or end of year examination is not suited for this purpose.

Utility of assessment is traditionally expressed as a notional concept represented as using a product of validity, reliability, acceptability, feasibility and educational impact.² For CBA, validity and educational impact are the major determinants of its utility. Despite subjective judgments being involved, their reliability can be improved by increasing the number of assessors, assessments, tasks and by involving all teachers of the department in CBA process. This is a simple intervention to not only take care of subjectivity but also to improve ownership of teaching-learning and assessment.³

5. How does CBA differ from traditional assessment?

Traditional assessments are easy to design, administer, score and analyse compared to CBA but may not be able to provide complete information about the stage of the student. Traditional assessments are snap shot observations of learning, are generally not linked to instructions or outcomes and *promote test taking behaviour*. They are fragmented and mainly focus on knowledge (sometimes skills). CBA, on the other hand, provides more comprehensive information about not only the current stage of the student but also about his progression and ascendancy. They are longitudinal, often with low stakes and help to reduce examination anxiety. CBA is based on direct observation and therefore helps in generation of authentic feedback, which helps the students to learn better. This process of *assessment for learning* is crucial for the acquisition of competencies.

Competency based assessment should help in collecting and analysing evidence to decide if a student is competent in relation to a required competency and in relation to his/her stage of training. The underlying concept of competency – i.e. the *habitual and consistent* use of knowledge, technical skills, clinical reasoning, communication, emotions, values and reflection in daily practice for the benefit of the individual and the community being served, again demands that the student should consistently demonstrate the desired behaviour rather than only during the final examination.

Competency based assessment aids in the process of learning. Effective feedback is paramount to helping learners improve. CBA is an ongoing process so that any deviation in learning can be recognized early and taken care of by providing formative feedback. This concept is crucial and aligns very well with the basic principles of competency based medical education viz. active involvement of the learner, creating an authentic environment for learning, direct observation and provision of formative feedback. CBA requires active participation of the student in the form of self-assessment and reflections.⁴ The paradigm is reflected in figure 1.⁵

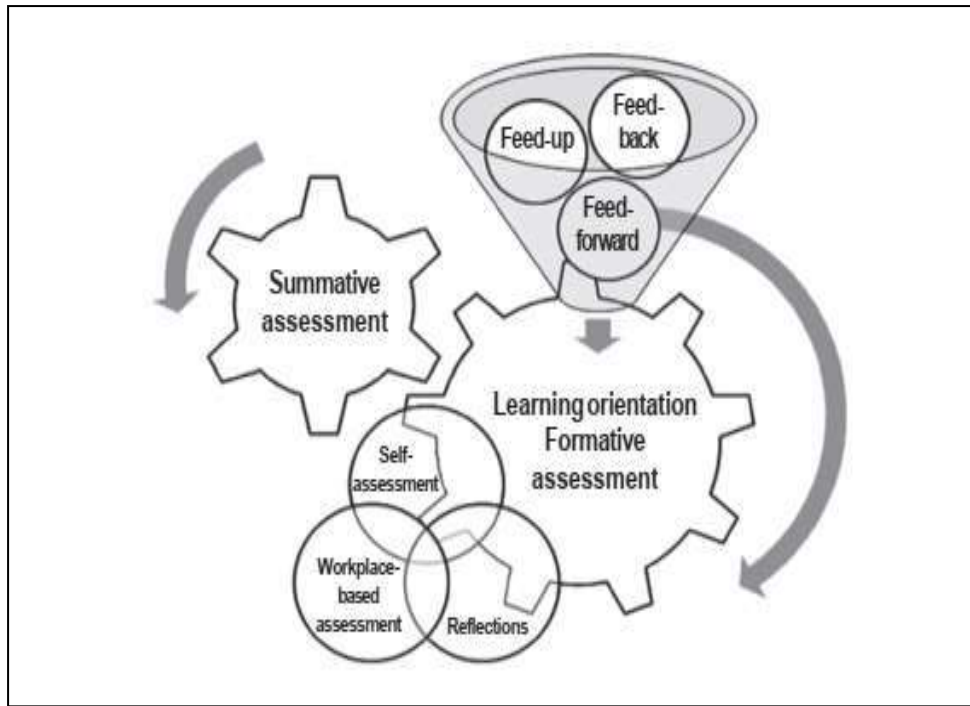


Figure 1. Paradigm of medical student assessment⁵

(Reproduced with permission from National Medical Journal of India)

Medical education literature distinguishes between competence (ability to do) and performance (actually doing). In terms of Miller's pyramid, competence would fall under the 'shows' category while performance falls under 'does'.⁶ For the undergraduate students, most of the assessment would be up to 'shows' level. Since they are not authorized to independently take care of the patient or are not directly in charge of patient care, targeting the 'does' level will pose logistic difficulty.

6. What should be assessed?

Assessment requires specification of measurable and observable entities. This could be in the form of whole tasks that contribute to one or more competencies or assessment of a competency *per se*. Another approach is to break down the individual competency into learning objectives related to the domains of knowledge, skills, attitudes, communication etc. and then assess them individually. However, as stated earlier, using individual domain framework may not always result in making an accurate assessment of the specific competency. Therefore, efforts should be made to include competencies in the assessment process as much as possible. CBA is very useful to convey a message to the students to structure their learning around competency framework.

The assessment opportunities can be broadly divided into ongoing and term end. While the term end examinations (Summative assessment) will usually be conducted by the Universities, the ongoing assessments are conducted by the teachers teaching the subject and can be both formal and informal.

The summative assessment e.g. University examinations at the end of professionals, are used for pass or fail decision. The purpose of such assessments is to sample the learning and ensure quality. Since all competencies should be assessed, summative assessments alone are not the option for CBA. For logistic reasons, competencies like communication, team work, ethics, professionalism and many procedural skills are also not assessable at term end examinations.

Ongoing assessment provides many options for this purpose. A blueprint may be needed to decide which competencies should be assessed during internal assessment and which should go to summative or University examinations. Informal assessments should happen during teaching learning activities with the express purpose of finding out the stage of the student and taking corrective action in teaching-learning methodology on an ongoing basis. During lectures, small groups or seminars, use of techniques like clickers, one-minute papers and muddiest point provide valuable information to check understanding and provide developmental feedback.⁷ Same can be done during practical/clinical teaching using one-minute preceptor (OMP) or SNAPPS technique (Summarize history and findings, Narrow the differential; Analyze the differential; Probe preceptor about uncertainties; Plan management; Select case-related issues for self-study)⁸⁻¹⁰. Many of these do not need to be considered for pass / fail decisions but are useful to aid learning and acquire competencies. These can be planned by the teachers on a day to day basis and modified depending on the tasks at hand.

Features of Competency Based Assessment (CBA)

- CBA operates within the framework of competencies. Assessment tools should align with competencies/objectives.
- CBA should help to acquire competencies/objectives (*assessment for learning*) and their certification (*assessment of learning*)
- CBA is continuous and ongoing process with opportunities for providing developmental feedback
- Direct observation of students improves utility of CBA and feedback
- Multiple assessors, multiple tools and multiple assessments improve the validity and reliability of CBA

7. Formative & Internal Assessment (IA)

Formative assessment is an assessment conducted during the instruction with the primary purpose of providing feedback for improving learning. It also helps the teachers and learners to modify their teaching learning strategies. The feedback is central to formative assessment and is linked to deep learning, seeking to explore the educational literature and its pedagogical lessons for healthcare educational practice. It provides inputs to both students and teachers regarding adequacy of teaching-learning¹⁰. A variety of feedback principles and techniques can be used depending on the context.^{11, 12}

Although there can be a debate on the summative or formative nature of IA, it still provides the best opportunities for formative purposes. IA is when assessment is done by the teachers who have taught the subject. It overcomes the limitations of day-to-day variability and allows larger sampling of topics, competencies and skills.

In competency based curriculum, IA provides useful avenues for both formative and summative assessment. IA focuses on the content and process of learning i.e. what and how students have learnt throughout the course. This assessment gives priority to psychomotor, communication and affective domains. These domains are usually not assessed by the traditional assessment methods. It should involve all faculty members of a department (Senior Residents upwards) and not just one or two senior teachers. This helps to build ownership of teaching-

learning and assessment as well as provide 'hands-on' experience in assessment to all teachers. IA can be a very useful tool for assessing all competencies in any competency based curriculum.

IA should not be considered as an assessment without external controls and can be utilized in a manner to overcome some of its perceived weaknesses. Utility of IA can be further improved by involving all teachers in the department and limiting the contribution of individual teacher, test or tool.¹²

8. Designing a system of assessment

While designing an internal assessment, all domains of learning i.e. cognitive, psychomotor and affective should be taken into account and weightage should be assigned to these domains for assessment.

Miller's pyramid (figure 2) provides a simple way to select appropriate tool for assessment. Efforts should be made to climb higher in the pyramid.^{6, 13} The following adapted example illustrates this:

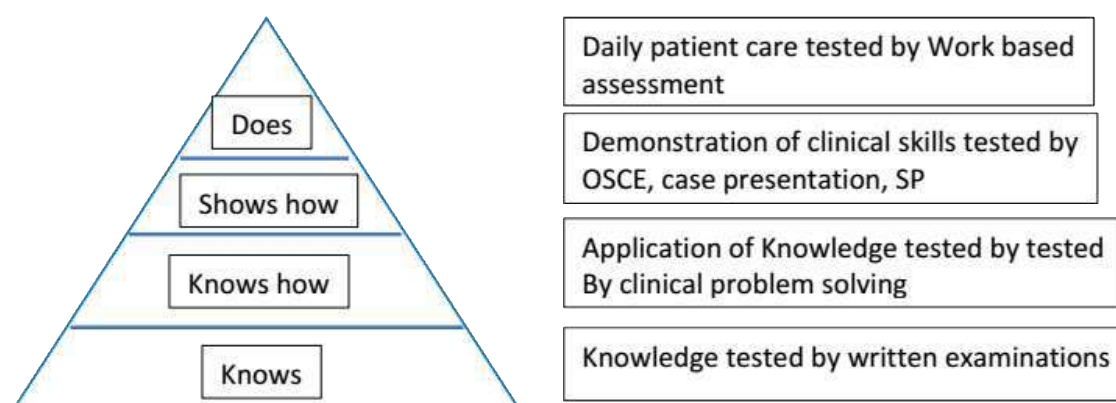


Figure 2. Assessment methods as per levels of competency (Adapted from Ramani)¹³

OSCE: Objective Structured Clinical Examination, SP: Standardised/ Simulated Patients

The key to building validity and making CBA assessment useful is its alignment with competencies/objectives. Including some aspects from competencies of other phases is useful to assess integration of concepts. Some examples of such alignment can be seen in the competency sheet given in Table 1.

Table 1. Deriving assessment methods from objectives

Competency: An **observable** ability of a health professional, **integrating multiple components** such as knowledge, skills, values and attitudes.

PA42.3	Identify the etiology of meningitis based on given CSF parameters	K/S	SH	Y
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Objective: Statement of what a learner should be able to do at the end of a specific learning experience

PA42.3.1	At the end of the session the PII student must be able to enumerate the most common causes of meningitis correctly	→	Short note or part of structured essay: Enumerate 5 causes of meningitis based on their prevalence in India
PA42.3.2	At the end of the session the PII student must be able to enumerate the components of a CSF analysis correctly	→	Short note or part of structured essay: Enumerate the components tested in a CSF analysis
PA4.3.3	At the end of the session the PII student must be able to describe the CSF features for a given etiologic of meningitis accurately	→	Short note or part of structured essay: Describe the CSF findings that are characteristic of tuberculous meningitis
PA4.3.4	At the end of the session the PII student must be able to identify the aetiology of meningitis correctly from a given set of CSF parameters	→	Short note / part of the structured essay/ Skill station/ Viva; Review the CSF findings in the following patient and identify (write or vocalise) the most likely ethology

A useful approach, especially for affective, psychomotor and communication domains, is to adopt the concept of *assessment toolbox*. A toolbox is a listing of available tools (and rating forms, if required), which are suggested for a particular competency or sub-competency and aims at improving the value of assessment data.¹⁴ The listed tools are suggestions only and can be freely used either singly or in combination by teachers to suit particular requirements. Efforts should be made to use multiple tools for a given competency to improve validity and reliability of assessment.

While assessment will continue to be subject based, efforts must be made to ensure that phase appropriate correlates are assessed to determine if the learner has internalised and integrated the concept and its application.

a. Internal Assessment logistics

Scheduling of IA

A proposed schedule of tests for IA is given in Annexure 1. These are minimum required numbers but more tests can be scheduled by departments as required. An end of posting clinical assessment shall be conducted for each clinical posting in each professional year. Prior to University examinations, departments can conduct additional tests as and when required with the purpose of providing

formative feedback to the students. In subjects that are taught at more than one phase, proportionate weightage must be given for internal assessment for each Phase. For example, General Medicine must be assessed in second Professional, third Professional Part I and third Professional Part II, independently. A student who has not taken minimum required number of tests for IA each in theory and practical will not be eligible for university examinations. Proper records of the work should be maintained which will form the basis for the students' internal assessment and should be available to the assessors at the time of inspection of the college by the Medical Council of India.

Components of IA

- (i) **Theory IA can include:** Written tests, should have essay questions, short notes and creative writing experiences.
- (ii) **Practical / Clinical IA can include:** practical / clinical tests, Objective Structured Clinical Examination (OSCE) / Objective Structured Practical Examination (OSPE), Directly Observed Procedural Skills (DOPS), Mini Clinical Evaluation Exercise (mini-CEX), records maintenance and attitudinal assessment.
- (iii) **Assessment of Log-book.** Log book should record all activities like seminar, symposia, quizzes and other academic activities. Achievement of certifiable competencies should also be recorded in logbooks. It should be assessed regularly and submitted to the department. Up To twenty per cent IA marks (Theory and Practical) should be from Log book assessment.
- (iv) **Internal Assessment for Professional development programme (AETCOM)** will include:
 - a. Written tests comprising of short notes and creative writing experiences in each subject.
 - b. OSCE based clinical scenarios and/or viva voce. Skill competencies acquired during the Professional Development Programme must be tested during the clinical, practical and viva voce in every subject.

Colleges and teachers should try to build capacity to use a variety of assessment tools. A number of tools are available in the form of assessment toolbox.¹⁴ The construct validity and predictive utility of internal assessment is high.¹⁵ Many of the tools mentioned for IA may appear subjective. However, by virtue of being high on *validity* and by conveying a message to the students not to ignore skills, attitudes and communication (*educational impact*), they contribute to better learning. Since stakes at IA are low, the use of expert subjective assessments to cover areas which are not assessable by conventional objectivised assessment tools is appropriate. There is plenty of evidence in literature to suggest that expert subjective assessments can be as reliable as highly objective ones.¹⁶

The IA of broader specialties should also include marks from all the allied specialties e.g. General Medicine should include marks of Psychiatry, Dermatology, Venereology & Leprosy and Respiratory Medicine including tuberculosis, while General Surgery should include Orthopaedics, Dentistry, Anaesthesiology and Radio-diagnosis, so that students do not ignore these postings. The proportion of the marks for each allied specialty shall be proportionate to the time of instruction allotted to each. It may be noted that although very small contribution is being made by allied subjects, yet it serves as motivator to the students to not miss these postings. When subjects are taught in more than one phase, the assessment must be done in each phase and must contribute proportionally to final internal assessment.

Assessment of Foundation Course should be included in formative assessment of first phase. Assessment of ECE should be included in formative as well as in internal assessment in first phase subject wise. Assessment of electives should contribute to internal assessment in final phase part-II. *There should be at least one assessment based on direct observation of skills, attitudes and communication at all levels.* Communication and attitudinal assessment should also be built in to all assessments as far as possible. A log book must be used to record these components. **A sample format of log book is being published separately.**

Feedback in IA

Feedback should be provided to students throughout the course so that they are aware of their performance and remedial action can be initiated well in time. The

feedbacks need to be structured and the faculty and students must be sensitized to giving and receiving feedback.^{11,12}

The results of IA should be displayed on notice board within two weeks of the test and an opportunity provided to the students to discuss the results and get feedback on making their performance better. Universities should guide the colleges regarding formulating policies for remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason(s).

It is also recommended that students should sign with date whenever they are shown IA records in token of having seen and discussed the marks. **Internal assessment marks will not be added to University examination marks and will reflect as a separate head of passing at the summative examination.**

Record keeping

The peculiarities of CBA, particularly its longitudinal nature and its use as a measure of progression require a good record keeping. Such records can vary from manual to electronic. In whatever form they are used, the essential features should include regularity, availability to the students and a documentation of discussion on the results (present status, feedback and suggestions for improvement) between the student and the teacher(s). Many aspects can be covered in a group feedback while some will require one to one discussion. The formats for use in Indian settings have been published and can be suitably modified for local use.¹²

These concepts have been incorporated in the proposed GMER 2019 and are reproduced below.

Excerpts from proposed GMER 2019

11.1.1 (b) Internal Assessment: Internal assessment shall be based on day-to-day assessment. It shall relate to different ways in which learners participate in learning process including assignments, preparation for seminar, clinical case presentation, preparation of clinical case for discussion, clinical case study/problem solving exercise, participation in project for health care in the community, proficiency in carrying out a practical or a skill in small research project, a written test etc.

1. Regular periodic examinations shall be conducted throughout the course. There shall be no less than three internal assessment examinations in each Preclinical / Para-clinical subject and no less than two examinations in each clinical subject in a professional year. An end of posting clinical assessment shall be conducted for each clinical posting in each professional year.
2. When subjects are taught in more than one phase, the internal assessment must be done in each phase and must contribute proportionately to final assessment. For example, General Medicine must be assessed in second Professional, third Professional Part I and third Professional Part II, independently.
3. Day to day records and log book (including required skill certifications) should be given importance in internal assessment. Internal assessment should be based on competencies and skills.
4. The final internal assessment in a broad clinical specialty (e.g. Surgery and allied specialties etc.) shall comprise of marks from all the constituent specialties. The proportion of the marks for each constituent specialty shall be determined by the time of instruction allotted to each.
5. Learners must secure at least 50% marks of the total marks (combined in theory and practical / clinical; not less than 40 % marks in theory and practical separately) assigned for internal assessment in a particular subject in order to be eligible for appearing at the final University examination of that subject. Internal assessment marks will reflect as separate head of passing at the summative examination.
6. The results of IA should be displayed on the notice board within a 1-2 week of the test. Universities shall guide the colleges regarding formulating policies for remedial measures for students who are either not able to score qualifying marks or have missed on some assessments due to any reason.
7. Learners must have completed the required certifiable competencies for that phase of training and completed the log book appropriate for that phase of training to be eligible for appearing at the final university examination of that subject.

b. Summative assessment logistics (For Universities)

Summative assessment consists of University examinations. Each theory paper will have 100 marks. Marks distribution as per proposed GMER 2019 for various subjects is given in Table 2.

Table 2: Marks distribution for various subjects in University examinations

Phase of Course	Written-Theory – Total	Practicals / Orals/ Clinicals	Pass Criteria
First Professional			<u>Internal Assessment:</u> 50% combined in theory and practical (not less than 40% in each) for eligibility for appearing for University Examinations
Human Anatomy - 2 papers	200	100	
Physiology - 2 papers	200	100	
Biochemistry - 2 papers	200	100	
Second Professional			<u>University Examination</u> Mandatory 50% marks in theory and practical (practical = practical/ clinical + viva) [theory=theory paper(s) only]
Pharmacology - 2 Papers	200	100	
Pathology - 2 papers	200	100	
Microbiology - 2 papers	200	100	
Third Professional Part – I			Internal assessment marks are not to be added to marks of the University examinations and should be shown separately in the grade card.
Forensic Medicine & Toxicology - 1 paper	100	100	
Ophthalmology – 1 paper	100	100	
Otorhinolaryngology – 1 paper	100	100	
Community Medicine - 2 papers	200	100	
Third Professional Part – II			
General Medicine - 2 papers	200	200	
General Surgery - 2 papers	200	200	
Pediatrics – 1 paper	100	100	
Obstetrics & Gynaecology - 2 papers	200	200	

As per proposed GMER 2019, University examinations will be held in the month of September for first & second phase and October for final phase part 1. The examination for final phase part II will be held in the month of January (Table 3).

Table 3: Examinations schedule

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
							Foundation Course	I MBBS			
I MBBS								Exam I MBBS	II MBBS		
II MBBS								Exam II MBBS	III MBBS		
III MBBS Part I									Exam III MBBS Part I	Electives & Skills	
III MBBS Part II											
Exam III MBBS Part II		Internship									
Internship											

Theory question paper (Knowledge part)-For Universities and colleges

Universities should instruct paper setters to follow guidelines for paper setting as given below:

1. Follow MCI competencies for paper setting in the subject.
2. Designing of question paper should take into consideration all levels of knowledge domain e.g. Bloom's taxonomy of cognitive domain. Use appropriate verbs for the questions at each level to assess higher levels of learning.¹⁷ An example is given below in Table 4. Use combination of various types of questions e.g. structured essays (Long Answer Questions - LAQ), Short Answers Questions (SAQ) and objective type questions (e.g. Multiple Choice Questions - MCQ). Marks for each part should be indicated separately. MCQs if

used, should not have more than 20% weightage. Example of theory paper and some examples of questions are given in Annexure 2.

3. The question paper setter must sample the contents appropriately from competencies. The blueprinting grid can help the paper setters to balance the question papers in content related aspects as depicted below in Table 5. Blueprinting will add to the value and quality of these assessments. Moderation of theory question paper by subject expert must be arranged by Universities.

Table 4: Verbs in various levels in Knowledge domain (Bloom's taxonomy)¹⁷

Level	Suggested Verbs
Knowledge	Define, Describe, Draw, Find, Enumerate, Cite, Name, Identify, List, label, Match, Sequence, Write, State
Comprehension	Discuss, Conclude, Articulate, Associate, Estimate, Rearrange, Demonstrate understanding, Explain, Generalise, Identify, Illustrate, Interpret, Review, Summarise
Application	Apply, Choose, Compute, Modify, Solve, Prepare, Produce, Select, Show, Transfer, Use
Analysis	Analyse, Characterise, Classify, Compare, Contrast, Debate, Diagram, Differentiate, Distinguish, Relate, Categorise
Synthesis	Compose, Construct, Create, Verify, Determine, Design, Develop, Integrate, Organise, Plan, Produce, Propose, rewrite
Evaluation	Appraise, Assess, Conclude, Critic, Decide, Evaluate, judge, Justify, Predict, Prioritise, Prove, Rank

Table 5: Blueprinting in knowledge domain

(Representative example only. Actual figures may vary with the subject and Phase)

Level	Topic A	Topic B	Topic C	Topic D	Total
Knowledge	1	2	1	1	5 (20%)
Comprehension	1	1	1	2	5(20%)
Application	2	1	1	1	5 (20%)
Analysis	1	1	2	2	6(24%)
Synthesis		1		1	2 (8%)
Evaluation	1		1		2 (8%)
Total	6(24%)	6(24%)	6(24%)	7(28%)	25 (100%)

Practical/Clinical examination

This part should include assessment in psychomotor and affective domain. Assessment of clinical and procedural skills should be based on direct observations by the examiners. Avoid making this assessment mainly targeted to knowledge domain only. e.g. by asking a learner in a room away from actual patient, “how history was taken”. Instead, learner should be observed while he/she is taking history.

The competencies dealing mainly with skills and affective domains in each subject must be included. Many of the tools mentioned for formative assessment may not be usable / feasible at the University examinations e.g. mini-CEX. However, multiple tools like case presentations, OSCE and/or OSPE should be employed.^{11,14,18-22} The value of conventional case presentation should be improved by having 1 or 2 longer (15 minutes or so) OSCE type stations, where examiners can observe and assess complete history taking (e.g. family history, present history etc.) and/or physical examination skill. This can be done either with check lists or using global ratings. Not only will this improve the validity of case presentations, but also provide an opportunity to assess attitudes and communication in context.

Pre- and para-clinical departments should make practical exercises application oriented. Objective Structured Practical Examination (OSPE), One-Minute Preceptor (OMP), Directly Observed Procedural Skills (DOPS) etc. can be suitably modified for this purpose. Practical tests should not become simply tests of knowledge.

Multiple teachers should be involved in assessment. This will help in not only taking care of subjectivity but also provide much needed training in assessment to senior residents and assistant professors.

The use of multiple methods, by multiple examiners in multiple settings to assess multiple competencies, blueprinting and longitudinal assessment help to improve the reliability and validity of assessment.^{6, 18,23}

The relevant provisions from proposed GMER 2019 and are reproduced below:

Excerpts from proposed GMER 2019

University Examinations

- 11.2.1 University examinations are to be designed with a view to ascertain whether the candidate has acquired the necessary knowledge, minimal level of skills, ethical and professional values with clear concepts of the fundamentals which are necessary for him/her to function effectively and appropriately as a physician of first contact. Assessment shall be carried out on an objective basis to the extent possible.
- 11.2.2 Nature of questions will include different types such as structured essays (Long Answer Questions - LAQ), Short Answers Questions (SAQ) and objective type questions (e.g. Multiple Choice Questions - MCQ). Marks for each part should be indicated separately. MCQs shall be accorded a weightage of not more than 20% of the total theory marks. In subjects that have two papers, the learner must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass.
- 11.2.3 Practical/clinical examinations will be conducted in the laboratories and /or hospital wards. The objective will be to assess proficiency and skills to conduct experiments, interpret data and form logical conclusion. Clinical cases kept in the examination must be common conditions that the learner may encounter as a physician of first contact in the community. Selection of rare syndromes and disorders as examination cases is to be discouraged. Emphasis should be on candidate's capability to elicit history, demonstrate physical signs, write a case record, analyze the case and develop a management plan.
- 11.2.4 Viva/oral examination should assess approach to patient management, emergencies, attitudinal, ethical and professional values. Candidate's skill in interpretation of common investigative data, X-rays, identification of specimens, ECG, etc. is to be also assessed.
- 11.2.5 There shall be one main examination in an academic year and a supplementary examination to be held not later than 90 days after the declaration of the results of the main examination.
- 11.2.6 A learner shall not be entitled to graduate after 10 years of his/her joining of the first part of the MBBS course.

11.2.7 University Examinations shall be held as under:

(a) First Professional

1. The first Professional examination shall be held at the end of first Professional training (1+12 months), in the subjects of Human Anatomy, Physiology and Biochemistry.
2. A maximum number of four permissible attempts would be available to clear the first Professional University examination, whereby the first Professional course will have to be cleared within 4 years of admission to the said course. Partial attendance at any University examination shall be counted as an availed attempt.

(b) Second Professional

1. The second Professional examination shall be held at the end of second professional training (11 months), in the subjects of Pathology, Microbiology, and Pharmacology.

(c) Third Professional

1. Third Professional Part I examination shall be held at end of third Professional part 1 of training (12 months) in the subjects of Ophthalmology, Otorhinolaryngology, Community Medicine and Forensic Medicine and Toxicology
2. Third Professional Part II - (Final Professional) examination shall be at the end of training (14 months including 2 months of electives) in the subjects of General Medicine, General Surgery, Obstetrics & Gynaecology and Pediatrics. The disciplines of Orthopaedics, Anaesthesiology, Dentistry and Radiodiagnosis will constitute 25% of the total theory marks incorporated as a separate section in paper II of General Surgery.
3. The discipline of Psychiatry and Dermatology, Venereology and Leprosy (DVL), Respiratory Medicine including Tuberculosis will constitute 25% of the total theory marks in General Medicine incorporated as a separate section in paper II of General Medicine.

9. Capacity building

Considering the importance of CBA in making competency based curriculum a success, preparing the faculty to decide and use appropriate tools is crucial. Faculty needs to move beyond 'conventional' assessment methods. It is also important to remember that usefulness of many newer tools depends on the way they are used. Faculty also needs to be trained to develop their own toolbox depending on resources, expertise and contextual factors.

The revised Basic Course Workshop (rBCW) in Medical Education Technologies provides training in tools to be used for lower two levels of Miller's pyramid while the Advance Course in Medical Education (ACME) trains in those for higher two levels. In addition, the trained faculty and Medical Education Units should have in-house programs to build capacity for assessment. Involving junior faculty in IA is a useful step to provide hands-on training in assessment. Sensitization and training of all stakeholders at the University and Institutional level is required.

It is equally important to involve the student community and make them aware of these changes. Many changes require a variance from established practices. Foundation course and introductory sessions in each department should orient the students to the changes in assessment.

10. Implementation & Monitoring / Curricular Governance

Internal assessment formats are to be developed by institutes as per proposed GMER 2019. The changes in summative assessment (university examination) are to be adopted by universities and details to be provided to the affiliated colleges. Quality assurance techniques in formative assessment (self / peer monitoring) and University examinations (question paper moderation by subject experts, external monitoring or posting external observers/examiners) should be employed to improve assessment.

11. Examples / Models

The suggested formats are provided in annexures.

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Annexure 1

Suggested phase wise scheduling of tests for internal assessment for Colleges

(This is only a suggested sample plan. Local changes can be made if they conform to proposed GMER 2019)

Phase	Minimum Number of tests during the year	Remarks
1 st	Human Anatomy 3, Physiology 3, Biochemistry 3, Community Medicine 1	<ul style="list-style-type: none"> •ECE assessment should be included subject wise •There should be at least one short question from AETCOM in each subject •One of the 3 tests in preclinical subjects should be prelim or pre-university examination
2 nd	Pathology 3, Pharmacology 3, Microbiology 3, Two tests for- General Medicine (Including Psychiatry, Dermatology, Venereology & Leprosy (DVL) and Respiratory Medicine including Tuberculosis), General Surgery (Including Orthopaedics, Dentistry, Anaesthesiology and Radiodiagnosis), Obstetrics & Gynaecology, Forensic Medicine & Toxicology and Community Medicine End of posting (EOP) examination at each clinical posting including those of allied subjects	<ul style="list-style-type: none"> •Clinical subjects should also be assessed at end of each posting (EOP) – Theory and Practical •There should be at least one short question from AETCOM in each subject •One of the 3 tests in Para-clinical subjects should be prelim or pre-university examination

3 rd	<p>Forensic Medicine & Toxicology 2, Community Medicine 2, Ophthalmology 2, Otorhinolaryngology 2</p> <p>Two tests for-</p> <p>General Medicine (Including Psychiatry, Dermatology, Venereology & Leprosy (DVL) and Respiratory Medicine including Tuberculosis), General Surgery (Including Orthopaedics, Anaesthesiology and Radiodiagnosis), Pediatrics, Obstetrics & Gynaecology</p> <p>EOP examination at each clinical posting including allied subjects</p>	<ul style="list-style-type: none"> • Clinical subjects should also be tested at end of each posting (EOP)-Theory and Practical • There should be at least one short question from AETCOM in each subject • One of the tests in Ophthalmology, Otorhinolaryngology /Forensic Medicine & Toxicology/ Community Medicine should be prelim or pre-university examination
4 th	<p>Two Tests for-</p> <p>General Medicine (Including Psychiatry, Dermatology, Venereology & Leprosy (DVL) and Respiratory Medicine including Tuberculosis), General Surgery (Including Orthopaedics, Anaesthesiology and Radiodiagnosis), Pediatrics, Obstetrics & Gynaecology</p> <p>EOP examination at each clinical posting including that in allied subjects</p>	<ul style="list-style-type: none"> • Clinical subjects should also be tested at end of each posting (EOP)-Theory and Practical • There should be at least one short question from AETCOM in each subject • One of the tests in General Medicine, General Surgery, Pediatrics and Obstetrics & Gynaecology should be preliminary or pre-university examination • Assessment of electives to be included in IA

AETCOM: Attitude, Ethics and Communication

The internal assessment marks for each subject will be out of 100 for theory and out of 100 for practical/clinical (except in General Medicine, General Surgery and Obstetrics & Gynaecology, in which theory and clinical will be of 200 marks each). Internal assessment marks will reflect as a separate head of passing at the summative examination and will not be added to the University marks.

Twenty five percent of weightage in theory tests in General Medicine and General Surgery should be given to allied subjects and there should be at least one question from each allied subject.

Annexure 2

Examples of theory questions

Sl. No.	Type	Explanation	Examples
1	Long essay question	<p>The question should pose a clinical/practical problem to the students and require them to apply knowledge and integrate it with disciplines. Avoid giving one liners as questions. The question stem should be structured and marking distribution should be provided. Use action verbs from higher domains as given in this document.</p> <p>Please avoid simple recall based questions. What is asked in the examination generally sets the agenda of what and how the students learn.</p>	<p>A 6 days old term neonate has presented with jaundice noted at 3 days of age. He is born out of normal delivery at home. On examination, he looks pale, has a liver of 5cms and spleen of 2 cms. Other systemic examination is normal.</p> <ol style="list-style-type: none"> a. What is your provisional diagnosis? b. Which other conditions need to be considered? c. Enumerate the lab tests that you will order and their likely reports in each of the diagnosis that you considered. d. Explain the physical findings in the light of underlying derangements. <p>- Describe the clinical features, complications and management of type 2 diabetes mellitus. (3+3+4=10)</p>

Sl. No.	Type	Explanation	Examples
2	Short notes	These provide opportunity to sample a wider content, albeit in a short time. The questions should be task oriented rather than Write a short note on xxx. (Two questions based on ECE in Phase 1 in internal assessment) (Two questions based on integration in Phase 2 & 3 in internal assessment)	<ol style="list-style-type: none"> 1. What are the various ways in which acute glomerulonephritis can present during childhood? 2. What is the role of antibiotics in childhood diarrhoeas? 3. What is the utility of routine vitamin K administration during newborn period? 4. Compare and contrast the use of ramipril and amlodipine in treatment of hypertension.
3	Reasoning Questions	These provide excellent opportunities for testing integration, clinical reasoning and analytic ability of the student.	<ol style="list-style-type: none"> 1. Which components of breast milk help in prevention of neonatal infections? How do they help in prevention of infection? 2. Plan immunization for a 2 years old totally un-immunized child. 3. What is the physiological basis of origin of respiratory sounds? How can they help us in making a diagnosis? 4. Explain why adrenaline is the preferred medication in anaphylactic shock.

Sl. No.	Type	Explanation	Examples
4	Short notes Applied aspects	(Pre- & Para-Clinical subjects: questions on applied aspect) (Clinical subjects: questions on preclinical basis)	<u>Pre & Para-Clinical subjects:</u> Describe clinical significance of half-life of drugs. <u>Clinical subjects:</u> Explain patho-physiological basis of clinical features of heart failure
5	Short notes AETCOM	(one question on AETCOM in all subjects in all phases)	Pharmacovigilance program of India AETCOM: What are the rights of a patient in a hospital setting
6	MCQs	MCQs should be scenario based, single response with 4 options in answers. Avoid one liner and negative terms in stem of question. Avoid 'all of above' and 'none of above' in options.	<p>1. A 25 year old lady was using oral contraceptives successfully for last two years. She got tuberculosis and was prescribed Rifampicin. She became pregnant after 2 months of starting Rifampicin despite continuing the oral contraceptives. Which of the following effects of Rifampicin can be the reason for this?</p> <p>A. Induction of oral contraceptive metabolism B. Stimulation of ovulation C. Interruption of entero-hepatic circulation D. Increased excretion of oral contraceptives</p> <p>Key: A</p>

Sl. No.	Type	Explanation	Examples
	MCQs		<p>2. A 2 year old child presents with excessive weight gain over last 1 week. He has puffy eyes, pitting edema and normal blood pressure. Urine examination shows no RBCs but massive proteinuria. Which of the following biochemical parameters is likely to be elevated in this child?</p> <p>a. Urea b. Cholesterol c. Creatinine d. Uric acid</p> <p style="text-align: right;">Key B</p> <p>3. Which of the following term best describes the decreased effects of beta adrenergic agonists in bronchial asthma after long term use?</p> <p>A. Pharmacokinetic tolerance B. Pharmacodynamic tolerance C. Tachyphylaxis D. Drug dependence</p> <p style="text-align: right;">Key: B</p>

Note: AETCOM question should be based on competencies (primarily knowledge based) acquired during the AETCOM module training. At least one question in each paper of the clinical specialties should test knowledge - competencies acquired during the professional development programme (AETCOM module); Skills competencies acquired during the Professional Development programme (AETCOM module) must be tested during clinical, practical and viva.

In subjects that have two papers, the learner must secure at least 40% marks in each of the papers with minimum 50% of marks in aggregate (both papers together) to pass in the said subject.