PERSPECTIVE

The Quarter Model: A Proposed Approach for In-training Assessment of Undergraduate Students in Indian Medical Schools

TEJINDER SINGH, *ANSHU AND †JYOTI NATH MODI

*From the CMCL-FAIMER Regional Institute, Christian Medical College, Ludhiana, India; *Department of Pathology, Mahatma Gandhi Institute of Medical Sciences, Sevagram, Wardha, MS and †Department of Obstetrics and Gynaecology, People's College of Medical Sciences and Research Centre, Bhopal, MP.*

Correspondence to: Dr Tejinder Singh, Program Director, CMCL-FAIMER Regional Institute, Christian Medical College, Ludhiana 141008, India. cmcl.faimer@gmail.com

In-training Assessment (ITA) has the potential to test a wide range of competencies which are not testable by the year-end examination. However, despite high validity, educational impact and feasibility; its implementation is flawed. This paper proposes a "quarter model of in-training assessment" for implementation in the undergraduate medical curriculum in India. The model proposes that assessments be carried out at least quarterly; no teacher should contribute more than 25% of the marks for any student; no single assessment tool should contribute more than 25% marks; and no assessment should contribute to more than 25% of the total marks. We believe that structuring the implementation using multiple tests on multiple content areas by multiple examiners using multiple tools in multiple settings in the proposed quarter model will not only improve the reliability and validity of internal assessment, but also its acceptability.

Key words: *Assessment, Formative assessment, Internal assessment, Medical education.*

Formative assessment has a major influence on learning [1]. The educational utility of a summative or year-end examination is limited since it usually involves a single encounter with assessment of a limited number of competencies, mostly knowledge-based, with no opportunity for feedback and improvement. Internal assessment provides a very useful opportunity to not only test acquisition of knowledge but also provide feedback to make learning better.

The strengths of internal assessment (IA) are three-fold. One, there is an opportunity to provide timely corrective feedback to students. Feedback is recognized as the single-most effective tool to promote learning [2].Two, IA can be designed to test a range of competencies, such as, skill in performing routine clinical procedures (giving injections, suturing wounds, performing intubation etc.), professionalism, ethics, communication, and interpersonal skills, which are hardly assessed in the final examinations [3]. Three, the continuous nature of this assessment throughout the training period has the potential to steer the students' learning in the desired direction over time. The focus is on the process, as much as on the final product of learning.

The concept of IA is not new. The University Grants Commission [4] recommends that we need to "… move to a system which emphasizes continuous internal assessment and reduces dependence on external examinations to a reasonable extent." Similarly, the National Accreditation and Assessment Council (NAAC) encourages the use of internal assessment to guide learning [5].

The draft of the 2012 revised Regulations on Graduate Medical Education (GME) released by the Medical Council of India (MCI) stipulates that undergraduate students should have passed in their IA to be eligible to appear in the final university examinations [6]. The recommendation is for IA to be based on day-to-day records. Also, regular assessments conducted throughout the course shall relate to assignments, preparation for seminars, clinical case presentations, participation in community health care, proficiency and skills required for small research projects etc. Further, electives and skills should be assessed as part of internal assessment [6].

PROBLEMS WITH INTERNAL ASSESSMENT IN INDIA

Despite its obvious strengths, internal assessment has not been used to its full potential in India. Often trivialized as a replica of the final examination, IA is restricted only to theory and practical tests, while its potential to test other competencies is seldom exploited. The major issues with internal assessment in India are: improper implementation, lack of faculty training, misuse or abuse,

lack of acceptability among all stakeholders and perceived lack of reliability [7].

Improper implementations: Implementation has a strong bearing on any assessment and its educational utility. The earlier 1997 guidelines [8] did not carry any mention of how the IA was to be implemented. Institutions were left to design their own plan of IA leading to considerable variation in the methods of assessment and the competencies assessed. Practical guidelines have not been provided for implementation of IA in the 2012 revised regulations on GME [6] either, giving rise to a sense of *déjà vu*.

Lack of faculty training: Faculty development is pre-requisite to proper implementation of any educational method. Lack of training is often the reason for poor implementation, lack of transparency, and inadequate or no provision of feedback to students. By not providing timely and appropriate feedback, the biggest strength of internal assessment is nullified. When teachers do not give competencies such as communication skills, professionalism, ethics, interpersonal skills, ability to work in a team etc. enough weightage in the internal assessment due to the fear that these cannot be precisely measured, they indirectly convey to students that these qualities are not important in medicine. While the faculty do gain experience of teaching and research, there is no opportunity for them to get a hands-on experience on student assessment.

Misuse/Abuse: IA is often misused as an examination without external controls [9-10].The 2012 draft regulations [6] have proposed some variations from the 1997 regulations [8]. Marks of IA are no longer to be added to the final scores. Although not expressly stated, fear of abuse of IA to inflate marks seems to have prompted this change. However, this opens new opportunities to use IA to assess competencies hitherto left un-assessed.

Lack of acceptability: The issues that lower the acceptability of IA from all its stakeholders are: variability in marking by institutions, too much 'power' bestowed to single individuals (often departmental heads), too much weightage to single tests and a perceived lack of reliability. Reliability (also sometimes described as reproducibility) is commonly seen as 'consistency of marking'. Here, it may be pertinent to clarify that reliability should be seen as consistency or reproducibility of student performance rather than consistency of marking by examiners. Assessing a student in one clinical situation poorly predicts his performance in another clinical situation. Also, it is uncertain that a physician will encounter the same conditions in actual practice under which he was assessed. Therefore, if reliability has to contribute towards prediction of student's future performance in real situations, the true meaning of reliability should be 'consistency of performance' rather than 'consistency of scoring' [11]. Marker variability in IA is often cited as a reason for lack of reliability. Research has consistently shown that increasing the number of assessors and increasing the sample of the content being assessed improves reliability [12]. Even with rather subjective assessments, having different assessors for different parts of a test can neutralize an incompetent/ biased assessor's influence [13]. By increasing the number of clinical situations in which a student is assessed, the reliability of the assessment can be improved more than by merely making more objective tests.

The utility of any assessment is dependent upon its validity, reliability, acceptability, feasibility and educational impact [14]. Although each one of these attributes is important, there is always some trade-off between them. For example, an assessment which is apparently low on reliability can still be useful by virtue for its positive educational impact [13]. Where combinations of different assessments alleviate drawbacks of individual methods, use of the programmatic approach to assessment is advocated, thereby rendering the total more than the sum of its parts [15].

When properly implemented, IA scores over the year-end examination in terms of its validity, reliability (consistency of performance), feasibility and educational impact [7]. To ensure that students are not denied the benefit of this extremely useful modality, efforts need to be made to improve its implementation and acceptability.

In this paper, we propose a model for internal assessment, which tries to overcome some of the issues that teachers and students face. We call it the '*in-training assessment* (ITA) *program*' as it reflects the philosophy and intent of this assessment better. The ITA is designed to not only test knowledge and skills, but also provide an opportunity to assess competencies which are not assessable by conventional year-end examinations. The purpose of ITA is to provide feedback to students and teachers, and to improve student learning. It is proposed to be a longitudinal program spread throughout the MBBS training. ITA is expected to be complementary to the end-of-training assessment (ETA) carried out by the affiliating Universities to test for attainment of intended competencies.

THE PROPOSED QUARTER MODEL

The salient features of this model are outlined in the ***Box* 1.**

Box 1: THE QUARTER MODEL OF IN-TRAINING ASSESSMENT

1. One assessment to be conducted at least every quarter.
2. No teacher to contribute more than a quarter (25%) of the marks for any student.
3. No single tool to contribute more than a quarter (25%) of the marks.
4. No single assessment to contribute more than a quarter (25%) of the total marks.

Format: We propose that students be periodically assessed during the course of their training by the faculty of their parent institutes. Passing separately in ITA and ETA, in both theory and practical/clinical components should be mandatory. As proposed in the Graduate Medical Education Regulations 2012 [6], while passing in ITA will be an eligibility criterion for appearing in the University examinations, marks obtained in ITA will not be added to the marks obtained in ETA. The scores can be converted to grades using a 7-point scale (using absolute grading criteria) and shown separately on the mark-sheet issued by Universities.

Organization and Conduct: To allow greater spread of marks, each subject may be assessed out of a maximum of 100 marks (50% for theory and 50% for practical/clinical component) in the ITA. ITA should make use of a number of assessment tools. For theory: essay questions, short answer questions (SAQ), multiple choice questions (MCQ), extended matching questions and oral examinations should be used. For practical/clinical assessment: experiments, long cases, short cases, spots, objective structured practical/clinical examinations (OSPE/OSCE), mini-clinical evaluation exercise (mini-CEX) and objective structured long examination record (OSLER) should be used. Viva in practical/clinical assessment should focus on the experiments actually performed or cases actually seen rather than being a general viva. Colleges can add more tools depending on the local expertise available.

The planning and assessment for ITA should involve all teachers of each department to ensure that no single teacher contributes more than 25% of the marks to the total marks and no single assessment tool contributes more than 25% marks to the total ITA. For this purpose, teachers would mean all those working as tutors/ senior residents and upwards.

The proportion of 25% marks should be calculated from the assessments spread over the entire year. For example, the departments should be at liberty to have four assessments with one having only essay type questions, another having only MCQs, the third having only oral examination and a fourth one with a mix of all. Or they could have four assessments with a mix of essays, SAQs, MCQs and oral examinations. The same applies to practical/clinical examinations. However, for subjects like radiology, TB and chest, dermatology, casualty and dentistry, each teacher and each tool may contribute 50% to the assessment in that subject. In effect, it means that to maintain the 25% limit, at least four teachers and four different assessment tools should be used for ITA. For subjects with the 50% limit, at least two teachers and two tools will be required.

The marks for ITA in each subject is shown in ***Table* I**. To illustrate its working, two examples, one from a pre-clinical (Physiology) and another from a clinical (Pediatrics) department are provided (***Fig.* 1 and 2**).

The given sample formats have been drafted using the prescribed number of teaching staff for an institution admitting a batch of 100 students in a year. Utilization of end-of-posting assessment for the practical component of ITA in clinical subjects may contribute towards time efficiency of the ITA program by using same assessments for formative as well as summative purposes.

As ***Fig*.2** shows, ITA is proportionately divided over the phases for subjects that are taught over different semesters. For subjects that include other allied subjects (*e.g.* Medicine includes Dermatology, Psychiatry etc.), a proportion of ITA is allocated to allied subjects based on the teaching time allotted. Students would need to secure

TABLE I DIVISION OF MARKS

Theory (Max. marks 50)		*Practical/clinical (Max. marks 50)*	
Knowledge tests: using multiple tools*	40	Practical and clinical skills (including communication skills, bedside manners): using multiple tools*	35
Preparation, participation, regularity, sincerity	8	Regularity, sincerity, professionalism, presentation	8
Other academic activities: quiz, seminar etc.	2	Log books	5
		ICMR or other projects, community work, etc.	2

**As explained above in the text.*

Theory (Maximum Marks: 40)#						Other skills Maximum marks:8			Other academic activityMM-2	Faculty conducting assessment* (Theory & Practical)
Semester	ITA no.	Essay	SAQ	MCQ	Oral	Participation in discussions, tutorials , team work MM-4	Regularity MM-2	Sincerity MM-2		
I	1			5	4	1	Attendance: >90%- 2 80-90%- 1	May be marked as: Very sincere-2, Sincere-1	Participation in quiz/seminar-1 Participation in ICMR project-1	LECT1, TUTOR1, TUTOR2
I	2	4	6			1				LECT2, TUTOR3, TUTOR4
II	3		4	5		1				AP1, LECT1, LECT2
II	4	6			6	1				PROF1, AP1, LECT1, LECT2

*# The distribution of 40 marks can be altered as per requirements. Only no single assessment tool will contribute to over 25% of the marks; * For Medical Schools with 100 seats. Depending on seats and faculty availability, this scheme maybe modified suitably. No single faculty will contribute over 25% of the total marks; Faculty: Professor: PROF 1; Associate Professor/Reader: AP1; Assistant Professor/ Lecturer: LECT1, LECT2; Tutor/Demonstrator: TUTOR1, TUTOR2, TUTOR3, TUTOR4; MM-Maximum marks.*

FIG.1 *Physiology : Sample format for ITA.*

Semester	Clinical posting (in weeks)	Theory (Maximum Marks: 40)#				Other skills Maximum marks:8				Other academic activity MM-2	Faculty* conduting assessment (Theory and Practical)
		Essay MM -10	SAQ MM -10	MCQ MM -10	Oral MM -10	Role play, counselling MM-2	Participation in case discussions- MM-2	Regularity MM-2	Sincerity MM-2		
III (No theory classes)	–	–									
IV	2			10				Attendance: >90%-2 80-90%- 1	May be marked as: Very sincere-2, Sincere-1	Participation in quiz/ seminar-1 Participation in ICMR project-1	AP, LECT2, SR1
V	–	3	3		4						PROF, LECT1, SR2
VI	2					2					AP, SR1, SR3
VII	2						2				LECT2, SR2
VIII	4	3	4		3						PROF, AP, LECT1,SR1
IX	-	4	3		3						PROF, AP, LECT1, LECT2

*# The distribution of 40 marks can be altered as per requirements. Only no single assessment tool will contribute to over 25% of the marks; * For Medical Schools with 100 seats. Lecturer: LECTT1, LECT2; Senior Residents; SR1, SR2, SR3. No single faculty will contribute over 25% of the total marks.; Faculty: Professor: PROF; Associate Professor/Reader: AP; Assistant Professor*

FIG 2 *Pediatrics: Sample format for ITA - Theory (maximum mark 50); Minimum 4 ITAs over entire course.*

passing marks (>50%) in theory and practical separately for allied subjects also.

All results should be declared within two weeks of the assessment. Students should sign on the result sheet in token of having seen the results. The results should also be uploaded on the college website within two weeks of being put up on the notice board. Students who do not pass in any of the assessments should have the opportunity to appear for it again – however, any repeat assessment should not be conducted earlier than two weeks of the last to allow students to meaningfully make good their deficiencies. Only one additional assessment may be provided to make good the deficiency. If a student is unable to score 50% even after an additional assessment, he should repeat the course/posting and appear for University examinations 6 months later.

Teachers should provide feedback to students regarding their performance. A group feedback session should be organized within a week after declaration of results. However, for persistently low achieving students, one-to-one feedback sessions may be organized.

To use the power of assessment meaningfully for better learning and to ensure stability in assessments, all colleges should appoint a Chief Coordinator. All the teaching departments should also appoint a teacher as coordinator to plan and organize ITA. Departments should coordinate among themselves and with the Chief Coordinator to ensure that students do not have assessment in more than one subject during the same week. As far as possible, all ITAs should be scheduled on Monday mornings so that students get the weekend to prepare and do not miss classes. For clinical subjects, the practical component of the ITAs should be scheduled at the end of clinical postings. The minimum number of ITAs for each subject should be specified in the beginning of the term. The plan and tentative dates of assessment should be put up on the notice board within the first month of starting that phase of training. The ITA plan of each department should be developed as a standard operating protocol (SOP) document, approved by the Curriculum/ Assessment committee of the college and reviewed (and revised if required) annually. This document should be made available to the students at the beginning of each phase.

Record keeping: It is important to maintain a good record of performance in ITA to ensure credibility. Students should have access to this record and should sign it every three months. A sample format for record keeping has previously been published [16].

Faculty development: Unless both the assessors and students understand the purpose of this exercise, this powerful tool will continue to be trivialized and acceptance will remain suboptimal. Success of this model will require training faculty in use of multiple assessment tools. Currently, faculty development is carried out through the basic course workshops on medical education; this needs to be scaled up for capacity building of medical teachers. It is also imperative that the students be sensitized to the ITA program for MBBS during the proposed foundation course (the first two months before Phase I of MBBS).

DISCUSSION

The quarter model addresses several commonly leveled criticisms against internal assessment. The strength of ITA is expected to be realistic in its continuous nature and in the fact that it is based on longitudinal observations in authentic settings. Provision of feedback not only allows for mid-course correction of the learner's trajectory [17] but also reinforces their strong points.

Medical competence is an integrated whole and not the sum of separate entities. No single instrument will ever be able to provide all the information for a comprehensive evaluation of competence [18]. Single assessments, howsoever well planned, are flawed [15]. By including assessment in various settings and by use of multiple tools in this model, the intention is to increase the sampling and to make more well-informed and defensible judgments of students' abilities. Use of multiple examiners is expected to help reduce the examiner biases involved in the process of assessment, and also minimize misuse of power.

Understandably, this model may demand more effort and work from the faculty members. However, we feel that that the added benefits of this model would be a better distribution of student assessment tasks within the department and also an opportunity for the tutors/senior residents to be trained in assessment methods under supervision. It must be reiterated here that assessment requires as much preparation, planning, patience and effort that research or teaching does. Assessment has been taken rather casually for far too long and at least semi-prescriptive models of ITA based on educational principles are a need of the day. Ignoring educational principles while assessing students, merely because it results in more work, seriously compromises the utility and sanctity of assessment.

Black and Wiliam [19] state that any strategy to improve learning through formative assessment should include: clear goals, design of appropriate learning and assessment tasks, communication of assessment criteria

and provision of good quality feedback. Students must be able to assess their progress towards their learning goals [17]. The quarter model largely takes into account all these elements. Our model gives a broad overview of what is and what is not being measured. It also balances the content and counteracts the tendency to measure only those elements which are easy to measure. By involving students early in the process, informing them of the criteria by which they will be judged, the assessment schedules and most importantly, giving them feedback on their learning, the model is expected to provide them an opportunity to improve performance. The display of ITA grades alongside the ETA marks is expected to demonstrate the consistency of student performance and prevent manipulation of marks.

This model has been conceptualized using accepted theories of learning and assessment. Multiple tests on multiple content areas by multiple examiners using multiple tools in multiple settings in the quarter model will improve the reliability and validity of internal assessment, and thereby improve its acceptability among all stakeholders.

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