

Twenty Lessons to Incorporate EBM Concept and Practices into Medical Education

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1. Introduction

Evidence-based medicine (EBM) is a new paradigm for the health-care system involving using the current evidence (results of the medical research studies) in the medical literature to provide the best possible care to patients.¹ It has encouraged the rapid and transparent translation of the latest scientific knowledge in the day to day practice of medical professionals. EBM has given new direction in all the fundamental responsibilities of medical professionals like care of the patient, research, teaching and learning, and public health. There is need to move from opinion-based education to evidence-based education. Best Evidence Medical Education (BEME) is the implementation of methods and approaches to education based on the best evidence available.² The evidence available may be in a wide variety of formats for example: the results of the controlled experimental studies, description of case studies, and opinions of experts. Studies alone are not the evidence.³ As Hart and Harden have suggested evidence is defined in the American Heritage Dictionary of the English Language as a thing or things helpful in forming a conclusion or judgement.^{4,5} The current practices in different regions and institutions in the world will be a form of evidences to consider. Similarly the available evidences in the clinical medicine, or indeed in any other field like airlines industry, need to be correlated with the areas to give focus in the medical education. The text is discussed in four sections, viz. planning of medical education and the community need and service; training and assessment; teachers' criteria and training; and finally individual's mistake, system's error, health safety and trainees. To highlight the key areas of medical education and training requiring attention, the learnings are presented in the form of twenty lessons to consider.

2. Planning of medical education and the community need and service

2.1 Undergraduate medical education

Since seventeen century, different curricular models have been considered which have catalyzed significant changes in the medical education: the apprenticeship model, the discipline-based model, the organ-system-based model, the problem-based-learning model, and the clinical-presentation-based model.⁶ These curricula differ to a varying extent in the organization of course content, controllers of content, relationship of clinical to basic sciences, organization of concept formation, teaching methods, timing of patient/case,

exposure, cognitive skills emphasized, primary learning guides and problem-solving model.⁶ Each has advantages and disadvantages as per the context and mixtures of models are used now in the medical education. In developing countries, the departments in general tend to control the content of the undergraduate medical education as per the discipline-based model, but principles of other models are increasingly being applied.

2.2 Educational strategies

The focus on the undergraduate medical education in the industrialized countries is increasingly on the newer approaches of educational strategy, as opposed to the traditional ones. The newer approaches are highlighted by the SPICES model, consisting of Student-centered, *Problem-base*, *Integrated*, *Community-based*, *Electives with a core and Systematic*.⁷ These are in contrast to the traditional approaches like *Teacher-centered*, *Information gathering*, *Discipline-based*, *Hospital-based*, *Uniform and Apprenticeship*. These approaches are self-explanatory, as their names indicate, to some extent and need to be considered and balanced in their spectrums wherever applicable. The problem-based learning approach uses problem-based learning as a vehicle to develop a usable body of integrated knowledge and develop problem-solving skills. A student-centered approach emphasizes on the student, increases motivation and prepares for continuing education.⁷ But teachers, students and staff need to adopt and prepare for it. Various approaches depend on the context and situation. However the teaching and learning experiences of students should not be left to chance and it should be planned and recorded and assessed in a systematic manner. Electives allow students to focus as per their need or choice.

2.3 Integrated approach

A number of methods are used to integrate the curriculum, like spiral curriculum and multi-professional learning.^{7,8} There is rapid growth of medical colleges in the developing countries leading to dearth of teachers in basic science. A few available basic science teachers may go to different medical colleges and there is tendency of medical colleges even to lure such teachers from other colleges, hampering the teaching of medical students. The acute shortage of basic science teachers in the developing countries has also indirectly raised the need to widen discipline-based approach to integrate the curriculum in the possible ways. The related clinical faculty can undertake the required extra training and then they can be certified for the training of students in the related basic science, for example general surgeons in anatomy, internist in pharmacology, internist and anesthetist in physiology and pathologist in forensic medicine. The teaching by such adjunct clinical faculty will automatically expose the students to the clinical implication of the basic science, making it a sort of applied basic science. The concerned department may be run by the regular faculty and the concerned subject or curriculum committee may be formed by including both the regular and well trained certified adjunct faculties. The regular and the adjunct faculties can learn from each other. The increased interaction will help to develop organ-system-based teaching learning. The exposure and inclusion of the adjunct faculties in the subject committee will also help to arrange early clinical exposure of the students and the vertical integration of the curriculum. In this way, the discipline-based models of the undergraduate medical education will move towards the newer models incorporating the advantages of both discipline-based and integrated approaches.

2.4 Community-based education

In community-based education students are taught in a community setting in contrast to community-oriented education where the focus for teaching is the needs of the community.⁸ But in the name of community-based education there may not be much benefit to the student or the community by just posting the students in the community, e.g. for family data collection. The postings of the students covering the overcrowded curriculum should also fulfill the need of the students. If the required and relevant areas, like general practice, internal medicine, pediatric, surgery or obstetrics and gynecology, of the posting for the students are actually practiced in the community, it would be useful to all. For this, the medical institutes should have their own or have affiliation with peripheral institutes providing service to the community in the urban and rural areas. The faculty of the medical institutes can be posted there on rotation and the students will be able to utilize most the posting under their own teacher in the community. It will also directly benefit the community especially in the developing countries, where health-coverage of the general population is inadequate.

2.5 Incorporation of learning theories in the residential training

The learning is not easy to define.⁹ The learning theories are also equally, or more complex, to explain. Just knowing something does not complete the definition of learning. From the educational point of view it may broadly be called a process which brings relatively permanent changes in the way of thinking about and/or feeling about and/or looking at the reality and/or behavior of a learner through experience, education, training, or practice. The change may be temporary or permanent.

The concept about teaching and learning has changed dramatically over the several decades. "Teaching by pouring in" refers to a medieval belief that we teach people by drilling holes in the human head and, with a funnel, pour information into the brain. Then came the era of behaviorism where the issue was not how new knowledge is acquired, but how is new behavior acquired. Behavior can change as a result of extrinsic motivators such as incentives, rewards and punishments, which are utilized in different ways in the training and education in all the fields. Behaviorism is also seen further flourishing with the competency and learning outcomes movement, which focuses exclusively on observable behavior.¹⁰ During the late 1960s and early 1970s cognitivism became popular to understand learning.¹⁰ Cognitivism was closer to a common sense view of how people learned, attempting to map individual thinking processes. The cognitive perspective recognizes the need to build rich, interconnecting knowledge structures, based on existing knowledge, that allows continuing incorporation of new learning. Social cognitive theory (formerly social learning theory) acknowledges the social (interactive) aspect of learning and unites two approaches, behaviorist and cognitive, to understanding knowledge. It posits that our actions, learning and functioning are the result of a continuous, dynamic reciprocal interaction among the three sets of determinants: personal, environmental (situational) and behavioral.¹¹ Similarly constructivism is based on the premise that the learners construct their own perspective of the world through individual experience and schema.

The ability to reflect on one's practice or performance is critical to lifelong, self-directed learning. At the heart of various learning theories is the belief that we can learn from experience, incorporating it into our existing knowledge and skills. This opportunity for reflection must be actively incorporated and a systematic approach to facilitate reflection must be introduced early. Reflection is not merely description of experience, but analysis of it; it is not a natural and intuitive ability, but must be developed through practice. It is critical to becoming an effective lifelong learner, as it also enables learners to develop and apply standards to their performance, decide what further learning needs to occur, and to continue their learning over a professional lifetime.¹¹ The concept of the reflective practitioner incorporates all five stages that professionals use in problem solving: knowing-in-action, surprise, reflection-in-action, experimentation, and reflection-on-action. Reflectivity in practice is a learned skill of critical thinking and situational analysis.¹¹

Self-directed learning is an aspect of several theoretical approaches, including the cognitive, social learning, humanist and constructivist. Humanist approach views self-direction as evidence of higher level of individual development. Self-directed learning elements can also be seen in the ability to learn from experience, through critical reflection, which allows learners to identify their personal learning needs, and to be aware of, monitor and direct the growth of their knowledge, skills and expertise.¹¹

Experiential learning theory considers that learning is best achieved in an environment that considers both concrete experience and conceptual models. There is the necessity of integrating the process of actual experience and education in learning.¹¹ Learners along the medical educational continuum use various experiential learning methods. These may include: apprentice, internship or practicum, mentoring, clinical supervision, on-the-job training, clinics, case study research.¹¹ There is a shift away from the older apprenticeship system towards more formal structured training. Structured training focuses on formal skills training, evidence-based accountability, objective evaluation, and competence-based assessment.¹² Old apprenticeship models stressed 'immersion' – the learning by experience simply through exposure. New apprenticeship or 'cognitive apprenticeship' models stress that novices do not simply learn how to 'do' the job as they gain expertise – they also learn how to 'think' and to 'recount' the job.¹⁰ Doing, thinking and recounting are intimately linked as a ground for learning. Medicine is a complex professional practice in which the separation of cognition (thinking), conation (will), affect (feeling), and skill (doing) is impossible and unnecessary and in which individual cognition is secondary to social and other similar effects, i.e. context in learning. Learning implies connections between thinking, sensing, doing, feeling, willing, imagining, intuiting and thinking about thinking (metacognition).¹⁰ After the undergraduate medical education, the medical doctors undergo the structured training programme, commonly called residential training or simply residency, when they work under supervision in the specialty concerned. Most of the theories of learning are incorporated in various forms in the structured residential training at different stages. The focus is on active learning, rather than on passive teaching.¹³ Teaching is the process or the 'means' and learning is the outcome or the 'end'. The concept of the structured training programme of residency with actual working in the field under supervision with various teaching-learning and communication activities is to make the learners learn actively and reflectively.

2.6 Continuum of medical education as per the community need

There is continuum of medical education: undergraduate medical education, residential training, and continuing medical education. After undergraduate education, medical doctors have to undergo the structured residential training and accredited appropriately in a specialty before they are allowed to practice. What or where they will practice will depend on the service available in the community. The whole medical education is planned as the need of the community.¹⁴ The service and need of the curriculum decides the medical curriculum. The continuum of medical education and the need of structured training programme of residency are evident by the successful absorption in the US residential programme of thousands of medical graduates taught in different undergraduate curriculums from the developing countries. The structured residential training is obviously important. The undergraduate medical education of whatever curriculum is incomplete without further residential training.

2.7 Lessons learned

Lesson 1: Graduation like MBBS alone not sufficient to allow doctors to practice independently

In the past after graduation the doctors were expected to practice independently with or without having some experience in hospitals. But with increasing vastness of medicine and changing concept of learning and medical education and increasing focus on safety and rights of patients, such independent practice for any medical graduate is not possible now in the industrialized countries. Many lessons could also be learnt from the evidences of the background and implementations of series of health and educational reports and reforms, like Tomorrow's Doctors, Modernizing Medical Careers and others in different parts of the world.¹⁵⁻¹⁸ With the rapid and massive growth of diagnostic and therapeutic interventions and specializations, the need of structured residency programmes for medical training is more now. Without even the basic training of the medical profession of vast majority of medical doctors, it will be difficult, if not impossible, to implement evidence-based medicine. Thus every medical graduate now needs to undertake structured-residential training to practice clinical medicine.

Lesson 2: Structured training programme of residency is a 'must' in postgraduate medical education

As discussed above, after graduation, medical professionals need to undergo supervised, structured residential training of actual working to fulfill the required evidences to be fit to practice in any field. In developing countries, many postgraduate degrees are awarded without residential programme. Evidences are clear that such 'theoretical' or 'library' degrees, either for national or foreign students, are not valid for any clinical practice on human beings. Training and learning would not be acquired without working as residents. Teaching and learning basically occur while managing cases in the units. The focus is on developing skills of reflexivity, not just remembering. The residents have to manage patients and face different situations, so the materials to be learned are personally relevant and responsibilities to learn fall on the learners themselves as well. This is an example of task-based learning, the strategy that focuses student learning around real cases that the students meet in the wards, out-patient departments and emergency.¹⁹ The meaningfully learned

knowledge is retrievable, durable and generalisable. The students acquire basic science knowledge and clinical reasoning skills in the context of actual patient care.¹¹

Lesson 3: The candidates selection for any Sub-Specialist Training should only be from among those who have already completed General Specialist Training

After the undergraduate medical education, for clinical practice every graduate will have to undergo General (or Basic) Specialist Training. After the General Specialist Training, they can join the medical practice in the relevant subject or can continue Sub- (or Higher-) Specialist Training.¹⁶⁻¹⁸ The general outline of the training of the medical professionals is shown in the Figure 1.



Fig. 1. The continuum of education of the medical professionals: The medical graduate can only practice in any specialty after the necessary accreditation in the relevant field after undergoing structured-residential training.

After graduation, medical professionals need to undergo supervised, structured residential training of actual working and get accredited in the General Specialty like General Surgery, Internal Medicine, General Practice or others. Then they can either practice in the General Specialty or go for Sub-Specialist Training similarly in different sub-specialties like cardiology, diabetes, urology and others.¹⁶⁻¹⁸ Each step of requirement is important to go to the next phase. The ‘experience of working’ alone in any basic specialties, medicine or surgery, will not fulfill the requirement to allow the candidates go to higher specialties, like gastroenterology or urology, training. But direct enrolment and teaching in different sub-specialities is practiced in many ‘postgraduate’ programmes in the developing countries. The candidates for any Sub-Specialist Training should not be enrolled before they complete the relevant General Specialist Training. Similarly the experts need to consider whether direct orthopedic training, as practiced in many countries, should be allowed or not without first undergoing the training in General Surgery, particularly if the orthopedicians primarily manage trauma patients, and trauma units or centers.

Lesson 4: Need of structured residential training programme in General Practice

Evidences are clear that medical professionals need to fulfill the required evidences to be fit to practice in any field before they can be allowed to practice independently. Similar requirements are required for anyone to practice as Generalist in rural or urban areas. General Practitioners have to manage from medicine to surgery, pediatric to geriatric, orthopedics to obstetrics, and other. Residential training in General Practice provides the necessary medical professionals to serve in the community as practiced in industrialized as well as now in some developing countries in the world.^{16-18,20} Similar program is required in other countries before the medical graduates can practice in the rural or urban community. Such practitioners will also be the most appropriate personnel to be further trained for some months in health administration or public health to take such responsibilities later; this would also provide them further career incentive.

Lesson 5: Need of structured training programme, with appropriate eligibility criteria, in infectious diseases

Communicable or infectious diseases are major public health burdens in the developing countries.²¹ But there is scarcity of Sub-Specialist Training programmes in Infectious Diseases for the medical professionals already qualified with General-Specialist Training in Internal Medicine to produce infectious disease specialists.^{20,22,23} That could be one of major reasons of not having adequate service and data of infectious diseases in the developing countries. The trend now is to train the medical professionals in the Infectious Diseases after the General Specialist Training programme of residency in Internal Medicine.¹⁶⁻¹⁸ Similar program is required in the developing countries to produce appropriate consultants and leaders in this common major problem of infectious diseases, including HIV/AIDS, tuberculosis, hepatitis and others.

Lesson 6: Need of appropriate eligibility criteria for the educational course of public health and health-service administration

Health administration plans and mobilizes the health professional service in any country. The service decides the curriculum for the training of health professionals in any community.¹⁴ So health-service administration is a key point and personnel need to have experience and concepts of both the medical education and health problems in the community. Medical doctors just with the undergraduate education, like MBBS, may not have full concepts of the health problems even with any other administrative training alone. Similarly in the public health, training the MBBS, or non-MBBS, graduates only with some months of master in public health training program may not now produce appropriate experienced professionals to give the required leadership in this vital field. The varied eligibility criteria for such course in public health seems to be creating confusion in the hierarchy of postings and in the planning and implementation of the necessary programmes in the developing countries. General Practitioners or other practitioners who have had undergone structured training programme after medical graduation may be the appropriate persons to be further trained in health administration or public health for some months to take such responsibilities. This would also be a career incentive for General Practitioners in the rural and urban community. Thus the training programme in public health and health-service administration needs to be discussed and planned considering the implications and the contexts.

Lesson 7: Public health institutes have to be involved in the structured training or postgraduate programmes

The opportunity for structured training in the developing countries is severely limited by the concept of giving 'postgraduate degrees' mostly inside the closed-wall of medical colleges,^{20,22} which are increasingly becoming private and charge exorbitant fees. The mass of people in developing countries attend public institutes, which are not given the due priority, or even attention, for improvement in the quality, as if EBM is only to be taught by the professors in the medical colleges. Whereas the public health institutes itself could also be easily included in the structured training of medical graduates improving the quality of the public health institutes and increasing the training venues to adequately train the medical graduates efficiently, as evident in the industrialized, as well as in some developing, countries.^{16-18,24,25} If the quality of the public hospitals is not taken care of, the

situation of the private institutions could become even worse. Considering the rapid and massive growth of diagnostic and therapeutic interventions and specializations, it may not be possible to keep all the facilities for patient care and residents' training under one roof or closed-wall of a medical institute, especially for the Sub-Specialist Training. Demographic and environmental conditions may also lead to variation in the types and cases of patients visiting any particular institute. Apart from the private medical colleges, other private medical institutes may also be included in the training programme if the facilities and patients are available. As the teaching-learning is a part of professionalism of medical professionals, the consultants and other specialists can easily be trained to be a supervisor and faculty for the training programme. The university and medical colleges can affiliate with the public hospitals for teaching-learning and service activities and can also develop their own medical centers in the peripheral part of the country. The students and the faculty of the medical institutes can be posted there on rotation in their required specialties in the peripheral health centers, which will also help the undergraduates and residents to get the experience of community-based education (as discussed in 2.4).

Lesson 8: Residential training, as well as later revalidation and appraisal, programmes are the responsibilities of the State, not of individual medical institutes or trainees

The structured residential postgraduate programmes need to be planned and supervised by the State as in the industrialized countries.¹⁶⁻¹⁸ Committee or councils are required to accredit institutes, like medical schools and public and private institutes, for training and similarly to accredit the structured residential programme.¹⁶⁻¹⁸ Subdivisions of the required functions for the training and registration of medical professionals and their relation with different institutes where structured training programme could be arranged are shown in the Figure 2. Relevant experts from different fields can be the members of the committees. There can be overlap of representatives from different stakeholders in the committees as per the local situation. But the academic requirements and programmes need to be guided by the principles and committees of the State. Registration of medical practitioners by the State is in general a separate issue (Figure 2). Identification and regulation of separate functions helps to promote their appropriate planning and implementation. But in many countries, all

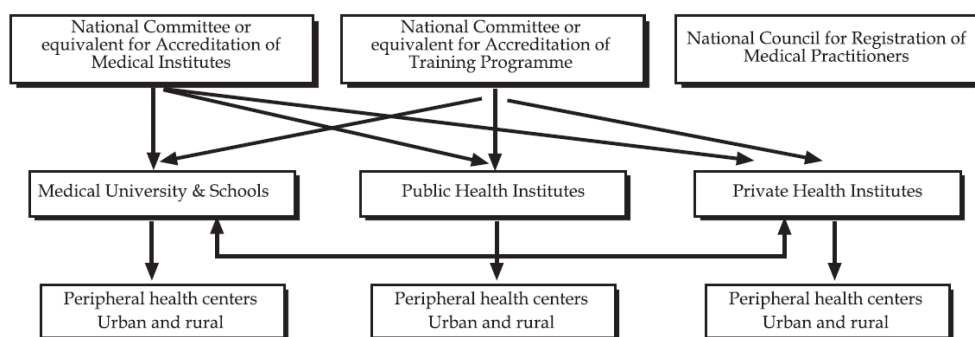
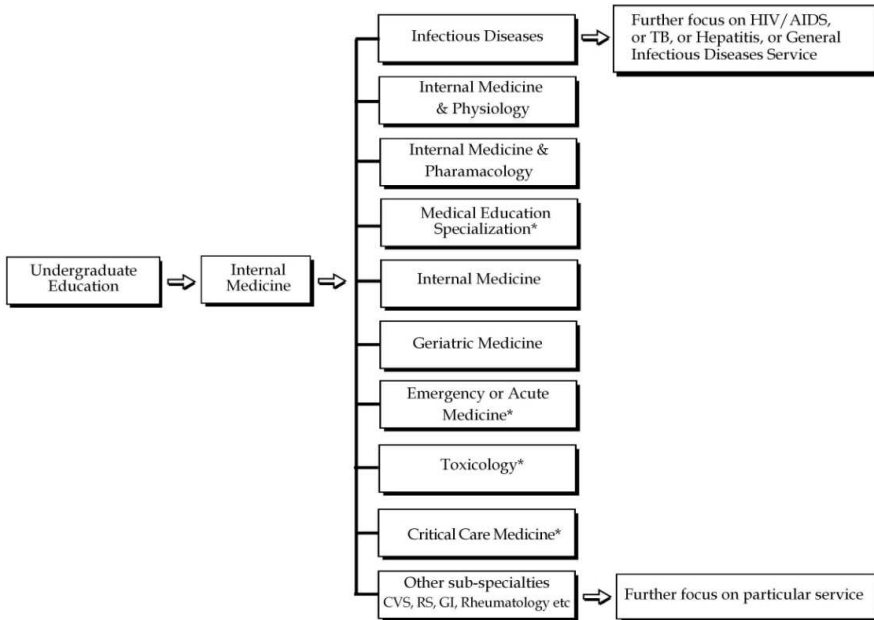


Fig. 2. Subdivisions of the required functions for the training and registration of medical professionals and their relation with different institutes where structured training programme could be arranged: There can be overlap of representatives from different stakeholders in the committees.

the three functions are managed by medical council.^{20,22} It would not be easy for any single organization to plan and manage different types of the functions requiring different approaches appropriately, which may, not surprisingly, lead to inefficiency and even corruption often heard in the developing countries. In UK, before the Calman reforms trainees were expected to organize their own training programmes. After the introduction of reforms the control and responsibility for the organization of training shifted to the committees.²⁶ Structured residential training, as well as later revalidation and appraisal, programmes are the responsibilities of the State for the safety and health of the people.

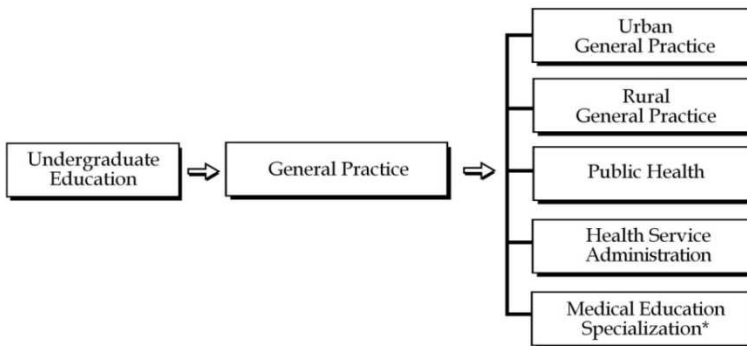
Lesson 9: Training of the medical professionals is planned as per the community need

Medical education and curriculum is guided by the community situation, practice and need.¹⁴ Community need may change as per the population demographics, disease patterns, resources and possible services. Specialty and subspecialty service development would be as per the local situation including volume of patients to justify the separate service, time of the available experts and the duration of training required to develop the expertise. The medical service practice in the community based on the available human resources may need to be restructured later differently for the effective and safe service delivery to the people considering the changing situation and teaching and learning concepts, increasing human resources and population as well as demand of the people, and trends in other parts of the world. For example, in many developing countries the patients in the emergency and observation wards are often managed by other speciality units, including Internal Medicine units, of the hospital and in this situation emergency department, simply a patient-entry point venue for other specialties to manage the patient, is easily coordinated by the General Practitioners even without any extra training. If the Emergency or Acute Medicine is to be practiced independently as in many industrialized countries, then internists may need to be further trained for it. Similarly, the intensive care or treatment units (ICU/ITU), especially the ventilatory and other related aspects, in the developing countries are managed, along with other related units, usually by the anesthetists or by respiratory physicians now in some places. But the Critical Care Medicine is itself becoming a separate sub-specialty service and training area from the Internal Medicine stream. With increasing number of elderly population the need of Geriatric Medicine service and training is also obvious. Thus, the training courses for different higher specialties practice are guided by the community service need. The community need may be different in affluent or non-affluent and sparse or densely populated areas even in the same country whether industrialized or developing one. Some possible service, career and training options of Internal Medicine, General Practice and General Surgery and their sub-specialties in the community are shown in Figures 3, 4 and 5 respectively. For the situation of the scarce human resources or patient-loads, like in rural areas, the trainees from the general stream of General Practice could be given extra required training in obstetrics and gynaecology and anesthesia to practice as rural general practitioner (Figure 4). There will be similar options of services and trainings for other specialties like Paediatrics, Obstetrics and Gynaecology, Radiology, Pathology and others. After the General Specialist Training in any specialties, a faculty can be fully trained in Medical (Health Professional) Education specialty. The proportions of the numbers of the training opportunities for General Practice and other General and Sub-Specialty Trainings should be decided as per the requirements of the community and the later possible careers. Whether the Dental Surgeons should first undergo general medical undergraduate education followed by General Specialist Training in Dental field is a matter which can be discussed by the relevant experts, especially for the overlapping fields like oral-maxillary-facial surgery.²⁷



*The extra service can be continued along with the Internal Medicine as per the volume of workload, time of the available experts and training required in the subject.

Fig. 3. Some possible options of services of Internal Medicine and its sub-specialties in the community, according to which the training of the medical professionals need to be arranged.



*The extra service can be continued along with the General Practice as per the volume of workload, time of the available experts and training required in the subject.

Fig. 4. Some possible options of services of General Practice and its sub-specialties in the community, according to which the training of the medical professionals need to be arranged.

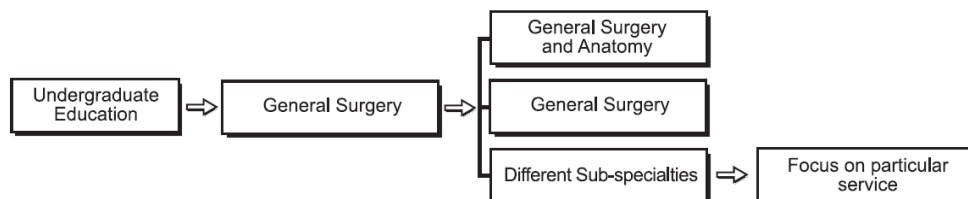


Fig. 5. Some possible options of services of General Surgery and its sub-specialties in the community, according to which the training of the medical professionals need to be arranged.

Lesson 10: Structured-residential programme involves doing the required work entitling the full pay and continuation of the service without any extra-training fee

Every medical graduate needs to undergo residential training before they can serve as a medical professional.¹⁵⁻¹⁸ Even while they are undergoing structured-training programme, they are working in the field of their career and serving the community. Thus residential programme, whether General Specialist or Sub-Specialist Training, is like in-service training, not requiring any special leave or extra-payment for the training. During the residential training, the residents provide efficient and actual service to the people for which they should be paid as well as such residential training, unlike undergraduate medical or other non-residential non-service providing higher education, should be free not requiring any extra-training fee as in many industrialized countries. This is different from educational programmes of other service personnel in any institute or national service, where people may have to take special leave to study without doing their assigned jobs. The medical training and service are interrelated. The formal inclusion of the concept will help the career and morale of the trainees which is important for the better service and care of the patients. The trainees can thus continue their sub-specialty training as per their choice and service.

3. Training and assessment

Optimal training of the residents is a key concern of all the stakeholders. The focus of teachers and curriculum planners is to provide appropriate training. But active participation of the learners is required. Students may not realize and give full attention to the concept of the training. Passing the examination is the major focus of students. Students naturally tailor their learning styles to the assessment demands. They are very quick to respond to what they perceive as the demands of the assessment system.²⁸ The content of the assessment will become in reality the course objective. For example, if it becomes widely known that topic 'A' is never included in any examination, it is difficult, if not impossible, to persuade students that mastery of it should be an objective for their studies.²⁸ Thus, assessment methods and criteria are the most effective tools we have to help all students achieve training criteria and ultimately pass. The curriculum planner and faculty need to understand the relation between the training and assessment criteria (Figure 6), and especially the fact that assessment is basically for training, not just for certification. The educational impact of the assessment on the learning of students is significant and faculty must utilize it to the maximum.

"It is the examination system rather than educational objectives, curriculum organization, or educational techniques that had the most profound impact upon student learning. For no matter

how appealing the statement of goals, how logical the program organization, how dazzling the teaching methods, it is the examination that communicated most vividly to students what was expected of them"

--George E Miller

"Students work to pass, not to know.....They do pass and they don't know"

--Thomas Huxley

"Learning, teaching and assessment must not be viewed as isolated concepts. In the ideal scenario effective teaching, effective learning and effective assessment are all part of the same educational process. The value of changing assessment to reflect what needs to be learned is evident since students learn what they will be tested on"

--Doyle, 1983

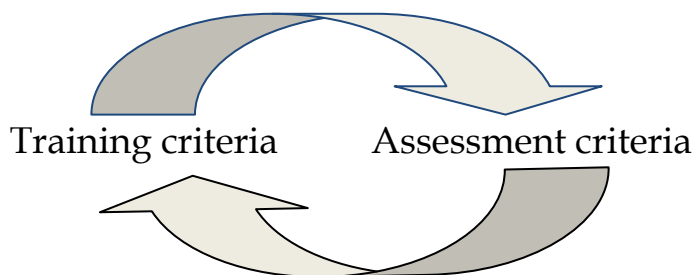


Fig. 6. The close relation between training and assessment criteria.

The assessment criteria should be clearly spelled out as per the outcomes we want of the products of the training. While preparing the assessment criteria, the faculty need to consider the training need of the students for the specialty in the local community and such criteria then should be made known to the students, so that they try to prepare accordingly, which in the process helps them to achieve the expected training need. We can, thus, say: "Whatever you want your students to do, include it as a part of the assessment first, and then only they will learn and do actively!"

3.1 Criterion-referenced assessment

The principal objective of medical education is to produce a competent physician. Unquestionably, the basic aim and approach for the evaluation process is to assess the standard of competency and not the rank order of students.²⁹ The assessment which simply ranks the order of performance in terms of their position in the group is norm- or normative-referenced assessment. The norm-referenced assessment fails to provide a clear picture of what the student can or cannot do. It does not provide useful feedback i.e. pinpoint strengths and weakness and it cannot discern to what degree an educational programme has met these standards.²⁹ Recognising the norm-referenced assessment's limitations, Glasser in 1963 formalised the concept of criterion-referenced assessment.³⁰ Standards of performance are set using minimal levels of competence before the test is applied. The assessor sets the level of performance which is required. It may be the total mastery of a task or it may be the minimal acceptable level. The criteria-referenced

assessment allows pinpointing students' capabilities i.e. what they can or cannot do. Thus criterion-referenced testing must become the principal method of evaluation within medical education. "Meeting the required standards" and "Fitness for purpose" are two notions that highlight quality assurance.³¹ Both are related ideas in that we need to consider the criteria against which the achievement of standards is going to be measured, and a major criterion must surely be the fitness for purpose. This certification cannot be achieved just by the theory or clinical practical examination in the exit examination. A mixture of assessment criteria and methods has to be documented.

3.2 Exit examination and the eligibility criteria for the exit examination

Apart from the assessment in the exit examination, the eligibility for the exit examination has to be defined by the criteria to be fulfilled. Once eligibility is expressed clearly, then it is obvious that all candidates have to achieve it before they can appear in exit examination and subject committees and examination section have to ensure they are achieved. Passing the examination is the major focus of students. Indeed, regulations, like the eligibility for final exit examination, and examination are the only 'languages' students try to understand fully and take seriously. Each component and criterion of the examination is vital to train the students appropriately and needs serious attention.

3.3 Lessons learned

Lesson 11: Spell out the eligibility criteria for the exit examination

The eligibility criteria for the exit examination will vary as per the level of assessment, situation of the service and need in the community where the candidates will later work, and the specialty. There is a example of ten criteria of assessment for the exit examination of residential-programme in the General Specialist Training.³² In general, the outline of the possible eligibility criteria for the exit examination could be considered in the following headings:

- Adequate attendance of actual working as a resident with regular and emergency duties
- Achievement of the minimum pass-percentage in the required theory and clinical examination held earlier
- Completion of horizontal and vertical, i.e. spiral upward, rotation training posting
- Completion of minimum numbers of most important, e.g. top 10, procedures and/or experiences
- Completion of relevant mandatory basic courses, like advanced cardiac life support (ACLS), communication skills including breaking bad news, learning principles and methods, evidence-based medicine, basic surgical skills, trauma-life support, palliative care, and others
- Completion of portfolio focused on communication
- Completion of minimum numbers of presentations, e.g. journal, case, topic and others
- Completion of minimum numbers of teaching to juniors and nurses

Lesson 12: Assess the required basic theory and clinical components in the early part of the training programme

One of the characteristics of the adult learners is that they base their learning upon the experiences they have.³³ The skills required for patient care depend upon learning in both

the theory and clinical areas.¹³ A lack of solid base of knowledge foundation, including applied basic science, during the clinical training programme will be a serious handicap for learning the concepts of the subject. If the students can correlate and apply their knowledge to the patient care related to the subject of postgraduation during the context of their training, then they are likely to have the full understanding of the concepts and principles of the specialty. For this purpose, the students have to acquire the required base of knowledge on time during the initial phase of training itself. The students give priority to the assessment. If the theory examination, including of the applied basic science, is held at the end of the final year, the students will naturally prepare for it at that time only. But the aim is not just to assess knowledge of the students at the end, but to train them in their actual field of specialization integrating all the required knowledge. Thus the basic or minimum theory and clinical components required for the training to be assessed in the early part of the training-programme have to be decided and arranged in the required scheduled. The training and assessment have to be primarily managed by the faculty of the relevant specialty, not by the basic science teachers. Such assessment would help to achieve the aim of formative assessment, which is the identification of deficiency during the training period in order to correct them. The possible topics, areas and questions to be asked in such assessment may be published as a guidebook and given to the students, so that they can prepare themselves for the examination. The role of study guides in facilitating and managing independent learning is well accepted.³⁴

Lesson 13: Plan appropriately the horizontal and vertical, i.e. spiral upward, rotation training posting

In postgraduate residential training, the students are rotated in different units related to their subject of post-graduation. During such rotations, the training and exposure in different sub-specialties required and the sufficient work load and other learning opportunities available should be considered to decide regarding the postings and their durations. The specialties for the residents to be rotated need to be correlated with the actual responsibilities they will be fulfilling later after the training. For example, in Internal Medicine rotation in psychiatry, diabetes, infectious diseases, ICU/ITU and CCU may be equally, if not more, relevant than in gastroenterology and cardiology alone if the residents later are not going to do any invasive or non-invasive procedures of gastroenterology and cardiology. For this, the subject committee may have to consider the types of patients managed by the general medicine unit and decide as per the local context. The postings planned a few years back will have to be reviewed as per the changing situation. The other important point to consider is that the training during the rotation postings is not just horizontal; it is also vertical and progressive, i.e. spiral upward. In the beginning of the training, the students are posted as junior residents in their subject of post-graduation for about some months to a year to get the basic knowledge and skills. Next they will be rotated in different subspecialties or related units as rotating residents. Finally they need to be rotated back as senior residents to their subject of post-graduation for about a year to assimilate or integrate all the learning. During this final posting as senior residents, they work with increased experience and responsibility of managing the unit with wider perspective and decision making responsibility, including supervision of junior residents, thus, to have the overview of the subject. The concept of problem based learning (PBL), i.e. a learning strategy characterized by self-directed active learning starting with problems or inquiries that learners themselves identify³⁵ is thus inherently incorporated in the third year posting. It is well said

that a good surgeon knows how to operate, a better surgeon knows when to operate and the best surgeon knows when not to operate. The decision making training in the specialty to be certified can be given in the final phase of posting in that subject. Approximately 75% of the significant events in surgical procedure are linked to decision making and about 25% to manual skills.³⁶ Thus appropriate horizontal and vertical rotation training postings need to be planned.

Lesson 14: Spell out the minimum numbers of most important, e.g. top 10, procedures and/or experiences

Postgraduate residents are required to maintain a record (log) book of the work carried out by them.^{20,22,23} But without the specifications of the minimum numbers of experiences required, checking the logbook with details of the entries of so many procedures and activities will just make it a formality for the residents to get it signed, even at the last hour before examination. If the minimum number of the top ten procedures or experience is spelled out, the verification of their completion by the subject committee can then be easily made as one of the eligibility criteria to be fulfilled before the final exit examination.^{24,25,32} The spelling out the minimal number of most important procedures and/or experience in the curriculum and logbook will automatically ensure fulfillment of many other necessary background experience as well.³² The principle objective of structured residential training programme is to produce a competent specialist. At the end of the training programme, it is necessary to certify the candidate's level of knowledge, skill and competence. The clear specification of operative skills is particularly vital in surgical specialties. For example to certify a medical profession as a trained in General Surgery, it has to be assured that the candidate has the necessary experience of working in General Surgery and s/he has achieved the necessary competency level to operate the required surgeries like appendectomy or cholecystectomy independently etc. With the documentation of such criteria of important procedures, then external examiners and reviewers can also give necessary feedback. The experts in the field may also need to discuss the related vital issues, for example "What is the domain of General Surgery now in the changing medical and demographic scenario like increasing old age and problem of benign prostatic hypertrophy, development of laparoscopic surgery, the scarcity of urology operation theatre (OT) and redundancy of general surgical service with mostly asymptomatic gall stones available to fill the OT list?"; or "Should the senior faculty and consultants in the General Surgeon Unit perform transurethral resection of prostate with Urologists dealing the area beyond the prostate?" and others.³⁷

Lesson 15: Need of skill laboratory for the safe and appropriate training of the residents

The rapid expansion of medical knowledge and medical procedures, lesser working hours available and longer years of training required considering the learning curve for appropriate competency and patient safety indicate the value and need of skill lab in clinical and procedural training. Simulation-based medical education is now recognized as an increasingly powerful complementary teaching methodology in the medical profession. It is driven by a combination of the forces; they are: the patient safety movement, objective structured clinical examinations, patient rights movements and patient ethical issues, animal rights movements, risk management and medicolegal atmosphere, economic forces, and the simulation industry.³⁸ Experienced surgeons, if they desire to learn an innovative procedure, students and surgical trainees have to pass through a learning curve to acquire any

particular new skills. This learning curve is usually constructed in retrospect, rather than being applied as a continuous assessment based on predetermined criteria. It is possible to predict the extent of a learning curve.³⁹ For example, Yaegashi et al relied upon operating time and blood loss when suggesting that gynecology trainees need to perform more than 75 hysterectomies to achieve competence in the procedure.⁴⁰ Surgeons can become proficient after performing about 25 laparoscopic antireflux procedures.^{41,42} It would be ideal if the learning curve for all the surgical procedures could be measured. Learning by 'service saturation' has to change in response to the decrease in hours that surgical trainees can work.³⁹ Thus it is increasingly crucial to take advantage of the educational value of every experience in an effort to shorten the length of the learning curve for new procedures. Teaching and development of practical skills is now frequently done in workshops and skills laboratories. It requires specialist materials and equipment, smaller class size and longer blocks of time for practice.³⁹ The use of simulation has the potential to allow measurement of performance and establish objective metrics that can be used for formative and summative assessments. This is of crucial importance if we are to consider the development of proficiency-based curricula rather than time-based educational programs. Different kinds of tools to teach practical skills are available like printed materials, mannekin, video, multimedia, complex manipulation simulators, integrated procedure simulators, laparoscopic simple box trainers, virtual laparoscopic trainers, and others.³⁹ Virtually reality technology have been used widely in aviation training and more recently it has been adapted for use in surgery.³⁹ A virtual reality simulator can offer the chance for the learner to repeatedly practice a manual skill until it is technically perfected. To utilize the resources effectively, especially if scarce, the skill lab can be developed with mutual collaboration as a common training venue for trainees from different institutes. International agencies and the institutes of industrialized countries should come forward to help establishing the skill lab in developing countries. Indeed the institutes in the industrialized countries can also be benefited by the mutual collaboration. Low resource centers may have volumes of patients and procedures and other varieties of disease patterns useful for the appropriate trainees from abroad. Thus both can benefit from cooperation, including faculty exchange and discussion forums. The experts from industrialized countries can visit low resource centers to help setting-up newer diagnostic and therapeutic modalities and units.

Lesson 16: The thesis-study not appropriate now for the residential training programme

Submission and approval of thesis work is a well known pre-requisite to become eligible to appear in the final exit examination in postgraduate clinical training programme in the developing countries.^{20,22,23} But in the changing situation of present context it appears to be a high-time to consider whether we should continue to keep thesis study as the necessary component in the clinical residential training of medical professionals. There is a rapid and massive growth of diagnostic and therapeutic interventions and specializations. It could be difficult for the residents to cope with the training and learning requirements related to their own field and thesis-study on human subjects, including children and pregnant women, could hamper the actual training required. Moreover the requirements required to conduct research in humans are clear and established now. Medical professionals need separate training and certification for conducting research. Both students and their guides, with burdens of and primary focus on service and teaching responsibilities, may not have enough time for or may not be well trained to conduct research mostly on patients attending health

institutes only for seeking treatment. The residents are students in the phase of learning of their own field, even leaving aside the research principles. The clinical training itself is getting more complex with rapid growth in technology, globalization and increasing expectation of the population. The structured residential training is required for all medical graduates. With the increasing number of trainees it could be more difficult, if not impossible, for the institutional review boards and research councils to make adequate supervision of such studies in the developing countries with likelihood of harms to the patients. It is, thus, an issue of basic safety and rights of the patients in the developing countries where illiteracy and ignorance of rights are also high. Conducting thesis-study is not necessary to learn EBM. EBM could be learned by mandatory basic course training on EBM, journal club, applying EBM in each patient and learning the development of one's practicing field. Requirement of thesis-study is not there in the clinical training programmes of many industrialized countries.¹⁶⁻¹⁸ If the thesis-study is not required, the number of residents to be enrolled to structured training programme of residency will also not be limited by the availability of faculty who can fulfill the criteria to guide the thesis work. The residents for the structured-training programme could, then, be admitted or enrolled as per the required training possible in the specialty under the supervision of the senior faculties who are already as such managing the unit and providing the necessary service to the community.

Lesson 17: Assessment of history taking, physical examination and communication is necessary in the exit examination of residential training programme

All evidences point the importance of history and communication in the patient management. Current evidence suggest that most diagnoses result from findings in the history, and to a lesser extent, the physical examination and laboratory testing.^{43,44} Similarly, failures in communication are the most frequent source of patient dissatisfaction. Some 70% of lawsuits are a result of poor communication rather than failures of biomedical practice.⁴⁵ Thus adequate training of communication and history taking is obviously important. Training and assessment of communication, including history taking, done during the undergraduate education before the beginning of the structured-residential training alone will not be sufficient. Effective history taking and communication depends on the base knowledge, experience of actual working in the specialty, and the practice of doing so during the residential training. If there is no assessment of the history taking and communication in the training programme of the residency, the students may not give much attention to it and may not try to gain knowledge about it or adopt practice. But the training assessments may be focused just on multiple-choice questions (MCQs) considering its reliability.^{16,17} An instrument may be perfectly reliable but totally invalid. For example, an MCQ examination may show high reliability but is it really a valid measure of whether students are competent in resuscitation skills or history taking and communication?⁴⁷ Existing methods of assessment of history taking and communication, e.g. modified OSCEs, multiple long cases, observed long cases, videos, simulated/standardized patients and others, may not have that high reliability. But that does not mean a method just because of its high reliability can replace a valid method of assessment especially when evidences are clear that value of communication is high in diagnosis as well as patient satisfaction and reducing medical error. In the criterion-referenced assessment, like for the accreditation of medical professional, validity is the priority to give attention particularly when the

assessment is considered along with a mixture of criteria. Whereas in the normative-referenced assessment, like in entrance examination for any programme or job, reliability assumes more importance than validity to remove any selection bias, or even possibility of nepotism or corruption (Figure 7). From this point of view reliability appears to support rights of the students and validity appears to support rights (and safety) of the patients. Using and finding reliable ways to make the valid assessment would be preferred in criterion-referenced assessment than using reliable method of assessment which is less valid.

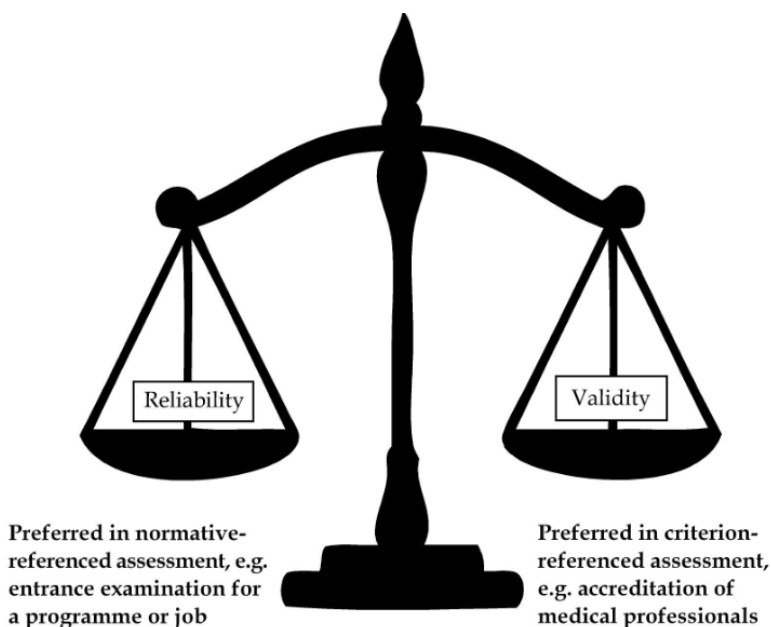


Fig. 7. Balancing reliability and validity as the assessment tool

Lesson 18: Include training in communication and reflection in the General Specialist Training programme

Different methods of teaching like case-based discussion, feedback, directly observed history taking, clinical examination and procedure performance are increasingly included now in the residential training. Many of these aspects can be efficiently incorporated in the ambulatory care setting of outdoor clinics by quick methods of teaching like one-minute preceptor model. Training programmes, most importantly, also need to be planned directly to cover communication, including breaking bad news and communication in consultation, by the communication and medical education experts. Communication training during undergraduate medical education without the required base knowledge of the subject of specialization and regular exposure during the residential training will not be enough for the requirements during the residential training. The communication is a daily, almost continuous, affair in the medical world. Valuable learning can be acquired from any experience in the medical training by reflection and further learning efforts.¹¹ For this, apart

from the other face-to-face training programs on communication, the learning-portfolio in the field of communication is of immense help.⁴⁸⁻⁵¹ Repeated training of all the residents is not feasible, but portfolio on communication gives an opportunity to learn from every encounter of communication. Learning-portfolio also helps the residents to develop the quality of reflective practitioner. Reflection is an essential component for the development of a learning cycle and life-long learning required for the professionals. It is essential for medical professionals to continue their personal learning plans as per the different developments and requirements later in their career. The accreditation process of the specialists should of course depend on fulfilment of work-designated responsibilities and requirements, not just on achievement of personal learning plans. Learning-portfolio is one of the useful approaches to facilitate reflection.⁴⁹⁻⁵¹ Thus, portfolio focused on communication would help the residents to improve their communication as well as the habit of reflection.

4. Teachers' criteria and training

The twelve roles of the teacher are well known: clinical or practical teacher and lecturer as information provider, on-the-job role model and teaching role model as medical expertise, learning facilitator and mentor as facilitator, student assessor and curriculum evaluator as assessor, curriculum planner and course organizer as planner, and study guide producer and resource material creator as resource developer.⁵² For the General or Sub-Specialty training of the residents the most important roles expected from the vast majority of faculty are those of medical expertise and supervision. They can then be easily trained in other common responsibilities regularly required for all viz. learning-facilitator and students-assessment. Some can be trained to coordinate development of resource and organization of course. A few will need to focus on curriculum planning and curriculum evaluation. The point to note is that in the twelve roles of the teachers, conducting studies and publication of paper on clinical aspects are as such not emphasized. But in the teachers criteria the focus is only in paper publication in their fields in many parts of the world.^{20,22,23} The teaching faculty designations itself appears to be linked more with the ideas of any research and paper publication, rather than with educational activities.^{20,22} Due to the minimum criteria required of the teachers to have done thesis-study previously and publish number of original articles, there is scarcity of teachers, when the need of today is to provide the opportunity of residential training to 'all' medical graduates, not just a few ones. The residents for the structured-training programme should be admitted or enrolled as per the required and relevant work available in the specialty, for which they are being trained. Thus there is dire need to consider appropriately the definition of the domains of the teachers and the criteria required for them which are separate from those of other academic positions. The teaching responsibility of the medical professionals deserves appropriate attention, priority, and 'glamorization' equal to, if not more than, their role as researcher.³²

4.1 Lesson learned

Lesson 19: Make appropriate teachers' criteria and plan necessary training accordingly

The teachers' criteria for the residential training programme should be based on the most important role expected from the vast majority of faculty, which is clinical and practical and

patient management skills. Any faculty or consultant are likely to have such expertise required for that contexts. Subsequently teachers' training needs to be planned and other requirements to be laid down to continue as teachers. Shorter overview training covering the spectrums of teaching-learning activities, lesson-planning, class-room teaching and communication skills, feedback method, ambulatory teacher-learning, assessment and other similar ones may be required for all. Specific workshops and training will be useful for assessment methods, microteaching, lesson-planning and other skills. Constructive feedback is an essential responsibility of all teachers for which they should be trained.⁵⁴ As the focus of healthcare provision shifts towards ambulatory care, increasing attention must now be given to developing opportunities for clinical teaching in this setting.⁵⁵ Many specialties like dermatology, ophthalmology, general practice, diabetes and others have significant ambulatory service. The number of residents in such specialties will not be dependent on the indoor works and bed numbers, but will depend on workload and opportunities for learning in the ambulatory care settings. Support and training of teachers and supervisors is essential in improving the quality of postgraduate medical education. All faculties may not have the similar roles. After the initial general training of the junior faculty, portfolio on postgraduate training will be useful to remind them regularly the various aspects of teaching-learning.⁵⁶ The portfolio can be for learning or assessment.⁴⁹⁻⁵¹ Audit, including of teaching-learning activities, will also be useful for junior faculty. The value of audit is well established and popular in industrialized countries since more than two decades in improving patient care as part of an ongoing educational process, basically involving change management and quality assurance.^{57,58} Training on preparation of study guides will be useful for majority. The role of study guides in facilitating and managing independent learning is well accepted.³⁴ The requirements of research training certification and paper publications, including on medical education, will also be applicable to the various academic faculty positions, especially the senior ones, but this should not prevent the enrolment of the medical graduates for the structured residential training. The criteria for teachers for residential training is a separate issue than that for other academic faculty positions. Thus the teachers' criteria, benefits and training need to match the expected training of the residents and provide the opportunities for training for all the medical graduates in the community.³² The faculty position designations of the teachers may be categorized based on different educational activities, involvement or roles like on-the-job training and supervision, clinical teaching, small group facilitation, assessment, curriculum management and planning, mentoring, audit, portfolio, study guide development, course organization, skill laboratory management, course evaluation, extra medical education qualification, medical education research and others. The recognition of such roles will help the appropriate development of all these required activities, which may otherwise be neglected as extra-burden.

5. Individual's mistake, system's error, health safety and trainees

There is still an unacceptably high level of risk associated with medicine, surgery and hospital stays.⁵⁹ Medicine remains a high-risk activity because it has not yet assimilated the necessary values to maintain safety practices.¹⁰ A mishap in health setting commonly occurs due to various errors like communication, environmental, human, team-work, technical, instrumental, decision-making, cross-checking, and others. Improvement of all such situation to minimize problems will not adequately occur if the law is to hold individual

clinicians responsible for 'mistakes'. To err is human; if humans are solely responsible, then errors will be there. Humans are fallible but the institute or the State should not be. Individual's mistake, system's error and medical negligence are separate entities. When individual's mistake causes harm to patients or others, then it becomes system's error. The institute and the State should continuously evolve foolproof cross-checking methods to prevent individual's mistakes and harm to patients and others, i.e. system's errors. Moreover if a trainee who is not adequately trained makes mistake, should the blame be put on the individual for making the mistake or on the institute or the State for posting or allowing the 'not-adequately' trained personnel to provide such service, i.e. for conducting system's errors? Improvement of any situation and team work requires workshops, training and making guidelines and rules by the institute or the State. The onus for safety should be on the institution and/or the State, rather than on the individuals. The institute or the State then can make enquiry which will also be useful for prevention of such mistakes and errors again. For gross, i.e. not expected considering the level of training of the personnel as per the existing local norms, situation and data, or deliberate medical negligence by the clinicians, the medical council is there to look after. With the responsibility, and the fear, the institutes and the State will gear up to follow all the possible safety measures. It took around 15 years for the modern airline industry to move from being a 'high-risk' industry to becoming a 'safety critical' or 'high reliability' culture. The outcome of this is well evidenced – it is now very safe to fly.¹⁰ The responsibility of airline safety lies with the airline industry and the State, not just on individual pilots. There is a need of developing a fundamental shift in values and practices of the medical education that would transform the safety culture.¹⁰

5.1 Lesson learned

Lesson 20: Health safety is a responsibility of the institute and the State

Delivery of the health care service to the people is the responsibility of the State. Health service and training of medical professionals are interrelated.¹⁴ Training of medical profession is also the responsibility of the State. Similarly safety of the patients in the health care service is the responsibility of the State and Institute and it cannot be left on the individual health workers or trainees. There are two major safety issues in the health care all over the world. One is to provide the expert assessment and planning of the management of sick patients as early as possible by the already trained faculty and the other is preventing unnecessary procedures, investigations and medications. The medical service in the human society should ultimately aim to provide immediate assessment of every new patient admitted in the hospitals by the already trained faculty twenty four hours a day seven days a week. Such assessment and care could be crucial for the survival of many patients. For the safety of the residents as well, the trainees cannot be just exposed to the situation or practice for which they are not adequately trained. The training should be supervised, structured and graded. Coverage by the trained supervisor and faculty is vital. Residents need also to be trained in all the basic safety principles. Health institutes, medical schools and the State are like industry. They have all the resources and experts to plan, implement and evaluate the safety issues. Service, training, and safety are directly or indirectly dependent on the finance. If optimum service, training, and safety are the responsibility of the institute or the State, not of the individual clinicians, the economic benefits or loss will also relate to the institute or the

State, not to the individual clinicians. If compensations are to be given by the institute or the State, not by the individual practitioners, the benefits, if any!, should also go to the institute or the State. The payment to the individual clinicians will then be as per the service hours, expenses required to acquire the skills and the training, and other factors, not payment according to every procedure. Because outcome of every procedure is also dependent on the patient-selection, quality of the instruments, facilities available, support human resources, team works and other factors, not just on the skill of operator. As such the skill may be difficult to acquire initially. But once acquired, it will be just maintained or improved like driving skill. On the other hand it is not easy to maintain 'knowledge' in this era of information bombardment. The institute or the State has also the responsibility to upgrade the skill and knowledge of the medical practitioners for the sake of the safety of the patients. The medical professionals decide the indication of any procedures and situations should not be created to make them bias in any form. If the operators, surgeons or interventionists are paid for each procedure, there will naturally be the increased probability of advising unnecessary surgeries and procedures not only to the individual patients but also even in the institutional or national guidelines. If the medical professionals who perform the procedures are paid inappropriately high as stipend by the institute, even if not directly for each procedure, it can lead to the similar situation. If the cost and benefit of the procedures is to be borne by the institute, the medical professional can decide the indication without any bias. It is, thus, a very important issue of safety, i.e. rights, of the patients. At this point it would be relevant to emphasize that all the medical professionals themselves also belong to the patient groups, especially in the old age, with consequent liability to the society and the State. The related aspect for the trainee is that if the teachers are paid for the procedure and are biased to perform the procedure, the learning will be similarly acquired, directly or indirectly. The residents ultimately learn considering the actual practice, not just the theoretical teaching or 'preaching', of their teachers. The medical students may from beginning be bias even to choose their career considering the economic benefit, rather than aptitude. Such tendency is observed both in developing and the industrialized countries. In this era of rapid and massive growth of diagnostic and therapeutic technology, unnecessary procedures, investigations, and medications are the major risks to patients as well as the significant cause of economic burden to the insurance companies, the State and ultimately to the people.

6. Conclusion

Medical education has evolved from different models and different educational strategies have been developed considering the experience and evidences. There is continuum of medical education from undergraduate medical education to structured-residential programme of specialist training incorporating the various learning theories. The concept of the structured training programme of residency with actual working in the field under supervision with various teaching-learning and communication activities is to make the learners learn actively and reflectively and be able to perform their responsibilities reflexly professionally. After graduation, all medical professionals need to undergo supervised, structured residential training of actual working and get accredited in the General Specialty like General Surgery, Internal Medicine, General Practice or others. Then only they can either practice in the General Specialty or go for Sub-Specialist Training similarly in different sub-specialties like cardiology, infectious diseases, urology and others. Training in

different specialties has to match the community service. The aim of the residential training is to make the medical practitioners fit to practice as per the community need. Public health institutes fulfilling the requirements have to be involved in the residential training programmes. Structured residential training, as well as later revalidation and appraisal, programmes are the responsibilities of the State, not of individual medical institutes or trainees. Committee or councils are required to accredit institutes, like medical schools and public and private institutes, for training and to accredit the structured residential programme.

The educational impact of the assessment on the learning of students is significant and faculty must utilize it to the maximum. Training should be planned focusing on the criterion-referenced assessment. The assessment criteria, especially the eligibility criteria for the exit examination, should be clearly spelled out as per the outcomes we want of the products of the training. Inclusion of training and assessment in communication in the training programme matches the importance of history taking and communication in the actual practice. Establishment of skill lab in developing countries is an urgent responsibility to be fulfilled by the national and international agencies. Considering the vast areas of training requirements in the short period available, the patients' safety, need of training of all the medical graduates in the community and the dearth of the faculty to fulfill the criteria to guide the thesis work, the practice of keeping thesis study of the patients, attending the health institutes primarily for the treatment, in the clinical training programme of the residents is not appropriate. Appropriate training and education of medical professionals are very vital for the safety and care of the patients and the community. Education role of medical professionals should be given due priority. Teachers' criteria and training need to match the expected training of the residents and provide the opportunities for training for all the medical graduates in the community. Then only we can expect the practice of EBM from the medical practitioners in every encounter with patients. To achieve such practice of EBM in each and every encounter with patients and to move the medical world from being a high-risk service to becoming a high reliability culture, there appears a fundamental need to acknowledge that health service, medical education and patient safety, and thus the health economics, are all interrelated and are the responsibility of the State, not the individuals.

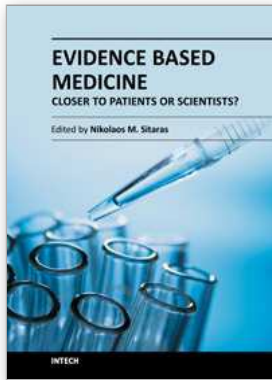
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Evidence-based medicine (EBM) was introduced to the best benefit of the patient. It has transformed the pathophysiological approach to the outcome approach of today's treatments. Disease-oriented to patient-oriented medicine. And, for some, daily medical practice from patient oriented to case oriented medicine. Evidence has changed the paternalistic way of medical practice. And gave room to patients, who show a tendency towards partnership. Although EBM has introduced a different way of thinking in the day to day medical practice, there is plenty of space for implementation and improvement. This book is meant to provoke the thinker towards the unlimited borders of caring for the patient.

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