

Integration of Emergency Medicine in Undergraduate Medical Curriculum: Curriculum for Preclinical Course

Dr. Neha kulkarni¹, Dr Chinmay shah²

Abstract: Emergency medicine (EM) offers what no other specialty offers. It is the medical specialty with the principal mission of evaluating, managing, treating and preventing unexpected illness and injury and provides valuable clinical and administrative services to health care delivery system. The Government of India recognizes “Health for All” as a national goal and expects medical training to produce competent “Physicians of First Contact” towards meeting this goal. Recognizing the impact of the emergency need on health outcomes, Medical Council of India (MCI) has given importance to the teaching emergency medicine in vision 2015 MCI. As per the guidelines in vision 2015 MCI there should be interaction or integration of the basic departments with clinical departments during the preclinical year of medical education. Curriculum formation for preclinical years is first step for the integration of EM in undergraduate curriculum. Integration of EM in preclinical years allows students to have a smoother transition into the clinical training. Innovative and exciting teaching learning strategies used in this curriculum will fosters many of the essential concepts such as critical thinking, communication, leadership, professionalism, problem solving skills and inter-professional teamwork and make them understand basic knowledge, skill and attitude required in an emergency, this will fulfil the goal and MCI guidelines.

Keywords: Emergency Medicine, Health for All, undergraduate curriculum

¹Assistant Professor, Department of Physiology, J N Medical college, Belgaum ²Associate Professor, Department of Physiology, Government Medical College Bhavnagar.

Corresponding author mail: dr.nehaskulkarni@gmail.com

Introduction:

Emergencies arise in the home, community, hospital wards and clinics. All physicians should be capable of handling unexpected emergencies until the patient can receive definitive care.¹

Internists and public health advocates recognized that basic emergency management was crucial for patient safety^{2,3}. Emergency medicine (EM) offers what no other specialty offers. “It is the medical specialty with the principal

mission of evaluating, managing, treating and preventing unexpected illness and injury and provides valuable clinical and administrative services to health care delivery system⁴ and global discipline that functions as a cornerstone for secondary disease⁵. Many core EM interventions are simple and effective.^{6,7}

“The implication that one can graduate in medicine with distinction while unable to avert disaster in practical clinical situations is thought provoking”, this is written in The Lancet in 1972, and still today as medical schools explore the depth and extent of undergraduate education in EM⁸.

In 1982 John Bernard Henry, stated that “Every medical school graduate should possess at least a rudimentary competence in the management of medical and surgical emergencies⁹”. In 1994, Josiah Marcy, Jr. Foundation held a conference on ‘The Role of Emergency Medicine in Future of American Medical Care’. It was felt by the conference participants that every physician should possess the knowledge and skills to deal with common emergencies¹⁰. In 1995, Macy Foundation Report stated: “All students who graduate from medical school should be capable of handling emergency situations¹¹”.

Emergency medicine has been recognized as a speciality in western countries however in India most hospitals and medical colleges have no provision for teaching specialty¹² also there is no incorporation of separate emergency medicine subject in the undergraduate medical curriculum¹³.

The medical curriculum in India, since long has been characterized by discipline based learning and compartmentalization of knowledge.

Each graduate will encounter an emergency situation in the community sometime during his or her medical career.

“It is unpredictable that a graduate from any medical school would be unable to produce basic life-saving skills and emergency care in the community but unfortunately this is not always the case and senior house officer starting a job are often found to be poorly trained in many aspects at the work¹⁵” because some common abilities should nevertheless be shared by all graduates¹⁶. Care of the actually ill patient in the hospital is often suboptimal, poor recognition of critical illness combined with a lack of knowledge and failure to appropriate clinical urgency of a situation¹⁷.

Survey and studies reported that graduating medical students are still inadequately trained in emergency care^{18,19}. "Recently, medical schools and curriculum committees have recognized the significance of teaching every student basic emergency care and life-saving procedures, not only do students desire this training, the public demands it of all physicians¹⁹". Training in emergencies is core in the curriculum. EM can provide exposure to a large number of varied procedural and cognitive skills that fulfil a wide range of competent physician's required educational experiences¹⁶. Jagoda et al. cited the Marcy foundation report on EM, "...medical school dean and faculty must ensure that every medical student has acquired the appropriate knowledge and skills to care for emergency patients²⁰".

One stated goal of the society for Academic emergency medicine 1999-2004 is to incorporate EM into the undergraduate curricula²¹. Surveys during the early years of development of the field showed a small percentage of schools requiring significant education in EM. In 1994, only 20% of allopathic medical schools had a required EM clerkship number changed from decade^{2,20}. The specialty EM provides unique expertise in several areas but integration of EM into the medical school

curriculum has preceded slowly²². More recently the number of academic departments of EM has increased²³, indicating potential growth of EM involvement in undergraduate education, accordingly key issue in emergency medical care had to be implemented in undergraduate medical education both to fulfil the expectations of public and society and to invent this special core objective as early as possible⁸. Association of American Medical Colleges (AAMC), American College of Emergency Physicians (ACEP), Society for Teachers of Emergency Medicine (SAEM) has recommended introduction of EM in preclinical years^{24,25}. Das and Elzubein confirmed the importance of training physicians and other health care professionals in first aid and BLS in the form of formal training in the first year of medical school²⁶. Many educators have promoted emergency medicine education in the preclinical years of medical school in western countries²⁷. However in India, most hospitals and medical schools have no provision for EM¹².

The Government of India recognizes "Health for All" as a national goal and expects medical training to produce competent "Physicians of First Contact" towards meeting this goal¹⁸. Recognizing

the impact of the emergency need on health outcomes, Medical Council of India (MCI) has given importance to the teaching emergency medicine in vision 2015 MCI²⁸. As per the guidelines in vision 2015 MCI²⁸ there should be interaction or integration of the basic departments with clinical departments during the preclinical year of medical education.

The extent of training and integration in undergraduate medical education curriculum still varies from institution to institution across the country. Although method of achievement will vary from institution to institution, skills can be taught through a combination of direct patient care, classroom and simulation training during preclinical and clinical curriculum and there is likely no better clinical setting than emergency department to provide them with this type of training²⁹. Basic EM knowledge and skills gained through medical school can provide a sound foundation for a student to build on throughout their residency training, regardless of the career that they choose²⁹. Many medical schools do not offer EM before the senior years^{8,30}, EM posting is last opportunity for a student. First year medical students are not at all taught about either clinical correlation or methods to handling the emergencies.

Therefore, the results of the need assessment, expert opinion supports the need for a curriculum change. Considering the flaws in the present curriculum there is a need to teach EM for undergraduate medical students at KLE University. Also according to AAMC and SAEM has recommended introduction of EM in preclinical course so there is need to form a EM curriculum for preclinical course. The ultimate purpose of integration of EM in preclinical course is to enhance knowledge, skills and the student's ability to handle basic common emergencies and to bridge the gap between classroom learning and clinical practice to give better health care. And also as per MCI Vision 2015, there is an acute need to incorporate innovative active teaching-learning methods and early clinical exposure into preclinical course.

An ideal curriculum would help the students to develop good knowledge attitude and skills to effective care for patients and utilize at the time of emergency need. An ideal state would be that, with the help of curriculum, by the end of preclinical course, students should be able to acquire basic knowledge and have deeper understanding of processes involved in basic critical care (at the time of emergency need), which will result into better medical care in future. Skills can be

taught through a combination of classroom teaching, simulation training and observation of patients in critical care unit or direct patient care²⁹.

An instructional methods used will be such that they will also foster the community oriented skills like taking responsibility and many of the essential concepts such as critical thinking, communication, team work, leadership, professionalism, problem solving skills³¹.

An ideal curriculum for EM includes the six basic elements to core a progressive learning environment over the entire undergraduate educational experience²⁴, which are

1. Progressive assessment skills of the Undifferentiated Patient
2. Recognition and stabilization of life threatening illness
3. Injury prevention and disease identification.
4. Content unique to medical emergency
5. Management of the health care system
6. Basic procedural competency.

These can be taught through innovative teaching methods such as case based study, Team Based Learning (TBL), Problem Based Learning (PBL), using simulated patients, early clinical exposure.

The ideal format for this type of curriculum would include both clinical experience and didactics, and longitudinal integrated with other courses and experiences.

As per Guidelines for Undergraduate Education in Emergency Medicine Paper, prepared by ACEP'S Academic Affairs Committee Members (May2008) "The preclinical years present ideal opportunities for initial training in this area²⁴", so the curriculum for teaching EM will be divided into preclinical and clinical years

Ideal approach for preclinical curriculum: A separate course on the approach to the care of acute ill or injured patient will be formed. A realistic approach is to integration of anatomy, physiology, pathology, pathophysiology and clinical concepts related to EM. An organ system approach could be used for the concept taught in other basic sciences courses²⁴.

This can be achieved by using a combination of teaching strategies like lectures along with the demonstrating the clinical application of the content area by using simulators, or mannequin. Students can be exposed to environment of ED and presentation of undifferentiated patient through observations and demonstration of audiovisual aid (CD / video, projection) , role play and TBL and case correlations

could be included in the teaching of this course.

Type of exposure included cardiopulmonary resuscitation(CPR) training , basic first aid, Emergency medical services (EMS), introduction to the injury prevention or disease identification principles taught in biochemistry, pharmacology and pathophysiology related to toxicology are included in the course.

Cardiopulmonary resuscitation and other basic first aid information are highly recommended for all medical students during the preclinical years. This content helps to achieve general objectives for EM and better preparation of the student for clinical years. A course on the basics of house hold emergencies and simple acute injuries, will introduce these basic skills that every physician should know²⁴.

Communication skill with an emergency should be included which are paramount in achieving excellent care²⁴. Clinical problem solving can be taught in preclinical course as including cases to illustrate core concepts. It should provide instruction for initial assessment, evaluation and stabilization²⁴.

Toxicology and environmental emergencies are content areas unique to EM. They provide opportunity to combine

principles taught in biochemistry, pharmacology and pathology as they are related to poisoning and environmental hazards²⁴.

Targeted learners are Phase- I medical students. In phase I, preclinical students learn Anatomy, Physiology, and Biochemistry and it will be integrated with EM.

Topics included in the curriculum are: Basic Life Support (BLS)/CPR, Basic First aid, EMS, Introduction and the prevention of emergency states.

Goal: The goal of this integrated curriculum is to make, all preclinical students understand basic knowledge, skill and attitude required in an emergency by using the effective teaching learning strategy that fosters many of the essential concepts such as critical thinking, communication, leadership, professionalism, problem solving skills and interprofessional teamwork.

Objective: By the end of the course students should be able to,

I. Cognitive:

1. Define and discuss the techniques of basic life support sequence.
2. Briefly describe how to activate and make emergency calls.

3. Briefly describe the importance of early, effective chest compression and defibrillation
 4. List and discuss the principles and practice of first aid.
 5. Define drowning and its first aid management
 6. Define the principle of performing water rescue on a drowning victim
 7. List common types of poisoning, and discuss their symptoms, signs and urgency of management.
 8. Describe the common snake bites and its first aid measures.
 9. Discuss the first aid measures of bites and stings
 10. List and discuss the different types of fracture, their symptoms and signs and methods of first aid measures including splinting and transport of the victim.
 11. Discuss the type of injuries to the muscles, ligaments and joints and their symptoms and signs and the first aid measures including RICE treatment (Rest, Ice, Compression and evaluation), immobilization and transportation
 12. List and discuss the first aid measures of sudden illnesses.
 13. Discuss the appropriate first aid measure to assist a women in labour
 14. Discuss the principles and procedures necessary in providing first aid assistance at the site of a road traffic accident (first responder approach)
 15. Discuss the first aid measures of behavioural emergencies
 16. Discuss the first aid measure of lightning injuries and altitude illnesses
- II. Psychomotor skills:** During the curriculum, $\geq 80\%$ of students will have to demonstrate the following procedures as assessed by the checklist.
1. Perform correct technique in BLS/CPR sequences such as
 - i. Active EMS
 - ii. Open air way
 - iii. Rescur breathing technique
 - iv. Chest compression
 - v. Recovery position
 2. Perform correct technique of applying bandage and dressings according to the type of injuries.
 3. Perform correct identification and application of pressure dressing to control bleeding
 4. Perform a correct technique of turning positioning and lifting an unconscious casualty
 5. Demonstrate the ability to make an emergency calls and the relevant vital information to relay to the operator and hospital call centre.
- III. Attitude:**

Aware of the importance of quick but thoughtful action when faced with emergency situations

Aware of one's limitations in handling emergency cases and the need to call for help

Strategies: A combined approach composed of large-group interactive lectures, TBL in small groups of 5-7 students, problem or case based learning, integrated practical training by demonstration using audiovisual aids, patient simulator/ mannequins, role play exercise and observation in the clinical setting are used.

Implementation: Implementation will involve planning of the course, working out resources, orientation of the faculty and students, predicting barriers, planning for addressing barriers.

The objective of EM course in preclinical curriculum is to provide knowledge, skill and attitude in emergency conditions. Multifaculty meeting conducted to decide about timetable, how each topic can best be learned, clinical exposure could be given to the student and evaluation and feedback. Time table is formed for the course, containing didactic lectures, TBL, procedural skills, and observations in the clinical settings

Lectures: Course content is delivered in the form of lectures, in the form of interactive sessions for large groups. The content of the lectures will provide the students a brief knowledge about the topics involved in the curriculum. At the end of such lecture, students will have an ideal about the various emergencies. Lectures will be delivered by the multidisciplinary faculty in the lecture hall using power point presentations.

TBL: is an innovative teaching-learning strategy that offers student-centered but instructor-led³². It is a structured, application-based³³, cost-effective teaching strategy which is effective in teaching necessary skills to student³¹. TBL teaching focuses on application of basic knowledge to solve complex real-world problems, ideally suited for pre-clinical and clinical teaching that results in a number of favorable knowledge, skills, and attitudinal outcomes³⁴.

This strategy fosters many of the essential concepts, such as critical thinking, professionalism, communication and interpersonal teamwork³¹. Where problem – based learning (PBL) is impractical in preclinical courses³⁵ employing TBL, students are more successful in using PBL

curriculum in later years of more advanced clinical training³⁶.

Important topics from course will be selected. Objectives will be framed for TBL session topic. One week prior to the TBL session, the students will be provided handouts which contain learning objectives, study material and 2-3 clinical case scenario related to the topics.

Each TBL session will be conducted in three phases. Phase 1 will be preparatory phase, where students acquire introductory information from lectures, reading from study material and also can gather information from the other sources. Phase 2 starts with individual readiness assurance test (IRAT) with MCQs. Immediate score will be given by instructor that monitors performance of each student. Then small teams will be formed with 5-7 in each team. The teams will answer the same MCQs as IRAT wherein the team members discuss the questions and respond to it. This will be team readiness assurance test (TRAT). In phase 3 Some questions framed from important material related to the lectures, given clinical cases related to concerned topic will be given to the students. Students will again do intra group discussion, analyze, anticipate and apply their previous knowledge. Instructor will randomly select students from group for

presentation of cases and answers, and then there will be inter group discussion and reflection on presented cases and answers of important questions. All cases and questions will be discussed. At the end student will receive feedback on the performance from the faculty and also peers. Grading will be given based on individual performance, group performance and each member's contribution. Role of the facilitator will be to clear any doubts or issues emerged during the discussion or makes necessary clarifications.

At the end of each TBL session, the student receives feedback on the performance from the faculty and peers. Faculty members evaluate students on their preparedness, active participation in the team discussions, cooperation and contribution to the team answers, on a 4 point scale. Quantitative and qualitative peer feedback is require. Grade is given based on individual assessment, RAT assessment, team assessments. These assessment grades are considered to determine the internal assessment grade points for the course and included in the final grade

Procedures/skills: Instruction on procedures can be provided by handouts, video-show and hands on demonstrations

How the skills are taught.

Four step approach to teaching skills³⁷

Demonstration (Know) -Trainer demonstrates without commentary on the activity to be learned

Deconstruction (Know how) -Trainer demonstrates while describing the steps

Comprehension (show how) -Trainer demonstrates while learner describes the steps

Performance (does)-learner demonstrates while learner describes the steps.

Skills will be taught by using mannequins, and simulated patients can be providing a safe environment for learning. In addition this setting allows students to gain experience with team leadership²⁴.Simulation emerged as alternative to traditional classroom based teaching by using this modality of teaching, decision making skills and clinical patient management in small group setting in the preclinical curriculum³⁸.It will bridge the gap between basic science knowledge and patient care. This type of exercises allow for the introduction of skills, concepts, and principles that may not be addressed until the clinical years of training²⁹.

Clinical observation: In parallel with the ability of medical simulation to integrate clinical concept into preclinical curriculum by utilizing the emergency department setting allows for innovative and exciting way to teach skills. Student will be posted to the emergency department (casualty) and observe the procedures done for the acutely ill patents and emergencies. They will also attain an emergency medical services (EMS) This type of exposure will also help the student understand the importance of ancillary personal and role they play in assessing a physician treating a patient. Student should participate in EMS scene responses as an observer and take part in communications.

Resources: Implementation of the designed curriculum will require resources in the form of personnel, time and faculty. Curriculum development will require course coordinator and tutors and faculties from different disciplines, who will plan about the course content and common conditions to be included in the course. They will conduct a meeting and plan according to the topics included in the course and also deliver didactic lecture and help in training practical sessions. A two days workshop will be conducted for the faculties and tutors to train for this course. A trained, certified person will train the

other faculty for skills used in the curriculum. The workshop will also demonstrate the process of problem solving sessions and the role of the teacher as a facilitator training for TBL will be emphasized. After the workshop the faculty will develop the material required for the actual sessions.

Support staff: The clerk/technician will require for typing the material require for TBL, feedback forms, time table. One attainer will be serve as a helping hand.

Time table: As per integration ladder described by R.M. Harden, act of planning a joint time table so that topics are taught in proper and logical sequence, for this faculty from different departments will call a meeting and set a sequential time table covering all topics included in the curriculum.

In addition to the teaching faculty, additional support staff will be required.

Equipment: LCD projectors and computer/laptops, mannequins used for demonstrating cardio pulmonary resuscitation (CPR), CDs/videos for demonstration, material required for control of hemorrhage like cotton spirit for cleaning, bandage, cloth, bed sheet and wooden splints for demonstration of limb immobilization and transport of the patient.

Miscellaneous: stationary, paper is required to prepare time table, handouts for TBL, feedback forms .etc ,

Support:

Internal support: Internal fund support will come from the dean's office.

External support: Interest in investment from private foundations/NGOs will have to be looked.

Infrastructure: curriculum can be implemented in existing infrastructure, using existing lecture halls, practical halls and hospital.

Barriers:

1. **Time:** There may be shortage of time for implementation of the curriculum because all the three subjects in preclinical are taught with packed schedule in one year duration. To overcome this, organ system approach could be used to reduce overlapping of the content taught in preclinical subjects and that time is utilized for the new curriculum or

Second option is keeping the current teaching as it is (traditional approach), 2wks can be utilize from the orientation programme, recommended as per MCI Vision 2015 (as orientation programme of vision 2015 has included topics involved in this above planned

curriculum), and these weeks are utilized at the end of first year when student get basic knowledge about different organs, systems and their function.

2. **New strategy:** There will definitely be resistance from the faculty members for shifting from traditional teaching to new instructional design (TBL) and also because it will demand investment of more time and efforts in constructing the case scenarios (problems), handouts etc. to overcome this problem, taking them into confidence and convincing them about the effectiveness. This can be done by conducting a faculty development meeting and explaining to them the merits over the conventional curriculum. Also as it demands extra work from the faculty it could discourage them to actively involve in the course. To overcome this, extra academic credit points could be given to encourage them. There will be resistance from the student for strategy (TBL).

The new curriculum will be explained to the student by conducting an orientation programme to clearly describe the rationale and objectives and clarify their doubts. Also their active participation in the sessions can be rewarded by increase in their internal assessment marks.

Orientation programme is conducted for the students.

Resistance from the non teaching staff might also be anticipated due to demand of extra work. This could be overcome by giving incentives.

3. Lab set up: For this new curriculum we require skill lab. Institute has skill lab for senior residents, we can utilise the same lab with the permeation of the dean and lab in charge.
4. Finance: Any new curriculum requires financial support. For this we can use funding from the internal or external sources. Convincing the Dean, stating that our main focus is to improve the quality of teaching, innovation and fulfil the guidelines of MCI and community need.

Evaluation: Evaluation of the proposed curriculum will include the student's assessment and a comparative pilot study to know the effectiveness of the curriculum.

Student assessment:

Formative assessment: The objectives for formative assessment evaluated as quizzes run (TRAT) during the TBL. Formative assessment focuses on student's strength and weaknesses. Student's strong and weak points are assessed²⁴.

Summative assessment: This assessment makes judgments about the student's correct achievements. It is a mechanism by which students are accountable for what they have learned during the course²⁴.

At the end of course written test is conducted in the form of integrated multiple-choice questions (MCQ) and short answers questions (SEQ) which will cover the topics taught in the course (knows)

Skill assessment: At the end of course student assessment will be conducted by OSCE/OSPE (Show how). OSCE/OSPE has been promoted to an accepted and applied tool for the assessment of practical performance in standardized setting with prepared check lists. OSCE/OSPE provokes student's learning behavior toward practical performance and problem solving skills as well as the individual power of judgment³⁹.

This tool of assessment will be ideal as every student gets the same assignments in a series of stations. The performance of each assignment will be observed and judged by the same examiner using a checklist. (sample check list is attached in appendix I) The students will be provided a case scenario presented to them in written form. The student will have to treat patient (demonstrate the steps involved in the

procedure) using mannequin or simulated patients.

To assess the student's reaction to the new curriculum, a response sheet will be distributed to the students. The response will be rated by the students on a 4-point scale (4-excellent, 3-good, 2-satisfactory, 1-not satisfactory) at the end of the course. This will compare the student's response over a period of time and will help the organizers by providing clues for improvement.

The students will also evaluate the tutors as these are an important element that can make or break the problem solving sessions⁴⁰.

The overall course grade is based on grade of TBL session (individual assessment, RAT assessment, team assessments) and end course assessment. Grades are based on the following scale:

Grades: A= 81-100, B=61-80, C=50-60, D= ≤49 (fail)

To evaluate the effectiveness of the course curriculum, pilot study will be planned on preclinical students. This will clearly indicate the effectiveness of the proposed curriculum.

Conclusion: Curriculum formation for preclinical years is first step for the integration of EM in undergraduate

curriculum. Integration of EM in preclinical years allows students to have a smoother transition into the clinical training. Innovative and exciting teaching learning strategies used in this curriculum will foster many of the essential concepts such as critical thinking, communication, leadership, professionalism, problem solving skills and interprofessional teamwork and make them understand basic knowledge, skill and attitude required in an emergency, this will fulfill the goal and MCI guideline

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