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Effectiveness of early clinical exposure in medical education: Settings and scientific theories – Review

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Abstract:

Early clinical exposure (ECE) is a teaching-learning methodology which fosters the exposure of medical students to the patients as early as the first year of medical college. A worldwide number of research studies investigated the outcome of ECE and found, ECE sessions motivate the medical student in various ways making their academic strength, improve clinical skills, and improve communication skills and making them more confident. In the medical curriculum, ECE makes an overall impact on student's performance and confidence. Planning of ECE in real-time practices can be done in different settings with the use of appropriate resources such as logbook, textbooks, notes, instruments, learning material, case record sheets, and computers. Herewith, we reviewed the scientific base responsible for these outcomes and discussed different ECE settings and their outcome. The Medical Council of India in new educational reforms made ECE sessions compulsory from 2019 in undergraduate medical curriculum. In conclusion, the challenge for health professions education is to look for ways to improve the quality of clinical education by comparing students' understanding and modifying practices of clinical education in new circumstances. Early clinical experience will definitely play a crucial role in this context, only if proper strategies are implemented. This systemic review article highlights ECE settings and scientific basis in a theoretical way helpful for medical faculties during its implementation in regular teaching.

Keywords:

Early clinical exposure, Medical Council of India, medical education

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Introduction

Early clinical exposure (ECE) is a teaching-learning methodology which fosters the exposure of medical students to the patients as early as the first year of medical college.^[1] Worldwide, the number of research studies investigated the outcome of ECE and found, ECE sessions motivate the medical student in various ways making their academic strong, improve clinical skills, improve communication skills, and making them more confident.^[2,3] ECE is one form of vertical integration pattern between preclinical subjects and clinical subjects.^[1] ECE as an educational model has been adopted by many medical colleges,

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universities across the world to bridge the gap between early theoretical years and clinical posting of the final year in undergraduate medical education.^[4] In the current scenario of the health-care system, the changes are seen at a rapid rate due to the increase of demand as the awareness and accessibility has reached to a larger scale of population.^[5] The Medical Council of India has introduced ECE in new reforms in curriculum, competency-based medical education (CBME) in India.

Role of Student in Early Clinical Exposure

In the curriculum ECE makes an overall impact on student's performance and confidence. In the curriculum students

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can have following four simple roles in early clinical posting.^[6]

Passive observer

As a passive observer, medical students can be observed differently situations in the hospital in real-time practices such as the minor procedure at outpatient department level, minor surgeries in OT, patient interaction, and patient's response. Actual visualization of medical or surgical procedure rather than theoretical reading and mugging can have a higher impact on memory retention and development of competency.

Active observer

As an active observer, the students can observe a few simple clinical skills such as catheterization, pleural fluid tapping, intubation. Students can note the checklist for these procedures. Students can correlate these things with what they were taught in a classroom setting. The active involvement of students enriches the memory of clinical skills.

Actor in rehearsal

As an actor in rehearsal, the students perform a task for learning such as performance of catheterization, and intramuscular injection. These real-time rehearsals can be initially performed on simulation-based models or manqué can be more helpful.

Actor in performance

As an actor in performance, the students can assist the resident in performing procedures such as catheterization, and intramuscular injection. This makes education more interesting. The active involvement of students enriches memory in clinical studies. Faculty should promote students active learning through self-reflection and participation in case discussion.

ECE as a hegemonic the educational model has been adopted by many medical colleges throughout the world to close the gap between basic and clinical science.^[7,8]

In a European survey conducted by Başak *et al.* found that observation, small group teaching, clinical bedside teaching, supervision, and feedback, reflective journal writing, self-learning, case-based learning, lectures, and shadowing were common teaching and learning activities in ECE programs.^[9]

Oppenheim, Zwietering *et al.* added that every fruitful ECE program should follow three educational principles:^[10]

1. Maintain students' learning cycle based on Kolb's experiential learning
2. Emphasize the active role of students
3. Provide timely supervision and feedback.

Başak *et al.* concluded that ECE training mostly takes place in primary care settings, general practice clinics, department outpatient clinics, and hospital wards, with only a few programs taking place in the community.^[9]

Besides experiential learning, medical students also engaged in situational learning during the ECE preceptorship while the community surrounding the clinic continues to shape the activity as a whole.^[9]

The learning process during ECE is therefore social and collaborative, so that the outcomes of ECE experiences should be affected by the environment.

Reports of Lancet Commission (2010) and "Howard Hughes Medical Institute" stressed on implementation of CBME including reforms in teaching styles.^[11] Subsequently, ECE and integration approach in medical education was broadly accepted and promoted by the number of countries worldwide. In 2019, Medical Council of India introduced CBME pattern in India and introduced ECE as one of compulsory practices in regular teaching.^[12] There are found geographical variations due to need based regulation of syllabus. In developed countries, colleges are putting stress over simulation technology, three-dimensional models, and skill laboratories while in developing countries colleges are putting stress over direct patient contact and communication. Thus, ECE can be included in various ways in different types of settings.

Although U. S. dental schools have been incorporating more ECE into their curricula over the past decade, these reports suggest that it has not led to earlier clinical competency assessments.^[13] The South African medical education curricular landscape has changed over the last two decades and with student centered view they incorporated ECE as an important tool. They found excellent results.^[14]

Learning and Early Clinical Exposure

Learning is a behavioral phenomenon that occurs when molecular changes at one or several sites are amplified, processed, and transformed by an interconnected network of neurons.^[15]

Our human brain processes information in complex networks of nerve cells. The cells communicate and excite one another through special connections, called synapses.^[16]

There is a number of learning styles such as visual, aural, verbal, physical, logical, social, and solitary.

Memory is the faculty of the brain by which the data or information is encoded, stored, and retrieved when

needed. It is the retention of information over time for the purpose of influencing future action.^[17]

Kolb's Learning Theory Mechanism

Kolb states that learning involves the acquisition of abstract concepts that can be applied flexibly in a range of situations.^[18] In Kolb's learning theory, the impetus for the development of new concepts is provided by new experiences.^[19] He stated that "Learning is the process whereby knowledge is created through the transformation of experience." (Kolb, 1984, p. 38).^[19]

Effective learning is seen when a person progresses through a cycle of four stages as shown in following types:

1. Having a concrete experience followed by
2. Observation of and reflection on that experience which leads to
3. The formation of abstract concepts (analysis) and generalizations (conclusions) which are then
4. Used to test hypothesis in future situations, resulting in new experiences.

According to Kolb, (1974) learning is an integrated process with each stage being mutually supportive of and feeding into the next.

It is possible to enter the cycle at any stage and follow it through its sequence.

However, effective learning only occurs when a learner can execute all four stages of the model. Therefore, no one stage of the cycle is effective as a learning procedure on its own.^[19]

Accordingly Kolb's Learning Theory, students direct involvement in learning processes develop their ability to possess and use analytical skills to conceptualize hospital-based experience, and it also utilizes decision-making skills when presented cases during their clinical practice.^[18,19]

The main goal of the ECE is a correlation of basic sciences content with clinical sciences in a spiral integration model in real-time learning practices, so as to establish the cognitive component of professional learning.^[17,18]

ECE helps students to develop fundamental clinical skills as well as a moral attitude with active learning.

It also aids students to overcome their pressures and anxieties and motivates them to develop a better insight into the medical profession.^[18]

It will surely lead to a positive influence on the attitude of the student towards medical education which will

help them to achieve social as well as professional satisfaction.^[19]

As students face an eternally growing amount of information in the medical sciences, ECE will increase their exposure to clinical problems and thus prepare them to be up-to-date clinicians.^[20,21]

Advantages of ECE are Well Documented in the Literature^[22-24]

ECE forms a crucial part of the initiation into medicine, smoothens the transition from layperson to student physician, provide them an opportunity to bring social relevance and contextualize basic science learning, provide teaching and learning of basic clinical skills, enhances student motivation and encourages the students to learn professional behavior.

Student's perception of the advantages of ECE was that it provided important validation of the student's decision to go to medical school. It was a lifeline that helped student stay focused on their studies and provided the opportunity to establish a link between the basic sciences concepts and actual patient cases.^[23,24]

Similarly, faculty perception of advantages of ECE was that it provided more integrated approach to teaching basic sciences and clinical medicine, increased excitement for learning by students provided better comprehension of basic science knowledge.^[24]

Historical Overview

There was found need of advancement and changes in medical education in 1940s period with industrial revolution, advancement in information technology, and changing world scenario. During 1940s, the separation of pre clinical and clinical training and with the increased in specialization pattern in education led to program emphasizing comprehensive patient care. Initially, in 1940 Western Reserve University School of Medicine in Cleveland, USA undertook revision of its curriculum including interdepartmental teaching and early exposure of students towards clinical discipline.^[25]

Hand-in-hand with residency training came the rise of specialization and sub-specialization among American doctors by the 1930s and 1940s.^[26] The subsequent reforms of the 1970s and 1980s have focused on the acquisition of appropriate attitudes and values with medical knowledge. "General Medical Council's (GMC) tomorrow's doctor" of the UK in 1993 suggested introducing medical students to clinical science from as early from year of their education.^[27]

World Federation of Medical Education (WFME) in 1998 strongly recommended integration based practices in medical education.^[28]

Early Clinical Exposure – Setting and Planning

Planning of ECE in real-time practices can be done at different setting with the use of appropriate resources such as log book, textbooks, notes, instruments, learning material, case record sheets, and computers.

These setting are broadly divided into three groups:

- a. Classroom setting
- b. Hospital-based setting
- c. Community setting.

Class room setting^[29-31]

The classroom setting is first basic form of ECE can be arranged with minimum efforts.

In a typical classroom setting, ECE can be used as an educational strategy in the following ways:

1. Direct arrangement of patients/cases to the classroom
2. Readymade case scenario discussion
3. Discussion of clinical material such as patient case record sheets, electrocardiogram, X-rays, computed tomography scan, other investigations reports.

It can be done in multiple small groups; hence, all students can be actively involved. Students can be judged for their interest, active participation, understanding of the subject if planned in small group learning sessions. These settings can be arranged with the help of clinical teachers with their direct involvement or indirect involvement.

These settings can make more interesting with more numbers of students' active participation. Topics or cases can be choosing correlating with them with current syllabus teaching in regular classes or students may have some basic prior information about the session. When a patient is brought to a classroom setting, the patient should be handle in an ethical manner. Faculty should explain basic signs and symptoms, basic clinical examination skills, taught earlier in teaching. The student's attitude can be developed by appropriate practices by faculty in setting and hence prior faculty training is mandatory in this context. Thus classroom setting is found most convenient form.

Hospital settings^[30,31]

The hospital setting is second and most important form of setting. It can be arranged batch-wise and with prior permissions or collaborations with clinical departments. If possible dedicated team of faculties can be formed from both departments. The time, place, topic related to cases should be finalized before the visit. The cases should be discussed with students correlating their context with what taught earlier in the classroom should be reflect more carefully.

In physiology, subject cases can be choose system-wise such as cardiovascular system, respiratory system, abdomen, or endocrine system. Basic pathophysiology should be well integrated into teaching. That helps students overall increase their interest in basic sciences learning.

In anatomy subject, surgical ward or radiology department visits can be arranged including cases related to basic anatomy. X-rays can be directly taught in the radiology department setting.

The basic understanding of cases, including sign, symptoms, diagnosis, and theory basis should be well correlated. Faculties should discuss in this manner that develops a positive attitude among students and making them more confident. Learning objectives should be needed specified very correctly and this is the pillar of hospital-based ECE setting.

In addition to the learning objectives related to the topic, following basic five objectives should be incorporated in all sessions:

1. Making familiarize to the clinical environment
2. Create awareness in different presentation of cases
3. Observe doctor–patient relationship
4. Observe doctor–patient communications
5. Patient empathy.

Students should be promoting to take notes and fill their logbooks. Students should write journals/logbooks with their own views rather than theoretical views or copy-paste from other students.

Community settings

The community setting is third and very interesting setting in the student's point of view.

The focus of community setting should be based on ECE visits covering the following points:^[32,33]

1. Correlate the context for basic science learning
2. Integration of basic sciences
3. Clinical dimensions and societal perspectives
4. Observation of community problems
5. Patient empathy
6. Seeing primary care providers at work
7. How living condition influence health and disease?
8. Responsibility of doctors in the community
9. Student involvement through activities.

Community setting can be planned by following options suitable to the college administration.^[34,35]

1. Regular periodical community visits
2. Short duration, such as 1 week posting to primary health center or small community center
3. Student group-wise family allotment

Community setting sessions are very important in following viewpoint of students.^[36,37]

1. It helps to learn preventive aspects of medicine
2. It helps to learn the ethical dimensions of doctor-patient relationship
3. It helps to learn behavioral and social sciences in real-time practices
4. It helps to bring in the socio-clinical relevance and context to the students
5. It helps to identify community level health issues
6. It helps to understand health education at the community level.

In classroom setting, our department has included “X-ray Module” in regular teaching for first MBBS students from 2016 in regular practical sessions. We included X-rays from cardiovascular system, respiratory system, and gastrointestinal system. We conducted different specialty modules in hospital-based setting covering the syllabus of clinical physiology. We explained basic clinical terminology and demonstrated system wise clinical examinations to students in small groups. We motivated students to observe and do basic clinical examinations in wards. Faculties and residents regularly supported students during these visits. In our college, community visits are regularly arranged by the Community Medicine Department. A family from the rural set up is allotted to every small group of students. It's very true, clinical education requires creating a supportive atmosphere for learners.^[37] Knowledge, attitudes, and behaviors are the essential factors in fostering an environment that positively influences.^[38] We found exclusively positive results and significant impact over student's performance using ECE.

Code of Ethics

While considering code of ethics, teaching procedures and assessments should be framed into a set of regulations drawn up by the university or institution.^[39] Herewith, we framed the modules with covering university syllabus and modules were validated by subject experts. Teacher's code of ethics comprises his duties, responsibilities, approach, outlook, honesty, and fairness.^[39] We motivated to all our colleagues to contribute honestly in all sessions. Medical educators have twin commitments of ethics, between a patient and doctor and between a teacher and student.^[39] In every session, we highlighted these practical as well as ethical aspects. The goals of medical education should be student centered.^[40]

Implementation Challenges

Interdepartmental coordination, faculty training, their own interest, and uniformity in training will be major changes in the implementation of ECE sessions in regular syllabus in the Indian context.

Conclusion

In conclusion, the challenge for health professions education is to look for ways to improve the quality of clinical education by comparing students' understanding and modifying the practices of clinical education in new circumstances. Early clinical experience will definitely play an important role in this context.

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Abbreviations

ECE: Early clinical exposure.

CBME: Competency based medical education.

OPD: Outpatient department.

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There are no conflicts of interest.

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