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Evaluation of Early Clinical Exposure as A Teaching Learning Method in Physiology for First Year Undergraduate Students

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Abstract
The introduction of Early Clinical Exposure for first year undergraduate students in the Curriculum by the National Medical Commission since 2019 will help them to recognize the relevance of basic sciences. The aim of our study was to see the effectiveness of Early Clinical Exposure as a teaching-learning tool in Physiology for first year undergraduate students. This was an educational interventional study conducted on 100 first year undergraduate students in a Govt. Medical College of India. Total 50 students were involved at one time, while the remaining were taught the same topic through didactic lectures simultaneously. Each session lasted for 3 hours as per NMC norms. The same set of peer reviewed Multiple Choice Questions were given to both sets of students which were compared. In addition the perception of the students and faculty was taken about these sessions. The mean score of the study group was found to be significantly higher as compared to the control group. More than 85 % of the students rated the program to be 'Very Good –Excellent, showed eagerness to learn more topics through this intervention (62%) and rated the guidance provided by the faculty to be excellent (52%).Total 8 faculty members were involved in this study who rated this Teaching Learning Methodology to be Excellent (>75%). Early Clinical Exposure can be considered to be an effective teaching tool for first year undergraduate medical students. If planned and implemented properly it can be adopted as a teaching strategy to introduce the various dimensions of the medical profession.

INTRODUCTION

The CBME (Competency Based Medical Education) curriculum was introduced in India in the year 2019, before which students gained theoretical knowledge in the first year of undergraduate students with no contact with the patient. Hence the medical faculty put a lot of emphasis on the introduction of Early Clinical Exposure (ECE) from the first year itself[1].

Few studies have been conducted on ECE in the last 2 to 3 years[2]. In our project we have introduced 3 modules of ECE according to the guidelines of CBME in Physiology .In addition to assessing the impact of ECE as an educational intervention, we have also taken a feedback from the students and faculty about what they thought of this educational intervention.

MATERIALS AND METHODS

Quasi-Experimental Crossover Design was used in this study. ECE is a new introduction for 1st-year medical students to recognise the relevance of basic sciences in diagnosis, patient care and treatment. This design was more feasible in educational setting where random assignment may disrupt existing administrative structures. The crossover component still allows all students to experience both teaching methods, partially compensating for the non-random assignment. Each student serves as their own control during analysis, helping to mitigate some of the baseline differences between groups.

This study was conducted in the Department of Physiology of a Govt. Medical College over a period of 4 months from September till December, 2023.

All 100 undergraduate students of 1st year were included in the study. The total number of participants were divided into 2 groups of 50 each, labelled as A (those taught through ECE) and B (those taught through didactic lectures). Crossover was done in the 2nd and 3rd sessions. The students were assigned to two groups based on their roll numbers - first 50 in A and next 50 in B. The roll numbers were assigned alphabetically. There are potential limitations to non randomization being used; selection bias and systematic differences between groups being few.

Before starting the project, written informed consent was taken from all the participants and clearance was taken from the Institutional Ethical Committee (IEC)

The inclusion criteria was all consenting students of first year undergraduates , whereas all those who were either absent or did not give their consent to be a part of this study were excluded.

Process of validation of a questionnaire: Pre-validated questionnaire was used to take the opinion of students as well as faculty members about ECE. After conducting a pilot project, the original questionnaire was suitably amended, keeping in mind the test-retest reliability based on the correlation of scores.

The same set of MCQs was given to the study and the control group that were internally validated by 'peer review'.

Sensitization and orientation of students and other faculty members about ECE was done before starting the project.

Total 3 modules were implemented over the entire duration of the project covering the following topics:

Sr No.	Topic	Competency No.
Module 1	Blood Groups and Blood transfusion	PY 2.9
Module 2	Renal function tests	PY 7.8
Module 3	Electrocardiogram (ECG)	PY 5.5

So one group was subjected to three modules of ECE and three didactic lectures. At the end of each sessions knowledge assessment was done thrice for each group hence there were 150 post session assessments for group A and group B each. Five students who missed either one or more post assessments were excluded from the analysis.

Study Flow:

The ECE session and didactic lectures were conducted simultaneously twice a month; on every alternate Saturday between 8-11 am. The performance of students was assessed at the end of ECE and didactic lectures by means of same set of 20 MCQs given at the end of each session. The test scores of the two groups were compared after each session. Students' and faculty feedback was taken on a pre-validated questionnaire after the ECE session.

One faculty member from the Department gave the didactic lecture of 1 hour duration simultaneously on the chosen topic followed by assessment in the form of MCQs. Other faculty members and residents of the Department were involved in conducting the ECE session along with faculty/ residents from other para – clinical and clinical departments depending upon the requirement and feasibility. Each ECE session lasted for 3 hours as has been recommended by the NMC[3]. The breakup of each session was as follows:

Introduction and Instructions to students: 20 minutes
Conducting the ECE session using actual patients/ paper based cases/ lab reports etc.: 90 minutes

Summary and Conclusion: 10 minutes

MCQ test at the end of the session: 30 minutes

Feed back from students and faculty members: 30 minutes

SPSS software (version 21) was used for the analysis of the collected data. (IBM, SPSS. INC, Chicago, IL).The data has been represented as percentage for the categorical variables and as mean ± SD for the continuous variable. Student's 't – test' was used to compare the scores between Groups A and B. The feedback from the students' and faculty members has been represented as percentages.

RESULTS AND DISCUSSIONS

This study was planned to evaluate the impact of Early Clinical Exposure as an educational intervention in first year undergradute students in the subject of Physiology. Three modules of ECE were implemented over a period of 4 months on 145 students who completed both Group A and B assessment, and 8 faculty members as per NMC guidelines.

The mean scores of the 2 groups (those exposed to ECE and those exposed only to didactic lectures) can be seen in Table 1.

Table 2 depicts the feedback received from the students and faculty members about ECE The mean score of the participants ranged from 3.12 to 4.44.More than 85% of the students rated the programme from 'Very Good – Excellent'. Many of the students felt that ECE created more interest in the subject/ topic, causing better retention and recall of the study material in comparison to being taught by only didactic lectures. Most of them were eager to learn other topics through this intervention (62%) and found the involvement and guidance provided by the faculty members conducting the ECE to be excellent (52%).

Total 8 faculty members from various departments of the institute were involved in implementing the 3 modules of ECE as a part of this study. The feedback received from them on a Likert scale can be seen in Table 3. All the statements except one had a mean score of more than 4.More than 75% of them found this medium of instructions to be excellent overall. Many of the faculty members felt that ECE significantly improved the teacher-student interaction and found the students enthusiastic to participate. A very high percentage of faculty members (87.5%)found the response of the students to ECE to be enthusiastic. .However around 50% felt that some sort of training needs to be provided to the faculty members for conducting the ECE and expressed concerns about co-ordination with the clinical departments for effective implementation. Some of the faculty also felt that ECE could not be considered suitable for covering all the topics and was rather time consuming method of teaching and learning

The questionnaire that was filled by the students and faculty after the ECE session also asked for suggestions (minimum 2) for improvement of the sessions. Some of the common responses received from the students were:component separation of the blood should have started earlier since adequate time was not given to it,the actual process of blood donation should have been done instead of explaining it only theoretically, the number of students in each group should have been smaller to prevent over-crowding, one group should not have more than 5-6 students at one time ,the session should be repeated once again to improve understanding, historical facts should be included related to blood donation to make it more interesting . They also felt that more ECE sessions need to be planned to include more topics ,the knowledge of students may be tested after the session in the form of a quiz /MCQ test/ group discussion instead of only a demonstration,the module/reading material/PPT should be shared with the students at least 1 week before the actual session ,more videos / pictures may be included and students can give a small seminar/summary at the end of each ECE session to explain what they have understood.
The faculty suggested that process of conducting ECE is very time consuming and should be
done monthly.

The study was conducted on 100 first year undergraduate students to assess the impact of ECE as an educational intervention in Physiology.

Integrated teaching and exposure to clinics in the first year of medical curriculum are being extensively implemented all over the world already[4]. Even in our country many of the faculty members have been using modules of ECE to introduce the students to some important topics of modern medicine from the first year itself[5].

ECE instills confidence in students by helping them improve their clinical and communication skills [6]. As per "Revised Regulations for Graduate Medical Education 2012" document it enables the student to recognize the relevance of basic sciences in patient care and relate to experience of patients as a motivation to learn"[7].

Some of the plus points of an ECE include: it eases the transition from a lay person to a medical student, helps them to understand some basic clinical terms, instilling in them the qualities of professionalism and ethics[8].

Some of the important benefits of ECE include -it instills humanistic behavior, exposes them to the health care delivery system in addition to improving their learning in the classroom[9].

Some of the authors have published similar results as ours[10]. However, a study from Kerala reported that implementation of ECE did not result in improved scores for clinical Anatomy questions, though it promoted better clinical correlation[11].

Table 1: Comparison of scores of students taught through ECE and Didactic lectures

Groups	Scores (mean ± SD)	P-value
Group A (N=145)	8.89±0.65	< 0.001
Group B (N=145)	6.66±0.96	

Table 2: Feedback of students about ECE on Likert Scale (N=145)

Q. No	Description	Mean Score	5	4	3	2	1
1	ECE created interest in the subject/topics.	4.42	81 (56%)	52 (36%)	7 (5%)	3 (2%)	2 (1%)
2	I had a better understanding of the topics by incorporation of ECE	4.34	68 (47%)	65 (45%)	8 (5.5%)	2 (1.5%)	2 (1%)
3	It encouraged me to participate more in such type of teaching methods	3.12	72 (50%)	45 (31%)	22 (15%)	3 (2%)	3 (2%)
4	I found the proper integration of the knowledge between basic and clinical sciences	4.29	65 (45%)	64 (44%)	13 (9%)	0	3(2%)
5	It was more useful in providing relevant subject material	4.20	60 (42%)	60 (42%)	22 (15%)	1 (0.7%)	2(1.3%)
6	It ensured proper utilization of resources (i.e. Clinical material).	4.23	63 (43.5%)	58 (40%)	21 (14.5)	1(0.7%)	2(1.3%)
7	This method will cause better retention of topics than lecture classes.	4.43	80 (55%)	52 (36%)	11 (8%)	0	2(1%)
8	This method will help me in better recalling of the topics.	4.41	83 (57%)	45 (31%)	14 (10%)	0	3(2%)
9	ECE will help me in lifelong learning of the topics when integrated with applied aspects	4.28	73 (50.5%)	50 (34.5%)	16 (11%)	3(2%)	3(2%)
10	ECE motivated me to study more on that specific topic	4.19	70 (48.5%)	45 (31%)	21(14.5%)	6 (4%)	3(2%)
11	I am satisfied with the involvement and guidance of teacher in ECE.	4.37	75 (52%)	56 (38%)	11 (8%)	0	3(2%)
12	I would like to learn other topics with this intervention i.e. ECE.	4.44	90(62%)	36 (25%)	16 (11%)	0	3(2%)
13	The overall rating of this instructional method	4.35	Excellent 72(49%)	Very Good 52 (36%)	Good 21 (15%)	Poor 0	Very Poor 0

Table 3: Feedback of faculty about ECE on Likert Scale (N=8)

Q. No	Description	Mean score	5	4	3	2	1
1	ECE has resulted in better understanding of subject in students	4.37	6 (75%)	1 (12.5%)	1(12.5%)	0	0
2	ECE encouraged active participation of students in learning the subject of anatomy	4.62	5 (62.5%)	3(37.5%)	0	0	0
3	The response of the students to the ECE was enthusiastic	4.87	7(87.5%)	1(12.5%)	0	0	0
4	ECE Improved student teacher interaction	4.75	6 (75%)	2 (25%)	0	0	0
5	ECE satisfies the current disciplinary, interdisciplinary and expectations of MCI	4.25	3(37.5%)	4 (50%)	1(12.5%)	0	0
6	ECE can be incorporated in routine teaching	4.5	5(62.5%)	2(25%)	1(12.5%)	0	0
7	ECE needs more manpower	4	3(37.5%)	2(25%)	3(37.5%)	0	0
8	ECE is burden to the faculty.	2.37	1(12.5%)	1(12.5%)	1(12.5%)	2(25%)	3(37.5%)
9	For ECE there may be concern over coordination with clinical departments	4.5	4(50%)	4(50%)	0	0	0
10	Some level of training is required to the faculty for conduct of ECE	4.25	4(50%)	3 (37.5%)	0	1(12.5%)	0
11	ECE is time consuming.	4.12	3(37.5%)	4(50%)	0	1(12.5%)	0
12	ECE is not feasible for all topics.	4	3(37.5%)	4(50%)	0	0	1(12.5%)
13	The overall rating of this instructional method	4.75	Excellent 6(75%)	Very Good 2(25%)	Good 0	Poor 0	Very Poor 0

Implementation of the sessions may be improved by teachers' training and use of Computer Assisted Learning for demonstration of clinical cases[12].

Different formats and types of cases help to provide acculturation and a unique learning experience for first year medical students[13]. Another study felt that it produces professionals with great values and promoted their overall development[14].

Most of the studies conducted so far to evaluate the efficacy of ECE as a T-L method have been qualitative/descriptive in nature[1].

A validated questionnaire having both open ended and closed ended questions was used to take the opinion of both students and faculty members about ECE as an educational intervention .Many of the students felt it should be used routinely to teach theory topics in Physiology as well as for sensitization of students in practical classes[15].

An integrated class on Respiratory Physiology was conducted by Physiology and General Medicine Departments on 150 first year students in 2023. A hospital visit was also arranged to expose them to relevant clinical signs and symptoms of patients. Their assessment was done through OSCE (Objectively structured clinical examination) before and after the intervention[16].

According to a study conducted in Maharashtra , students found the learning experience of ECE to be fruitful. However some of the common problems pointed out by them : co-ordination between different Departments to plan and conduct the sessions along with more consumption of manpower , time and infrastructure in the process[12].

150 medical students were exposed to 6 clinical Departments with at least 10 Hours of exposure to each Department. Based on the learning objectives for the students, ECE sessions were evaluated through pre and post-session questionnaires. It seemed to improve

all the three domains of learning-cognitive, psychomotor and affective domain. Based on the feedback received from the students, some of the themes identified included : "got familiar with various specialties", "motivation to learn, "application of basic sciences in clinical practice" "insight about what the patient undergoes"[2]. Students who had not been exposed to the medical profession earlier, ECE aided them in knowing about various departments and specialties in the hospital and familiarized them with different fields.

Medical faculty is the core factor in implementation of ECE and integration of curriculum for better results. Most of the participants (83%) felt that this method of teaching would definitely help the students if implemented properly. However around 30 % were in favour of only the traditional method of teaching[6].

Qualitative analysis of Focus Group Discussion (FGD) was done to study the perception of the seven teachers about ECE. The results of the study showed that because of ECE there was better correlation of practical knowledge with theoretical teaching, it improves the retention of knowledge and motivated them to perform better. Faculty from the Anatomy Department felt that considering the vast curriculum and time constraint, it is not practical to conduct an ECE for each and every topic[10]. They also felt that since a disease can have an effect on multiple systems at the cellular level, so for proper understanding not only Anatomy and Physiology are essential, but Pathology needs to be included too[10].

The coordinated efforts and dedication by the preclinical, para-clinical and clinical faculties are needed for best outcome of ECE. To conclude we can say that the most important aim of ECE is not only to highlight clinical knowledge but also to showcase the relevance of the basic sciences in first year undergraduation.

One of the major limitations of our study was the small sample size of 150 undergraduate students, which can be considered to be minimally optimal.Getting a real patient, which is considered the best way to implement ECE, can be considered another major limitation. Some of the other factors that should be considered are : lack of trained faculty, co-ordination with the clinical departments and requirement of extra manpower, time and infrastructure for effective implementation. In our study very few topics have been covered due to lack of time, more systems / topics need to be covered by this medium of instructions for better interpretation of the findings.

CONCLUSION

Early Clinical Exposure can prove to be an effective tool in shifting the curriculum from "Pedagogy to Androgogy". The performance of students exposed to this teaching-learning strategy was significantly higher as compared to those taught through only didactic lectures .It was found to be particularly advantageous for the slow learner. It can prove to be the ideal first step in making of a holistic physician by introducing him to the various dimensions of the profession like : ethical, interpersonal, professional, social besides scientific.

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