



Effectiveness of early clinical exposure in learning respiratory physiology among the newly entrant MBBS students

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Abstract

Introduction: Early Clinical Exposure has been conceptualized to orient medical students towards actual clinical scenario and help them correlate their theoretical knowledge with real life situations in early years of MBBS courses. In the present study we explored the outcome of early clinical exposure in the context of basic science topics (Physiology) in fresh MBBS entrants and compared their performance with a conventionally taught control group.

Methods: One hundred fifty voluntary students of 1st year MBBS (2015-16) batch consisted the sample of this study. They were divided into two groups through the simple random method (using computer generated random number table with roll numbers of the students). They were evaluated by MCQ (Multiple Choice Question) and OSCE (Objective Structured Clinical Examination) before and after being taught a basic Physiology topic (respiratory system) theoretically. The study group underwent clinical exposure before the post-test while the control group did not. Performance of the students was compared between the two groups by unpaired Student's t-test whereas marks of pre and post-test within the same group were compared by paired student's t-test. Everywhere $p < 0.05$ was considered to be significant.

Results: The marks of each group in the pre and post-tests differed significantly ($p < 0.05$ in each case). Post-test marks were significantly greater in each group though the level of improvement was strikingly higher in the study group ($p = 0.01$). Though there was no significant difference in pre-test marks of both groups ($p = 0.73$), post-test marks were significantly higher in the study group ($p = 0.04$). Among the exposed students, majority (92%) opined that ECE was a better technique being practically oriented and more interesting while some (8%) found it to be more time and energy-consuming, suitable for selective portions of basic science topics.

Conclusion: Early clinical exposure may be an effective technique to supplement the traditional theoretical teaching and improve the performance of fresh medical entrants in Physiology. It has better acceptability by the students and may be considered for inclusion in the existing pre-clinical curriculum with proper allocation of time and manpower.

Keywords: Early clinical exposure; Undergraduate; Curriculum

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Introduction

Existing medical education system in India mainly focuses on classroom and laboratory teaching in the first year of MBBS course where students get to learn three basic science topics namely Anatomy, Physiology and Biochemistry, hardly having any exposure to real clinical situations, rightly termed therefore as the pre-clinical phase. In the subsequent one and half year students learn Pathology, Pharmacology, Microbiology and Forensic Medicine which is called the paraclinical phase. Thereafter, for the next two years students learn clinics, which is divided into part I and II with inclusion of Ophthalmology, ENT, Community Medicine in part I and Medicine, Paediatric Medicine, Surgery, Gynaecology and Obstetrics in part II (1). Early clinical exposure (ECE) on the other hand, emphasises on introduction of medical students to the actual patient handling in various clinical scenario at the very first year. It has the potential to improve cognitive, psychomotor as well as affective domain of a medical student from the very beginning which is pertinent to the recent drive for the development of ideal physicians providing primary health care. Early clinical exposure ensures well integrated knowledge of the basic sciences, clinical experiences and social interaction in real life situation (2). Recognising the implication of ECE, Medical Council of India has recommended it in the new proposed syllabus from 2015 (3). Several studies have been undertaken to explore the impact of ECE among the medical students but most of them are opinion-based and qualitative by nature. The data pertaining to actual implication of ECE on students' performance as regards cognitive, psychomotor and affective domain is quite insufficient. With this background, in our study we explored the outcome of early clinical exposure in the context of basic science topics (Physiology) in a group of fresh MBBS entrants and compared their performance with a conventionally taught control group. Thereby we tested our research question, whether ECE is really a better educational tool for the development of knowledge, skill and attitude than the conventional theoretical teaching methods among the newly entrant MBBS students.

Methods

The place of this study was Bankura sammilani Medical College and Hospital in India. It was an experimental research with a study and a control group.

Voluntary students from the 1st MBBS batch of 2015-2016, who were not previously exposed

to any clinical teaching, were included in the study. Informed consent was taken from the willing candidates and written approval was obtained from the institutional ethics committee before conduction of the study. The study was designed to explore the impact of ECE on students' knowledge, skills and attitude and their perception of its merits and demerits.

The participating students were divided by simple random method (using computer generated random number table with the roll numbers of the students) into two groups, Group 1 or the study group and group 2 or the control group. The candidates in these groups were treated as follows:

1. A pre-test was administered, using a validated questionnaire consisting of 25 Multiple Choice Questions (MCQs) (50 marks) and 10 OSCE (Objective Structured Clinical Examination) stations (50 marks), to all participants to address three different domains of learning, namely: cognitive, psychomotor and affective, respectively. The MCQ's were based on subjective knowledge of the students on the selected topic. It mainly explored the cognitive domain of the students before and after teaching. The questionnaire was generated by the respective teacher and was validated beforehand.

- OSCE stations were designed to assess cognitive, psychomotor as well as affective domains. Totally, 10 OSCE stations were planned and 10 minutes was allocated to each station. History taking, examination of the patient, handling of instruments and elicitation of cardinal signs, interpretation of investigation reports and indication of basic pathophysiology involved were the main points noted in various OSCE stations. Five marks were allotted to each station based on different predetermined objectives. In OSCE, real patients with various respiratory complaints (recruited with informed consent), various respiratory instruments (spirometer, peak flow meter, stethoscope etc.), investigation reports (spirogram, flow volume curve, chest x-ray etc.) were given. Each OSCE station was monitored by an observer (recruited from the willing faculty members) who also evaluated the performance of the students according to the preformed checklist.

2. Group 1 or the study group underwent early clinical exposure after being taught a physiological topic (Respiratory system). After completion of the traditional didactic lectures, the students were taken to the clinical out-patient departments, and shown selective cases of respiratory system with cardinal signs and symptoms. Proper history taking and clinical examination, interpretation of investigation reports and discussion of the

underlying pathophysiology were emphasized by the respective teacher.

3. Group 2 or the control group was given the same theoretical teaching on the same topic in conventional method (classroom teaching without actual clinical exposure).

4. After 15 days, both groups were tested with the same questionnaire (post test) with MCQ and OSCE.

5. Group 2 students (Control group) who only underwent traditional teaching methods were also given the same clinical exposure after completion of the post test.

6. The attitude of the students from the study group towards such clinical exposure was assessed by an open-ended questionnaire, e.g. What is your opinion about the effectiveness of early clinical exposure as a teaching methodology? Do you expect the method to be followed in all other physiology topics? Are there any shortcomings of the method? etc.

The students' performance was compared between the two groups by unpaired Student's t-test whereas marks of the pre and post-tests for the same group were compared by paired t-test. Everywhere $p < 0.05$ was considered to be significant. The statistical software used was Microsoft excel and SPSS, version 18.

Results

Totally, 150 students were included and grouped into 2 (75 students in each group). Pre and post tests were conducted based on MCQ and OSCE, addressing different domains of learning. Full marks were 100 in each test (50 for MCQ and 50 for OSCE). The results are expressed in percentage. Marks obtained by each individual group in the pre and post-tests (aggregated marks in MCQ and OSCE with one standard deviation) are given in table 1.

The marks obtained by each individual group in the pre and post tests were significantly different when compared by paired Student's t-test ($p < 0.05$ in each case). The post-test marks

were remarkably greater in each group though the level of improvement was strikingly higher in group 1 (the study group). When comparison was done between the groups by unpaired Student's t-test, the post-test marks showed significant difference ($p = 0.04$), though the pre-test marks did not ($p = 0.73$).

Regarding the opinions of group 1 students about the merits and demerits of early clinical exposure, 92% of the students opined that it was extremely helpful and made the basic science topics more interesting and clinically relevant and thus made the topics more acceptable. All of them expected the technique to be followed for all other physiology topics, e.g. nervous system, cardiovascular system, etc.

Five percent of the students felt that the technique was more time and effort-consuming so that the students could hardly afford being burdened with the other two big subjects like anatomy and biochemistry in the very 1st year. 3% of the students gave opinion that this teaching method should be restricted to selected topics as it is more time-consuming. Actual numbers of students giving various opinions regarding usefulness of ECE are given in table 2.

Discussion

Since the past century, the medical students have to learn theory for two to three years before getting it applied in actual clinical practice. The main challenge pertaining to this age old undergraduate curriculum is to make the basic science topic like physiology interesting and acceptable to the fresh medical entrants. Different computer assisted modules and simulators have been tried to overcome such constraints but those are costly, dependent on constant power backup and technical expertise (4). On the contrary, Early Clinical Exposure emphasizes real human contact in a social or clinical context that enhances learning of health, illness, and the role of the health professional in so-called preclinical phase, e.g. 1st two years of medical

Table 1: Marks obtained by the two groups in pre and post-test with results of t-tests

Groups	Pre-test marks (%)	Post-test marks (%)	Change	p
Group 1	18±4.16	62±8.5	44.13±4.18	0.0016*
Group 2	19.16±3.8	51.6±5.2	32.37±1.5	0.0003*
P	0.739	0.04*	0.01*	x

* Significant

Table 2: Number of different opinions regarding usefulness of ECE

Total opinions	Student's opinions regarding ECE		
	Interesting and acceptable	Time and effort consuming	Should be reserved for selective topics
75	69	4	2

education. Early clinical experience is not only an interesting and acceptable method for the 1st year students, but also has a strong formative influence that can be used to generate a socially responsive career orientation (5). Encouraged by various professional bodies such as UK General Medical Council, many other medical schools are nowadays vertically integrating different types of practical experiences in the early years. A number of studies have been undertaken exploring the efficacy of such early exposure to actual clinical scenario, but most often they have been qualitative or descriptive studies based on students' feedback (6, 7). However, their findings are corroborative in most of the cases as regards students' satisfaction and better acceptance. We also found positive response from the students in our study regarding early clinical exposure. The major outcome of our study was performance-wise improvement of the students exposed to ECE than the conventionally taught group. Our finding is in compliance with that of Tayade et al. (2) Though the conventionally taught control group also showed improvement after theoretical teaching, their extent of improvement in performance was much less than that of the clinically exposed group. This may signify that ECE is not to replace conventional didactic lecture in teaching basic science topics but to supplement its effect in many added ways. The fundamental purpose of early clinical exposure in the 1st year should be to teach basic clinical skills, enhance students' motivation and prepare them towards the purpose for which they entered the profession, enable them to correlate what they are learning in basic sciences, encourage students to learn the professional behaviour of a doctor through observation and provide the context for application of their learning in practice (8). Besides these, ECE also helps to relieve stress of the students pertaining to patient handling, and develop clinical reasoning, communication skills, professional attitudes and empathy (6, 9). In other words, ECE enhances not only clinical aptitude development but also factual learning. It was shown in some previous studies that videographic demonstration of clinical facts could help students understand better and retain longer as this media is three dimensional and stimulates Wernicks area through auditory as well as visual pathway leading to a better integration of the information (10). Clinical exposure is more effective in this regard as this allows exposure to actual clinical problems and thus helps students correlate their theoretical knowledge with real life scenarios. It is less costly and more effective in generating future clinicians with integrated knowledge of

basic science topics and clinical applications.

But the context of time and energy constraints and shortage of manpower should be paid attention to while incorporating ECE program in the very 1st year. These have been raised as the pertinent limitations of ECE in various literatures. Proper distribution of lectures and clinical sessions should be done which requires special workshops and specific guidelines in this regard. Restructuring of curriculum is highly recommended while including ECE as a component of 1st year MBBS syllabus. Integrated approach of clinical as well as non-clinical departments and involvement of the community wherever possible are very much warranted for overall success of this programme (11).

Conclusion

Early clinical exposure may be an effective technique to supplement the traditional theoretical teaching to improve the performance of fresh medical entrants in basic science topic like Physiology. It has better acceptability by the students as it is more practically oriented and interesting. It may be considered for inclusion in the existing pre-clinical curriculum with proper allocation of time and manpower. Elaborate training and workshops with the faculties are needed in this regard before actual implementation of such programmes.

Limitation

It was a study of very short duration. Only a single preclinical topic could be covered. More topics should have been included for better interpretation. Implication of ECE should also be assessed prospectively on the same batch of students in regards of their knowledge, attitude and practice in upcoming years of the MBBS courses for reaching a more convincing conclusion.

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