A Study on Early Clinical Exposure trial on the 1st year students in a Medical College in Kolkata – Students' Perspective

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Abstract: In tune with the ongoing rapid developments in Medicine today, the Medical Council of India is bringing forth a change with the introduction of Early Clinical Exposure (ECE) from the 1st year of medical curriculum from August 2019. This Study done on 134 medical students at the end of their 1st year course, who could then assess the differences between traditional teaching and ECE, may serve as a guide to its introduction. A pre-set questionnaire, on the comparison of ECE with traditional lectures and its implementation, was assessed before and after an ECE trial. A significant change of ideaswere notedin students after the ECE trial:ECEsbeing more beneficial,causing no unnecessary burden to their studies, and providing more in-depth concept than routine classes. According to the student's perception ECEs should be introduced early in the curriculum. Case-based learning(CBL)form of ECE, showed well acceptance, aroused more clinical orientation than mundane lectures, and may better prepare students for the hospital wards from the 2nd year. While the 'Teacher' remains the single-most important factor, as opined by the students, 'Case' selection and 'Topics of ECE' are pivotal in success of ECE, thus mandating a needfor proper training and selection of Teachers who would provide ECE to the 1st year students.
Keywords: Case-basedlearning, Competency, Early clinical exposure, Traditional lecture classes

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I. Introduction

Traditionally Medicine had been taught for ages by way of lectures and dissections to the students in the early pre-clinical years. But in recent years an increasing trend towards introduction of clinical scenario, to the freshly inducted medical students, in various forms, is being practiced throughout the world.

Studies on Early Clinical Exposure (ECE) in medical curriculum across Europe [1] by the EURACT council, or studies on Early Clinical Skill Teaching in UniversitiKebangsaan Malaysia in Kuala Lumpur [2], or the study on 'benefits ofearly patient contact' in University of Washington School of Medicine [3], all point to the need of the hour: sensitization of the fresh medical entrants to early clinical exposure. Following suit, theMedical Council of Indiaenvisioned the need ofintroduction of Early Clinical Exposure (ECE) from the 1st year of medical curriculum, and the newly constructed Competency based UG curriculum for the Indian Medical Graduate has been developed andis due to be implementedfrom August, 2019 [4].

With the ever-growing branches of Physiology and Medicine, this is indeed a challenging task to bring in the clinical scenario to the newly joined medical students and make it comprehensible to them. Our Study is a trial of such an Early Clinical Exposure, in the form of Case-based Learning (CBL), on the 1st year medical students who had just completed their first-year course, to evaluate their responses and feedback to the 'to-be-newly-introduced-system' of medical teaching. How far the ECE and the new Teaching Methodology would succeed in replacing the Traditional teaching system and what would be its outcome should best be left to be decided in the coming years.

II. Methodology

An institutional based, analytical study with self-administered pre-exposure & post-exposurequestionnairewas carried out amongst the 1st year MBBS students of Calcutta National Medical College, Kolkata, in the month of April 2019, at the end of their 1st year of Study. This time of the year was chosen as the students, after completion of the syllabus and just before their final Semester Exams,are expected tohave a good idea of the subject and would be in a better position to judge the usefulness of ECE.

A total enumeration method was followed for sample collection with 145 students attending the class. The intention of the study was explained to the students, and a total of 134 students volunteered to participate in this Study. Aninformed written consent for the study was taken from each student and the 'Pre-

exposureQuestionnaire' supplied to them to be answered based on their 'ideas about ECE', before the ECE class. Then theClinical Exposure in the form of 'Clinical Case Discussion' of the Reproductive System was held for an hour. The class was an interactive session consisting of Case-related questions to be answered by the participating students. A total of five cases were discussed in this Case-based Learning, which incorporated the following 4 Core Competency of the New MCI curriculum [5] (to be introduced from the incoming August 2019 Session):

No.	COMPETENCY The student should be able to:	Core (Y/N)	Vertical Integration
PY9.9	Interpret a normal semen analysis report including (a) sperm count, (b) sperm morphology and (c) sperm motility, as per WHO guidelines and discuss the results	Y	
PY9.10	Discuss the physiological basis of various pregnancy tests	Y	Obstetrics & Gynaecology
PY9.11	Discuss the hormonal changes and their effects during perimenopause and menopause	Y	Obstetrics & Gynaecology
PY9.12	Discuss the common causes of infertility in a couple and role of IVFin managing a case of infertility.	Y	Obstetrics & Gynaecology

At the end of the ECE session, the same set of questions was used as 'Post-exposure questionnaire'. Questions were stated like "*ECE would not be much beneficial to my studies*", "*ECE requires more of your concentration*", "*ECE would cause more burden on students*" and "*Lecture classes provide more in-depth conception than ECE*": to be answered by giving a Likert scale score based on their opinion. Questions were both positively and negatively framed to avoid answering bias: to check whether the participants filled out the survey in a reckless fashion [6].

The Questions were based on the cognitive domain: involving the application, evaluation and analytical skills of the students.

There were eight questions to be answered on a 5-point Likert scale as: 1(*Strongly disagree*),2(*Disagree*),3(*Neither agree nor disagree*),4(*Agree*)and5(*Strongly agree*) [7]. Closed ended questions were chosen for getting quicker answers, ease of comparison,easy analysis and statistical interpretation – the quantitative data collected would be subjected to qualitative analysis to derive the impressions and views of the students regarding ECE.Any difference of scores after attending ECE would constitute one of the main focusesof this study, with higher scores indicating stronger agreement.

Additionally, the second part of thePost-exposure questionnaire had five questions. The first three were closed ended questions [8] which explored the student's final perception of ECE, like "*Is ECE better than usual lecture class?*", "*Does ECE effectively stimulate clinical orientation?*" and "*Does ECE arouse interest for further studies*?" In the 4ᵗʰ question the students had to select, from a set of guided answers, the best time to introduce ECE to the new 1ˢᵗ year students, according to their opinion. The last question was designed to serve as a guide to the introduction of CBL form of ECE:-the students' perception of what they felt was most important in the teaching process, to be arranged in the order of importance – between 'Teacher', 'Case selection', 'Quality of Slides' and 'Topic of ECE'.

The forms of 8 students who submitted incomplete forms were eventually cancelled, and thus the remaining 126 students out of the 134 students (94%) who submitted both the completed forms correctly, were assessed and taken as the total sample size.The data was compiled in Microsoft Excel 2010and analyzed with appropriate statistical tests. Mean and standard deviation of the Likert scores applied to each question, pre and post-exposure to ECE, were calculated.Student's paired t-test was applied, with a two-tailed hypothesis,to ascertain the significance of differences between mean values of these two distributions,pre and post-exposure to ECE.As per convention, ap-value of $p<0.05$ was taken as significant, and $p<0.01$ as a highly significant finding.

III. Results

A total of 126 students completedboth the pre and post-exposure questionnaire and eight questions were assessed for the pre and post-test scores. The distribution of the students were 75(59.5%)Boys and 51(40.5%) girls.The students had marked each question with a numerical value from the 5-point Likert scale, depending upon whether they '*completely disagree (1)*' to '*completely agree (5)*' with the statements. The question marked by the students,with the mean and standard deviationof the Likert scores given, had been recorded in Table 1.

Table 1 also show the mean and standard deviation recorded in the Post-exposure test, and the P-valuesobtained by the Students' paired t-test. Responses to Q.No.3 and Q.No.5 show the mean Likert values in the range of four to five,more so noted after the ECE class exposure, indicating stronger '*agreement*' with the statements in question.

Items with Likert scores closer to three indicate '*neither agree nor disagree*', and Q.No.7 and Q.No.8 recorded such values, indicating that majority of the students were unable to decide on those questions. The post-exposure values show significant and highly significant changes respectively, towards '*disagree*', indicating a change in their perception after the ECE trial.

Q.No.1, 2, 4 and 6 measured Likert values closer to two indicating '*disagreement*' to the following questions, which changed to '*stronger disagreement*' (with values closer to one) following ECE exposure.

In all 6 out of the 8 questions (75%) recorded significant changes in post-exposure scores, indicating that CBL had indeed changed the perception of the majority of the students regarding their opinions of ECE.

Table No.1: Mean, Standard Deviation (SD) and P-value of the answers to the questions, before (Pre) and after (Post) exposure to ECE.
(Significant P-values are underlined, and highly significant P-values are marked in bold)

Q No	Question	Pre		Post		P value
		Mean	SD	Mean	SD	
1.	ECE would not be much beneficial to my studies	1.95	1.13	1.51	1.16	**0.00042**
2.	Lecture Classes are more interesting than ECE	1.94	0.92	1.72	0.91	<u>0.024</u>
3.	ECE requires more of your concentration	3.90	1.05	4.04	1.08	0.184
4.	Lecture class can be remembered more than ECE	2.05	0.99	1.88	1.01	0.085
5.	ECE is the best approach to prepare you for patients & wards	4.67	0.58	4.83	0.45	**0.0109**
6.	ECE would cause more burden on the students	2.29	1.14	1.86	1.09	**<0.00001**
7.	Lecture classes allow more interaction with teachers than ECEs	2.58	1.20	2.35	1.15	<u>0.045</u>
8.	Lecture classes provide more in-depth conception than ECE	2.83	1.12	2.21	1.15	**<0.00001**

Fig.1 graphically demonstrates the Likert scores of each question of all the 126 students, pooled according to the values and colour-coded. Differences in pre-exposure (A) and post-exposure (B) values can also be appreciated. An increase in the students' response for each question towards either '*completely disagree*' or '*completely agree*' can be noted in their perception after the ECE exposure.

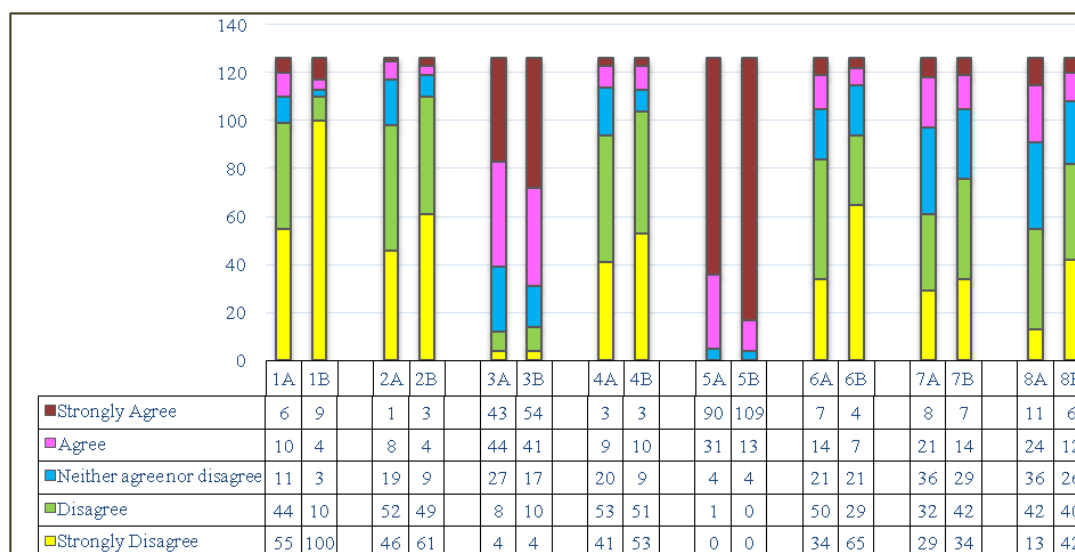|	1A	1B	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7A	7B	8A	8B
■ Strongly Agree	6	9	1	3	43	54	3	3	90	109	7	4	8	7	11	6
■ Agree	10	4	8	4	44	41	9	10	31	13	14	7	21	14	24	12
■ Neither agree nor disagree	11	3	19	9	27	17	20	9	4	4	21	21	36	29	36	26
■ Disagree	44	10	52	49	8	10	53	51	1	0	50	29	32	42	42	40
■ Strongly Disagree	55	100	46	61	4	4	41	53	0	0	34	65	29	34	13	42

Figure 1: Stacked column chart showing responses to the 8 questions, before (A) and after (B) ECE session. The table below the chart shows the number of students who indicated their response to each colour-coded Likert group.

An interesting observation was noted regarding the three closed-ended questions, which appeared in the 2ⁿᵈ part of the Post-exposure questionnaire, like: "*Is ECE better than usual lecture class?*", "*Does ECE effectively stimulate clinical orientation?*" and "*Does ECE arouse interest for further studies*?".They were answered affirmatively by 100% of the students. A possible explanation would be discussed in the later section.

Fig. 2 depicts, from the students' perspective, the best time when the ECEs should be introduced to the newly admitted 1ˢᵗ year students. Opinion is divided with just over a quarter, i.e. 35 students out of 126 (27%), thinking that ECE classes started at the end, after completing 1ˢᵗ year syllabus, might be better. But approximately 60% (75 out of 126) of the students feel anytime during the early months, either started in the middle or from the beginning is best suited to start ECEs.
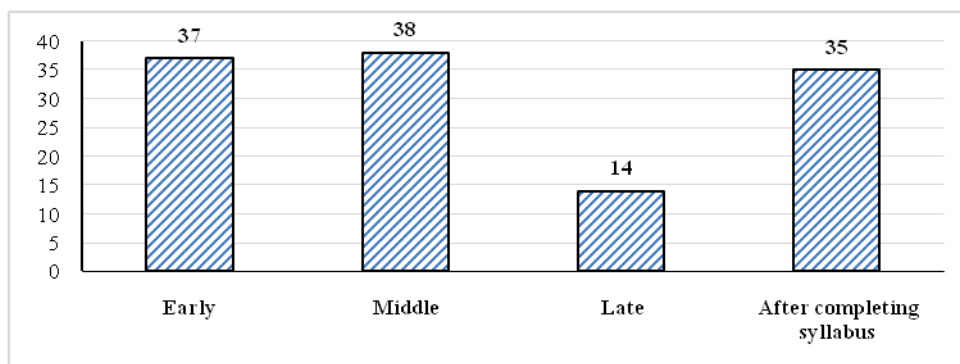
Figure 2: Bar Chart reflecting the students' opinionregarding the time of introduction of ECE to a new batch. (Values along Y-axis indicate the actual number of students who voted for each category).

In the last question of the post-exposure questionnaire, the students had to place the four components of CBL in order of importance (as per their perception), and rank them with a pre-assigned score – a score of 1 for the '*most important*' to a score of 4 for '*least important*'. The values in Table 2correspond to the total number of students who assigned scores of 1, 2, 3 or 4 for every component of CBL. Thus for the 'Teacher': 68 students gave a score of 1 (*most important*), 24 students a score of 2, 16 students a score of 3 and 18 students gave a score of 4 (*least important*); and so on. Finally Total Points and an Average were calculated.

Table No.2: Components of CBL and theirorder of importance with pre-assigned scores
(Score 1=most important, to Score 4=least important)

Pre-assigned Scores	Components of CBL			
	Teacher	Case selection	Quality of Slides	Topic of ECE
1	68	39	20	35
2	24	41	23	31
3	16	40	33	21
4	18	6	50	39
* Total Points:	236	265	365	316
**Average	1.873	2.103	2.897	2.508

(* Calculation ofTotal Points – Calculate the product of: no. of students in each cell x pre-assigned score; and then sum them up.
So, for 'Teacher' we proceed as:
68 students gave a score of 1 = 68 x 1 = 68
24 students gave a score of2 = 24 x 2 = 48
16 students gave a score of 3 = 16 x 3 = 48
18 students gave a score of 4 = 18 x 4 = 72
Thus, Total Points = 68 + 48 + 48 + 72 = 236
** Average – Divide Total Points obtained by the number of students participated, i.e. 236/126= 1.873)

In the Table2, the 'Average' is actually a '*weighted average*' of the pre-assigned scores, given to each component of CBL by the students; where lower the 'Average', higher is its rank in order of importance (as Score 1=most important). Thus 'Teacher' with an Average of 1.873 is the most important, and 'Quality of slides' with an Average of 2.897 is least important, in the opinion of the students.
Fig. 3 attempts to depict in the pie chart the relative area of importance of the four components of CBL, as opined by the students.
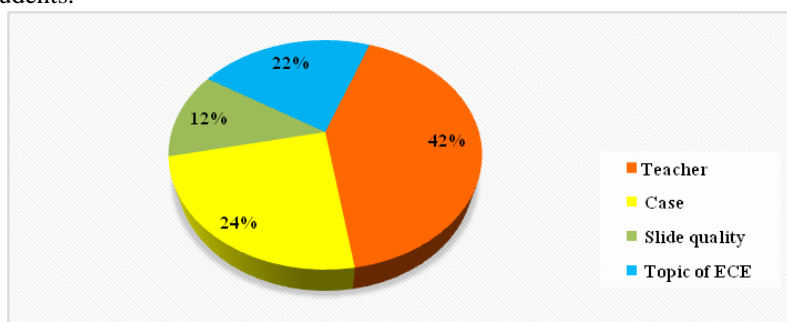

Figure 3: Pie Chart displaying the relative importance of the components of CBL

This Fig. 3 has been constructed based on the choice of the students, as the most important component of CBL (i.e. those with pre-assigned score of 1). The data from the first row of Table 2 shows how many students considered each item as most important, and has been depicted in the pie chart here. This is in agreement with the 'Average' calculated in the Table 2 for constructing the order of importance of each component.

IV. Discussion

Our idea was to expose a batch of 1st year MBBSstudents, who attended only traditional lecture classes throughout the year, to a session of Case Based Learning, and test their perspective on Early Clinical Exposure. As the batch was preparing for the second & final Semester Exam of the 1st year, after completion of the syllabus, it was decided as the right time to ask for their opinion,to gather their responses and note if any significant difference or a change of perspective resulted following a CBL session.

Case-stimulatedlearning as a form of ECE had been detailed by Sathishkumar S. in 2007 [9], and he showed that 69.6% of students felt that both case-based lectures and seeing patients contributed to their understanding. Adding to it, Vyas R. (2012) from Christian Medical College, Vellore, ina study entitled 'Recent Trends in Teaching and Learning in Physiology…' described the need of ECE and its various settings, including Class room setting[10].

Our study in classroom setting, based on administering a session of Case-based Learning on Reproductive Physiology, and recording the students' opinion, showed a significant change of perception in six out of eight questions (75%) in post-ECE questionnaire. Bhattacharya SN, et al had conducted a CBL on Endocrine Physiology and showed 91.52% improvement in post-CBL responses [11].

On studying students' responses post-exposure to CBL a highly significant change of attitude was noted with students finding ECEs greatly beneficial to studies, not causing any extra burden to them, and overall ECEs being more interesting than usual lecture classes. This is in accordance with some of the findings of Chinmay Shah (2018) who observed that ECE is a useful method for a basic science like Physiology, and whencombined with the traditional teaching method, can be retained and later practically applied[12].

A highly significant change,with a more strong agreement to the opinion that 'ECE is the best approach to prepare for patients & wards', was noted in our studyfollowing post-CBL exposure. A similar report published by Littlewood et al (2005), on a systemic review on thestrength and importance of outcomes on 'early experience' reported in the decade 1992-2001, concluded that'Early practical experience helps medical students develop appropriate attitude towards their studies and future practice, and orientates medical curriculums towards society's needs' [13].

In our study,Post-CBL exposure also reveals a highly significant change in favor of the idea that ECEs provide more in-depth conception than lecture classes, and significantly allows more interaction with teachers. On a similar note, Reza Esfehani (2012) reported that 2nd semester students believed in ECE improving their visual concepts, with an additional benefit ofstress reduction (42%), and gaining better attitude about further clinical activities (40%)[14].

In our study all (100%) students felt ECE was better than usual lecture class, ECE effectively stimulated clinical orientation, and ECE aroused interest for further studies. A possible explanation of a 100% affirmative response lies in the fact, that they were framed as 'leading questions': which reiterates that leading questions should best be avoided in questionnaires which involve statistical treatments. Nevertheless, such high percentages were also reported by Mafinezad MK (2016) in Iran, in a study on 1st and 2nd year medical students,and stated that 80.1% students felt ECE program could familiarize their learning with medicine allowing it to apply in clinical settings, and 84.5% students felt ECE increased their interest in medicine and motivated them to read more [15].Also Chari S.(2015) reported from Nagpur, India, that 87% students felt ECE increased interest and motivated them to learn basic sciences [16].

An interesting retrospective study on graduating seniors, in 1989 by Wolff TM and colleagues, found that cynicism with medical studies begin to develop from very first year of medical education and relates to development of stressors; and they suggested a long term clinical exposure and experience in real clinical environment [17]. Similarly Johnson and Scott from University of Washington School of Medicine (1995) reported that 40% students were cynical when they started school, but early clinical experience contributed to the students' satisfaction with medical education [18]. In our study we questioned the students about the appropriate time they felt ECE should be introduced, and 60% students felt the best time would be in the early months, thus sending a clear message towards its early introduction in the 1st year MBBS Course, and which could change the students' cynical attitude towards a more favorable one.

Recently in 2018, Alfehaid LS, et al from King Saud Bin Abdulaziz University for Health Sciences, Riyadh, Saudi Arabia, demonstrated the importance of continuous feedback from students; and training of both faculty members and students were highly recommended [19].We collected a feedback on students' perspective on the different aspects of Case-based Learning, which revealed 42% students feeling role of 'Teacher' as the

most important, with the 'Topics of ECE' and the 'Cases selected for study' being half as important each. This is in tune with Tayade and Latti (2017), who in a review article on the need of ECE in medical curriculum described ECE is an archetype of "vertical integration" in medical education with an immense interdisciplinary contribution, and the teachers in both basic science and clinical being primarily 'facilitators' [20]. Thus proper training of the 'Teachers', as suggested by our study based on students' opinion, is of paramount importance and would usher in the success of any ECE program.

V. Conclusion

This study done on the 1ˢᵗ year medical students enlightens us on the various aspects of ECE from the students' view-point. Students' opinion changed significantly after an ECE trial with majority of them finding ECE classes more interesting, greatly beneficial to their studies, without causing any extra burden on them, providing more in-depth conception and allowing more interactions with teachers than usual lecture classes. The students' unanimous verdict was that ECE classes stimulated their clinical orientation more, aroused more interest in their studies and believed that ECEs may better prepare them for patients and wards in later years. 60% of the students believed that early introduction of ECE in 1ˢᵗ year curriculum would greatly benefit them. As Teachers are the primary facilitators they should be trained to deliver ECE; and the students too felt their role as paramount in delivering ECEs, with proper case selection and topic of ECE being second in importance.

Limitations of the study

This study was done onmedical students who hadcompleted their 1ˢᵗ year course.Due to time constraint of the students with the approaching exams, we had to use aself-administered questionnaire which lacked internal validation check, though we discussed with some experts in its preparation. Thus before using this questionnaire again, validation check is required if intended to be used in larger surveys in future research.

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Conflicts of interest None.

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