

EVALUATING THE IMPACT OF EARLY CLINICAL EXPOSURE ON FIRST-YEAR MBBS STUDENTS: A COMPARATIVE STUDY

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Abstract

Background: This study aimed to compare the clinical skills and academic achievements of first-year MBBS students who undergo Early Clinical Exposure with those who follow a traditional curriculum. **Materials and Methods:** This study utilized a comparative, cross-sectional design to examine the influence of Early Clinical Exposure on first-year MBBS students. The research involved two groups: one cohort that participated in ECE and another that adhered to the traditional curriculum. Data collection was conducted through clinical competency evaluations using Objective Structured Clinical Examinations, academic performance records, and structured surveys assessing students' self-reported confidence, preparedness, and empathy. Additionally, attendance records for clinical rotations were analyzed to measure the extent of exposure. The data were analyzed through descriptive statistics, t-tests, Mann-Whitney U tests, Pearson's and Spearman's correlation coefficients, multivariate regression models, and ANOVA, allowing for a comprehensive assessment of the impact of early clinical exposure on clinical skills and academic achievements. **Result:** The findings revealed that students who underwent Early Clinical Exposure outperformed their counterparts in the traditional curriculum group on OSCEs, reflecting significantly higher clinical competencies. Moreover, ECE participants demonstrated superior academic performance across core subjects, indicating that early exposure not only bolstered clinical skills but also reinforced academic understanding. Correlational analysis highlighted a strong positive relationship between early exposure and enhanced clinical competence, academic achievement, and students' self-perceived readiness for clinical practice. Additionally, ECE students reported higher levels of motivation, increased confidence in their clinical abilities, and a heightened sense of empathy toward patient care, further underscoring the benefits of early clinical involvement. **Conclusion:** This study robustly demonstrated that Early Clinical Exposure significantly enhances both clinical competencies and academic performance in first-year MBBS students. By integrating clinical experience into the early stages of medical education, students exhibit greater engagement, increased self-confidence, and improved attitudes toward patient care. These results advocate for the inclusion of ECE in medical curricula and emphasize the importance of structuring early clinical exposure in a manner that fosters positive learning experiences without overwhelming students. Future research should focus on optimizing the structure and content of ECE programs to maximize their educational benefits.

INTRODUCTION

The paradigm of medical education has evolved significantly over recent decades, with increasing emphasis on refining the pedagogical methods that

prepare future healthcare professionals. A critical area of this evolution is the introduction of Early Clinical Exposure, wherein medical students are immersed in clinical environments early in their academic training, typically during their first year of

study.^[1] Traditionally, medical curricula have adhered to a "basic science first" approach, where clinical training begins only in the later years. However, this model is now being critically re-evaluated, with a growing body of evidence suggesting that early integration of clinical experiences can substantially enhance both the cognitive and affective learning outcomes for medical students. Early Clinical Exposure is the practice of integrating clinical interactions into the curriculum during the initial stages of medical education. This approach allows first-year students to engage with patients, attend clinical rounds, and observe the practical application of medical knowledge within healthcare settings.^[2] The underlying philosophy of ECE is based on the premise that exposing students to clinical environments at an early stage fosters a deeper understanding of medical theory, increases student motivation, and bridges the gap between academic learning and real-world application. As healthcare education evolves to prioritize patient-centered care, ECE is gaining traction to enrich the learning experience and cultivate a more holistic approach to medical education.^[3]

One of the foremost advantages of early clinical exposure is its potential to contextualize theoretical knowledge. Medical students often grapple with abstract concepts in subjects such as anatomy, physiology, and biochemistry, which may seem disconnected from real-world practice. Through early clinical interactions, students can observe firsthand how theoretical knowledge is applied in diagnosing, managing, and treating patients. This direct exposure to clinical practice not only enhances the students' understanding of their coursework but also imbues them with a sense of purpose and relevance that transcends the classroom setting.^[4] Furthermore, early exposure to clinical environments has been shown to foster higher levels of student engagement and motivation. Witnessing the tangible impact of medical knowledge on patient outcomes provides students with a powerful sense of the significance of their education. This heightened awareness often translates into greater enthusiasm for their studies, with students perceiving their academic pursuits as more meaningful and aligned with their future roles as healthcare professionals. This sense of purpose can encourage students to approach their learning with greater curiosity, diligence, and a proactive attitude, ultimately enhancing the quality of their educational experience.^[5]

However, the implementation of early clinical exposure is not without its challenges. One major concern is the readiness of first-year students to effectively engage with clinical environments. The early years of medical school are often characterized by a steep learning curve, as students are introduced to complex scientific principles and the demands of medical education. Introducing clinical exposure at this stage may overwhelm some students, as they

may lack the foundational knowledge necessary to fully comprehend clinical situations.^[6] Moreover, the quality and consistency of clinical exposure can vary depending on the availability of trained mentors, the nature of the clinical settings, and the level of integration within the curriculum. In some cases, students may experience limited or fragmented clinical exposure, which could undermine the potential benefits of this approach. In contrast, the traditional model of clinical education, which delays patient interaction until later years, offers a more structured and deliberate approach to training. This model allows students to first build a robust understanding of basic sciences before immersing themselves in the complexities of clinical practice. Advocates of this approach argue that a solid grounding in theoretical knowledge is essential for students to make informed clinical decisions and to understand the pathophysiology underlying various medical conditions. The traditional model also offers a more methodical progression from foundational knowledge to practical application, which can be beneficial for students who require a systematic approach to learning.^[7,8]

To evaluate the efficacy of early clinical exposure, it is essential to conduct empirical research comparing the outcomes of students who have undergone ECE with those who have followed the traditional curriculum. Such studies can provide valuable insights into whether early clinical exposure enhances students' clinical competencies, facilitates the integration of theoretical knowledge, and improves overall academic performance.^[9] Furthermore, exploring the impact of ECE on students' interpersonal skills, empathy, and communication with patients can offer a comprehensive understanding of the broader educational benefits of early clinical interaction. This study seeks to rigorously assess the impact of early clinical exposure on first-year MBBS students by comparing their clinical competencies, academic achievements, and subjective perceptions of their educational experience with those of students who have not had early clinical exposure. Specifically, the study examined whether ECE contributes to the students' ability to apply theoretical knowledge in practice, improves their clinical reasoning skills, and influences their long-term retention of clinical knowledge. By conducting this comparative analysis, the research aims to offer critical insights into the potential advantages and challenges of integrating early clinical exposure into medical curricula. Ultimately, the objective of this research is to inform the development of more effective medical curricula that optimize both the cognitive and affective dimensions of learning. If the findings demonstrate significant benefits from early clinical exposure, they could lead to a paradigm shift in medical education, encouraging institutions to reconsider the structure of their training programs and adopt a more integrated approach. This could pave the way for a generation of medical

professionals who are not only well-versed in scientific knowledge but also possess the clinical skills and empathetic understanding necessary to deliver high-quality patient care.

Aim of the study

To critically evaluate the impact of Early Clinical Exposure on first-year MBBS students, assessing its influence on their clinical competence, academic performance, and overall learning experience.

Objective

To compare the clinical skills and academic achievements of first-year MBBS students who undergo Early Clinical Exposure with those who follow a traditional curriculum.

MATERIALS AND METHODS

The study employed a comparative, cross-sectional design to evaluate the impact of Early Clinical Exposure on first-year MBBS students. It involved two groups: one group of students who had undergone Early Clinical Exposure as part of their curriculum and a control group that had followed the traditional curriculum without early clinical exposure. This design facilitated a direct comparison of the outcomes between students who had been exposed to clinical settings early in their studies and those who had not, with a focus on clinical competence, academic performance, and the overall learning experience. Additionally, the study included a qualitative component to assess students' perceptions of their educational experience, particularly regarding their engagement, motivation, and preparedness for future clinical practice. The study was conducted at a medical college offering both traditional and early clinical exposure curricula. Students from both groups were assessed at the end of their first year, ensuring a consistent comparison in terms of the time spent within the curriculum. Ethical approval for the study was sought from the institutional review board to ensure adherence to ethical guidelines and to guarantee the protection of participants' rights throughout the research process.

Inclusion Criteria

First-year MBBS students were included as the study specifically targeted the impact of Early Clinical Exposure during the first year of medical education. Only students enrolled in the first year of their MBBS program were considered eligible, as the primary objective was to evaluate the early integration of clinical exposure within the initial stages of medical training. Both groups of students were included in the study: those who had undergone Early Clinical Exposure and those who had followed the traditional curriculum without early exposure to clinical settings. This allowed for a direct comparison between the two groups, ensuring the evaluation of the specific impact of early clinical immersion on their academic and clinical outcomes. Participation in the study was voluntary, with informed consent obtained from

each student to ensure adherence to ethical standards and guarantee the protection of participants' rights. Only students who had willingly agreed to participate were included, safeguarding the study's integrity and ensuring the ethical compliance of the research process. Additionally, only those students who had completed the entire first year of study, including all related assessments and clinical activities, were eligible to participate. This criterion was critical to ensure that the study accurately assessed the full impact of the curriculum on students' academic and clinical competencies over the course of their first year.

Exclusion Criteria

Exclusion criteria were established to maintain the integrity of the study's findings:

- Students with Prior Clinical Experience
- Students with Academic Interruptions
- Students from Non-Participating Curricula
- Incomplete Data

Data Collection

Clinical competencies were evaluated through the use of Objective Structured Clinical Examinations (OSCEs), a widely recognized and reliable method for assessing practical clinical skills. The OSCEs were conducted to rigorously assess students' abilities in critical areas such as patient interaction, history-taking, physical examination, diagnostic reasoning, and communication skills. These assessments featured both simulated patients and standardized clinical scenarios, specifically designed to measure a broad spectrum of clinical competencies expected of first-year medical students. Each student was evaluated using a set of predefined criteria by trained and experienced assessors, ensuring both consistency and objectivity throughout the evaluation process.

Students' academic performance was measured through their grades in core subjects, including fundamental disciplines such as anatomy, physiology, biochemistry, and integrated medical knowledge assessments. These grades served as a key indicator of students' understanding of essential theoretical concepts, as well as their ability to retain and apply this knowledge in a structured examination setting. The analysis focused on comparing the mean scores between the two groups: the Early Clinical Exposure (ECE) group and the control group following the traditional curriculum to determine the potential influence of early clinical exposure on students' academic achievements.

A comprehensive and standardized questionnaire was developed to capture students' perceptions and attitudes regarding their educational experience. The survey featured Likert scale-based questions designed to assess multiple dimensions, including students' motivation and engagement with the curriculum, their confidence in clinical skills, the perceived relevance of early clinical exposure to their academic learning, their preparedness for future clinical work, and their attitudes toward patient care and empathy. This survey was

administered at the conclusion of the first academic year, providing valuable insights into students' self-reported outcomes and perceptions of their educational journey.

In addition, institutional data, such as attendance records for clinical rotations, were examined to assess the degree of participation in clinical exposure activities. This review enabled a detailed measurement of the extent to which the ECE group had engaged in clinical practice compared to the traditional group. Furthermore, data related to additional institutional metrics, including involvement in supplementary skill workshops or other forms of clinical training, were gathered to offer a comprehensive overview of the experiences of students in both groups.

Data Analysis

Descriptive statistics were initially employed to summarize the demographic characteristics of the study participants, including variables such as age, gender, and prior academic performance. These statistics were also utilized to provide a detailed overview of the clinical competency scores and academic performance (grades) for both the Early Clinical Exposure and traditional groups. This foundational step ensured a comprehensive understanding of the participants' baseline characteristics, thereby facilitating a clearer comparison between the two groups.

To determine whether early clinical exposure had a significant effect on clinical competency and academic performance, a comparative analysis was conducted. T-tests were applied to compare the means of clinical competency scores and academic grades between the ECE and traditional groups, under the assumption that the data followed a normal distribution. In instances where the data failed to meet the assumptions of normality, Mann-Whitney U tests were employed as a non-parametric alternative, allowing for a robust comparison of the ranks of clinical competency and academic performance between the two groups. To delve deeper into the relationships between early clinical exposure and various academic and clinical outcomes, correlation analysis was performed. Specifically, Pearson's correlation coefficient was utilized to assess the strength and direction of relationships between:

- Early clinical exposure and clinical competency scores
- Early clinical exposure and academic performance (grades)

- Clinical competency scores and academic performance
- Early clinical exposure and students' self-reported confidence and preparedness for clinical practice (as indicated by survey responses)

For ordinal or non-parametric data, Spearman's rank correlation was applied, ensuring that the analysis was appropriately tailored to the nature of the data. To gain a deeper understanding of the impact of early clinical exposure while controlling for potential confounders, such as prior academic performance, socio-economic background, or study habits, multivariate regression models were employed. These models provided a means to assess the independent effect of early clinical exposure on clinical competency and academic performance, while adjusting for other variables that might influence the outcomes, thus offering a more nuanced analysis of the data. Finally, to explore whether multiple demographic factors such as age, gender, or previous academic background had a significant influence on clinical competence and academic performance, Analysis of Variance was conducted. This analysis helped determine if specific subgroup differences existed within the ECE and traditional groups, based on these characteristics, thereby providing a more comprehensive understanding of the factors that may contribute to variations in learning outcomes.

RESULTS

[Table 1] provided an overview of the fundamental attributes of the study participants, which included age, gender, and prior academic performance. It listed 100 first-year MBBS students, detailing their individual ages, which ranged between 18 and 25 years, reflecting a typical age group for this cohort. The gender distribution was also captured, ensuring that both male and female students were represented, with a balance between the two. The Prior Academic Performance column reflected the students' previous academic achievements, typically presented as percentage scores. This factor was crucial in understanding how prior academic performance could potentially influence engagement and outcomes in medical education. The variation in prior academic performance served as a key baseline for comparing how Early Clinical Exposure impacted students across different academic backgrounds.

Table 1: Demographic Characteristics.

Student	Age	Gender	Prior Academic Performance
1	22	Male	91
2	20	Female	86
3	24	Male	82
4	21	Female	75
5	23	Male	77
...
100	22	Female	78

[Table 2] displayed the results from the Objective Structured Clinical Examinations, a central method used in the study to assess the clinical competencies of students. The OSCE scores, which ranged from 60 to 90, represented the students' abilities to perform essential clinical skills, such as patient interaction, diagnostic reasoning, history-taking, and physical examination. The table included scores from both groups: those who underwent Early Clinical Exposure (ECE) and those who followed

the traditional curriculum. These results enabled a direct comparison of clinical competency between the two groups. The variation in scores offered valuable insight into whether early exposure to clinical environments enhanced students' practical skills and their preparedness for clinical practice. Moreover, the scores provided a measure of how well ECE facilitated the development of clinical competencies during the first year of medical education.

Table 2: Clinical Competency Scores (OSCEs)

Student	OSCE_Score
1	84.5
2	71.2
3	76.8
4	72.1
5	79.0
...	...
100	80.5

[Table 3] summarized the students' grades in core subjects, including anatomy, physiology, biochemistry, and integrated medical knowledge assessments. These grades served as a primary measure of academic success and understanding of theoretical concepts critical to medical education. The grades for students in both the ECE and traditional groups were compared to evaluate whether early clinical exposure had an impact on

academic performance. These grades reflected how well students understood and applied their medical knowledge in examinations, thus providing insight into whether ECE improved academic outcomes. The table also provided an overall picture of the academic achievements of students across both groups, helping to identify if ECE resulted in significant differences in academic performance in the first year of medical school.

Table 3: Academic Performance (Grades)

Student	Grade
1	78.6
2	81.2
3	85.4
4	83.3
5	79.1
...	...
100	80.4

[Table 4] included responses from students regarding their educational experience, as assessed via a Likert scale ranging from 1 to 5. The table measured five key factors: motivation, confidence, relevance of early clinical exposure, preparedness for clinical work, and empathy. The motivation and engagement with the curriculum were crucial for understanding whether early exposure to clinical environments fostered greater interest and enthusiasm in medical studies. The confidence column reflected how capable students felt in their clinical skills after exposure to clinical settings. The relevance of early clinical exposure gauged how well students believed their early exposure connected with their academic learning. Preparedness evaluated how ready students felt for future clinical work, while empathy measured the extent to which students felt connected to their patients. These responses provided qualitative insights into how early clinical exposure shaped students' attitudes toward patient care and their readiness for the medical profession.

Table 4: Survey Results

Student_ID	Motivation	Confidence	Relevance	Preparedness	Empathy
1	4	3	5	4	4
2	5	4	4	3	3
3	3	5	4	5	5
4	4	4	4	4	4
5	5	3	5	3	4
...
100	4	3	5	4	5

[Table 5] tracked the number of clinical rotations or clinical exposure activities that students attended

during their first year. This table was essential for understanding the degree to which students in the

Early Clinical Exposure (ECE) group had exposure to clinical environments. For the traditional group, this column showed little or no clinical exposure during the first year, as clinical rotations typically began in the later years of the program. The number of clinical rotations attended provided a quantitative

measure of the extent to which students were exposed to clinical practice. This data was integral for understanding the relationship between clinical exposure and the development of clinical competence, as well as other learning outcomes, within the ECE and traditional groups.

Table 5: Clinical Exposure Attendance

Student	ClinicalRotationsAttended
1	12
2	15
3	10
4	18
5	13
...	...
100	16

[Table 6] presented the relationships between key variables measured in the study, specifically focusing on the correlation between early clinical exposure and clinical competencies, academic performance, and students' self-reported confidence and preparedness for clinical work. The Pearson correlation coefficients for various pairs of variables were provided. For example, the correlation between Early Clinical Exposure and OSCE scores was 0.45, indicating a moderate positive relationship, meaning that students who underwent early clinical exposure generally performed better in clinical competency assessments. Similarly, the correlation between Early Clinical Exposure and academic performance was 0.52, suggesting that

early clinical exposure positively influenced academic outcomes. Other correlations, such as those between clinical competency and grades (0.60) and between early clinical exposure and confidence (0.48), indicated that early exposure had a positive impact on a wide range of academic and clinical outcomes. The correlation with preparedness for clinical work (0.55) reinforced the idea that early exposure helped students feel more prepared for their clinical careers. These correlations provided insights into how early clinical exposure contributed to enhancing both technical skills and students' overall readiness for the medical profession.

Table 6: Correlation Analysis Results

Variable_1	PearsonCorrelation
Early Clinical Exposure vs OSCE	0.45
Early Clinical Exposure vs Grades	0.52
OSCE vs Grades	0.60
Early Clinical Exposure vs Confidence	0.48
Early Clinical Exposure vs Preparedness	0.55

DISCUSSION

This study sought to evaluate the impact of Early Clinical Exposure on first-year MBBS students, with a particular focus on clinical competencies, academic performance, and students' perceptions of their learning experience. The results suggested that ECE had a positive influence on clinical skills and academic outcomes. Students who underwent early exposure to clinical environments achieved higher scores in Objective Structured Clinical Examinations, which assessed essential clinical skills such as patient interaction, history taking, and diagnostic reasoning. Additionally, these students performed better in academic assessments, indicating that early exposure not only enhanced clinical competencies but also contributed to improved understanding and application of theoretical knowledge. These findings aligned with those of previous studies that have explored the benefits of integrating clinical exposure into the early stages of medical education.

For example, studies by Kerle and Tayade&Lattihad highlighted the positive effects of ECE on medical students' clinical skills, demonstrating that early exposure allowed students to appreciate the relevance of their academic studies in real-world scenarios, thus increasing their motivation and engagement.^[9,10] Similarly, Ottenheijm et al., reported that early clinical exposure helped students develop essential patient-care skills and provided them with a stronger sense of preparedness for clinical rotations.^[11] These results corresponded with the findings of the current study, where ECE students not only demonstrated enhanced clinical skills but also reported higher levels of confidence and a greater sense of preparedness for future clinical work.

Furthermore, the positive correlation between ECE and self-reported measures of motivation, empathy, and preparedness in this study supported the notion that early exposure to clinical environments fosters a deeper emotional connection with patient care. Previous research, including that of Littlewood et

al., emphasized the role of ECE in cultivating empathy and patient-centered attitudes in medical students.^[12] By engaging with real patients early on, students gained a more nuanced understanding of patient care, which, as this study suggested, may have enhanced both their clinical competencies and interpersonal skills.

Despite the positive outcomes, there were challenges associated with early clinical exposure that merited attention. One concern highlighted by previous research, including Verma was the potential for overwhelming first-year students who were still adapting to the academic rigors of medical school.^[13] While this study's results indicated that students found the early exposure enriching rather than burdensome, further studies were needed to explore how to structure ECE programs in ways that avoid overloading students, ensuring that they do not feel overwhelmed by the demands of both academic coursework and clinical practice.

The findings from this study also reinforced the importance of structuring early clinical exposure in a thoughtful and supportive manner. For students to benefit fully, ECE should not merely involve passive observation but also allow for active participation and regular feedback from clinical mentors. This approach was consistent with the recommendations of Yu et al., who had suggested that well-organized ECE programs, coupled with mentoring and reflective practices, tend to yield the best outcomes in terms of both clinical competence and academic success.^[14]

In comparing students who underwent ECE with those who followed the traditional curriculum, this study contributed to the ongoing debate about the evolution of medical education. While the traditional model, which postpones clinical exposure until later years, remains the standard in many medical schools, the findings from this study, in conjunction with previous research, suggested that introducing clinical exposure earlier in the curriculum can provide significant benefits. As Başak et al., had argued, the traditional approach risks delaying the development of key clinical skills and creating a disconnect between theoretical knowledge and its practical application.^[15] This study's results seem to confirm that early clinical exposure bridged this gap by enabling students to apply their theoretical knowledge in real-world contexts from the outset.

CONCLUSION

This study provided compelling evidence that Early Clinical Exposure significantly enhanced clinical competency, academic performance, and students' perceptions of their readiness for clinical practice. By integrating real-world clinical experiences into

the first year, medical schools can foster greater motivation, engagement, and empathy, ultimately better preparing students for their clinical careers. These findings were consistent with the broader body of literature advocating for a more integrated approach to medical education, blending foundational knowledge with practical experience. Future research should focus on optimizing the structure of ECE programs to maximize their benefits while ensuring that students are not overwhelmed by early exposure.

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