



## EDUCATIONAL ENVIRONMENT; MEDICAL STUDENTS' PERCEPTIONS OF THE EDUCATIONAL ENVIRONMENT IN THE SURGICAL THEATER

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**ABSTRACT... Objectives:** To measure the perceptions of medical students on the learning environment in surgical theater of FMH College of Medicine and Dentistry, Lahore, Pakistan. **Study Design:** Teaching hospital-based cross-sectional study. **Setting:** Fatima Memorial Hospital College of Medicine and Dentistry, Lahore, Pakistan. **Period:** January 2017 to June 2017. **Methods:** The Mini-Surgical Theater Educational Environment Measure (mini-STEEM) (thirteen items from the STEEM inventory) was used to measure perceptions of medical students on the learning environment in surgical theater. Mini-STEEM was administered to medical students of fourth and final year during their rotation in surgical theater at FMH College of Medicine and Dentistry. Social Sciences (SPSS) Version 20 was used for non-parametric statistical analysis. **Results:** Questionnaire was filled by all 134 students, with a response rate of 100%. The mini-STEEM was shown to be a reliable tool to measure overall learning environment in the surgical theater of FMH College of Medicine and Dentistry. The overall mini-STEEM mean score was 37.66 which was below the midpoint score (39). Students' ratings were low for two subscales, namely: 'Atmosphere' and 'Operating experience. Discrimination subscale showed high ratings as no significant differences of perceptions were found between male and female participants. **Conclusion:** The medical undergraduates perceived the educational environment within the surgical theater of FMH College of Medicine and Dentistry below satisfactory. Results of the study implied that the environment required multiple measures for improvement in the surgical theater to promote surgical education in undergraduate medical students.

**Key words:** Educational Environment, Medical Students, Surgical Theatre.

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## INTRODUCTION

Educational environment is an interactive network of forces playing an important role in producing positive outcomes of the curriculum related to teaching, learning and students' achievement.<sup>1</sup> It is considered as the main component of high quality medical education<sup>2</sup>, because it enables educators to strengthen the well-being and emotional development of students, and establishes good modeling of their professional role. Effective management of teaching and learning is influenced by understanding different factors of educational environment and adopting suitable changes and remedies wherever required.<sup>3</sup>

Several researches have been done and multiple educational environment instruments were

developed to investigate the perceptions of students on their learning environment. These are Dundee Ready Education Environment Measure (DREEM)<sup>4</sup>, Anesthetic Theatre Education Environment Measure (ATEEM)<sup>5</sup>, Postgraduate Hospital Educational Environment Measure (PHEEM)<sup>6</sup>, Operating Room Educational Environment Measure (OREEM)<sup>7</sup> and Surgical Theater Educational Environment Measure (STEEM). "STEEM" is a validated 40 item questionnaire that measures the learning environment in surgical theatre.<sup>8</sup>

Surgical theater is a challenging place where medical students feel pressurized and stressed<sup>9</sup>, because of the serious implications on patient safety.<sup>10</sup> The key strategies for learning in surgical theater include: mentorship, observation

and hands-on training. Therefore, roles of all participants are very crucial to make the surgical theater a desirable place for learning.<sup>15</sup>

Perceptions of medical students identify strengths and weaknesses of the educational environment in surgical theater and indicate the key variables that make an ideal learning environment for them.<sup>11</sup> Learning in surgical theater is important for students, not only for those who wish to become surgeons, but also for those who are not inclined towards surgery, because in many specialties (such as: family medicine), graduates still have to deal with general surgery. Educational environment in surgical theater influences medical students to choose surgery as a career or not.<sup>12</sup> Positive environment in surgical theater also promotes patient safety by reducing the number of medical errors.<sup>10</sup>

Many studies have been done around the world to explore the factors of educational environment in educational settings. However, there is limited literature available in Pakistan about medical students' perceptions of the educational environment in surgical theater. Therefore, the objective of this study is to measure the perceptions of medical students on the learning environment in surgical theaters of Pakistan.

### Context

The purpose of this study was to measure the perceptions of medical students of the learning environment in surgical theater of Fatima Memorial Hospital College of Medicine and Dentistry, Lahore, Pakistan. This study was directed by the following research question: What are medical students perceptions of the learning environment in surgical theater of Fatima Memorial Hospital College of Medicine and Dentistry, Lahore, Pakistan? This part describes the study design, sample, survey instrument and analysis.

## METHODS

### Study Design

Using a non-experimental, cross sectional design, a survey was used to measure the dependent variable of medical students' perception of the educational environment in the surgical theater.

### Setting

The setting for the study was a teaching hospital of Fatima Memorial Hospital College of Medicine and Dentistry. Fatima Memorial Hospital College of Medicine and Dentistry was established in 2001 as a private college of medicine and dentistry in Lahore, Pakistan.

### Sample

Census sampling was used.

### Inclusion Criteria

The study population included fourth and final year medical students, who finished the academic segment and began training in hospitals.

### Exclusion Criteria

All first, second and third year medical students did not participate because they had not started clinical training in hospitals.

### Instrument Used

STEEM questionnaire was a reliable and valid instrument for measuring medical students' perceptions of their learning environment in surgical theater. Cronbach alpha calculated for the used questionnaire by the developer was 0.86.<sup>8</sup> Exploratory factor analysis of STEEM questionnaire's results was done by Nagraj et al. In their study 13 factors were recognized which covered 73.2% of the variation. On the other hand 4 factors were recognized in "STEEM" inventory by Cassar, which in the study for undergraduates would only encompass 41.2% of the variance. These 13 factors were utilized to modify 40 items inventory into 13 items questionnaire, called 'mini-STEEM' questionnaire. It was a reliable, practical and valid instrument specifically designed to assess the learning environment in the surgical theater for undergraduate medical students.<sup>13</sup> (Labelling of three subscales shown in the following table.

The scoring for the subscales of this questionnaire are shown below:

Good surgical operating experience  $5 \times 5 = 25$  maximum

Friendly atmosphere in theater  $4 \times 5 = 20$  maximum

Discrimination against me  $3 \times 5 = 15$  maximum

Subscale 1	Good surgical operating experience Q4, Q5, Q6, Q7 & Q12
Subscale 2	Friendly atmosphere in theatre Q1, Q2, Q3 & Q14
Subscale 3	Discrimination against me Q9, Q10 & Q11

### Ethical Approval

The study proposal received approval from Fatima Memorial Hospital College of Medicine and Dentistry's ethical committee. After taking permission from the author Kevin Cassar, thirteen questions from "STEEM" Questionnaire were used to measure the perceptions of medical students on educational environment in surgical theater.<sup>8</sup>

### Procedure

The questionnaire was distributed to participants during their surgical rotation at Fatima Memorial Hospital College of Medicine and Dentistry. Questionnaire was distributed to 134 undergraduate medical students. Written consent was taken from the students before the survey. The survey was anonymous as students were asked to complete the questionnaire without indicating their names. Demographic questions 'participant's sex' and 'educational level' (year in medical college) were included in questionnaire. The mini-STEEM questionnaire consisted of 13 statements from STEEM questionnaire.<sup>13</sup> Students returned their responses within 5 minutes.

### Data Analysis

Five-point Likert scale was used for the responses on items. With 5 being "Strongly Agree" (SA), 4 "Agree" (A), 3 "Unsure" (U), 2 "Disagree" (D), or 1 being "Strongly Disagree" For items (11, 13-18, 25), the scoring was reversed ranging from 1 (strongly agreed) to 5 (strongly disagreed). The scale was reversed for statements<sup>8,9,10,11</sup> and 12 so that for all items: the greater the marks the greater the indication of positivity of perception. This suggests that the total maximum marks of mini-STEEM was 65 and least possible score was 13.

Total marks of 39 out of 65 would show a neutral perceptions, score >39 would show a more satisfactory learning environment, while score <39 would show a less than satisfactory educational environment. The three subscales,

'good surgical operating experience, friendly atmosphere in theatre and discrimination against me' were used for the general testing of outcomes of mini-STEEM to identify areas of strength and weakness within a surgical theater. The data was then entered in Statistical Package for the Social Science (SPSS) 20 and descriptive statistics were used for the mean, lowest and highest scores and standard deviation. The internal reliability of the questionnaire was calculated by using Cronbach's Alpha test. Mann-Whitney test was used to assess any significant gender differences among students.

### RESULT

134 students (100%) completed the questionnaire yielding a 100% response rate. There were 95 (70.9%) females and 39 (29.1%) males. Cronbach alpha calculated for the complete questionnaire was 0.70. It was an acceptable value. Discrimination domain gained maximum score. After reverse coding, the items regarding the discrimination due to race scored highest marks showing that participants did not notice any racism in the operating theater. The scores for the 13 items are shown in Table-I. The total mean of the inventory was 37.66 out of 65 for the 13 items mini-STEEM which was below 39. The standard deviation was 6.1 so the environment of surgical theater was a little below satisfactory level but within half standard deviation.

The highest percentage score was given to the "discrimination against me" subscale 74.63%, followed by the "good surgical operating experience" subscale which gained 57.84%, whereas "friendly atmosphere in theatre" obtained minimum percentage of 45.60%. The mean overall score of the whole group was 57.94%.

### DISCUSSION

Comparison Between the Current Study and Nagraj et al. 2006 Study<sup>14</sup>

Question number and theme of each question	N	Min	Max	Mean	Std. Deviation
Q1 - Enthusiastic trainer	134	1	5	1.96	0.862
Q2 - Theatre staff friendly	134	1	5	2.10	0.816
Q3 - Enough theatre sessions for getting experience	134	1	5	2.84	1.098
Q4 - Before operation – trainer discusses surgical technique	134	1	5	2.53	0.979
Q5 - Elective operating list has right case mix	134	1	4	2.38	0.764
Q6 - Good variety of emergency cases	134	1	5	2.85	1.134
Q7 - Enough opportunity to assist	134	1	5	3.16	1.138
Q8 - Operations too complex for my level*	134	1	5	3.14	1.020
Q9 - Anesthetists put pressure on for trainer to operate*	134	1	5	3.31	0.945
Q10 - Discrimination in theatre because of my sex*	134	1	5	3.87	1.100
Q11 - Discrimination in theatre because of my race*	134	1	5	4.01	1.007
Q12 - Too busy doing other work to go to theatre*	134	1	5	3.28	1.186
Q13 - Pleasant atmosphere in theatre	134	1	5	2.22	0.904
Overall scores for all 13 questions	134	13	54	37.66	6.100

**Table-I. Scores for each of the 13 questions and overall score for the mini-STEEM Items with \* were reverse coded items**

Variable	Nagraj et al. 2006	Current Study
Sample Size	99	134
Response Rate	100%	100%
Male: Female Ratio	1:1.8	1:2.4
Overall mini-STEEM Mean Score	45	37.66
Overall % Score	69.23%	57.94%
Overall Cronbach Alpha Coefficient	0.80	0.70
Gender Significant Differences	No significant statistical gender differences	No significant statistical gender differences
Target groups	final year medical students	fourth and final year medical students
Items used	13 items from original "STEEM" questionnaire	13 items from original "STEEM" questionnaire
Institution	a UK medical college	a Pakistani medical college

**Table-II. Comparison of mini-STEEM scores at FMHCMD (Current Study) and Nagraj et al. 2006 study**

Table-I shows comparison between the current study and Nagraj et al. 2006 study. This study had a larger sample size than the sample size reported in the Nagraj's study. The response rate was 100% in both the studies. The reliability of questionnaire in the current study (Cronbach alpha coefficient = 0.70) was an acceptable value but lesser than the Nagraj study (Cronbach alpha coefficient = 0.80), which shows a good reliability.

As discussed previously, surgical theater is a challenging place where medical students feel pressurized and stressed in its environment.<sup>15</sup> Positive environment of surgical theater promotes patient safety and encourages medical students to pursue surgery as a career.<sup>12</sup> However, in the current study, educational environment in the surgical theater has presented to be less

satisfactory with total score of 37.66 out of 65. This is different from the total score seen in Nagraj's study of 45 out of 65<sup>13</sup>, in which students indicated positive attitude towards surgery and surgical role models. In the current study, we found that the participants were not satisfied with the enthusiasm of their surgical trainers during teaching. Students scored lowest in the item regarding the enthusiasm of teachers related with the atmosphere of surgical theatre. Surgical educators have to combine their responsibilities of teaching and delivery of safe health care to patients. It is difficult to keep balance between these important tasks and this could be the reason of scoring less in this item. The other three items of this subscale also scored less than 3 (below midpoint) indicating less satisfactory and friendly atmosphere in theater. Our current

study revealed that the main problematic areas for the medical students in the surgical theater of Fatima Memorial Hospital College of Medicine and Dentistry are the atmosphere and operating experience. Due to insufficient sessions in surgical theaters, students are not getting enough experience and opportunities to interact with the surgical role models.<sup>16</sup> This limited interaction and communication between consultant, students and other personnel can be the cause of a less friendly atmosphere.<sup>17</sup>

Surgical theater is a place where patients' needs are priority and patient care is non-negotiable as compared to students' needs. There are many challenges facing the surgical consultants for their role as a teacher like shortage of time, balancing other responsibilities of service and administration against teaching. These challenges combined with fatigue or excessive workload of surgical trainers due to their duty hour restrictions and heightened sense of public accountability may be the reasons for less satisfactory environment.<sup>18</sup>

In Nagraj's study, all four items of the subscale 2 (Friendly atmosphere in theater) scored above the midpoint 3 indicating satisfactory and friendly atmosphere in theater.

Comparison between the replies showed major differences in the perceived learning environment, a finding which is different from Nagraj's study but in accord with the finding of Lyon.<sup>15</sup> Like Nagraj (2007) in the current study, there were no gender-based differences in the total scores or regarding any specific question on the questionnaire.

Based on the findings, following are the implications:

Provide good quality of surgical education by giving exposure to good educators acting as surgical role models in the initial years of medical training.<sup>9</sup>

Medical students should be treated as adult learners. Make them motivated and enthusiastic by teaching them relevant procedures based on

their previous experience, actively involve them and focus on problems.

Learning should be based on cycles of action, reflection and feedback. Mutual respect is also a very critical element for the ideal atmosphere in surgical theaters.<sup>19</sup>

Basic training should be provided to surgical trainers. Teacher training courses are very important to improve teaching skills and to deliver the best surgical teaching for the benefit of the students.<sup>19,20</sup>

Formal mentoring, reward and compensation should be considered for encouraging surgical trainers to be good educators in surgical education.<sup>17</sup> An award can be presented to surgical educator or supervisor from the hospital for his/her exceptional contribution toward supporting students to achieve their goals. This award can be judged on few standardized criteria: Demonstration of curriculum goals, role modeling as supervisor, involvement in training and teaching of medical students and understanding of surgical teaching and training to students. The limitation of this study is that it's a cross-sectional study performed in only one private medical school of Pakistan. It is required to repeat the present study for undergraduate medical students in different medical colleges of Pakistan to draw the big picture of medical students towards environment of surgical theater.

## CONCLUSION

This study has revealed that The Mini-Surgical Theater Educational Environment Measure (13 items questionnaire) is a reliable diagnostic tool to measure the educational environment of the surgical theater for medical students. The medical students were not satisfied with the overall learning environment of the surgical theatre especially towards atmosphere and operating experience in theater. The results indicate that a lot of factors can be improved. Accordingly, it is recommended that atmosphere and operating experience should be improved in the surgical theater by giving exposure to surgical role models, teaching the surgical teachers, recognizing medical students

as adult learners and providing formal mentoring in order to develop good surgical skills. This study could be used to improve the educational environment of the surgical theater in Pakistani context.

### Conflict of interest

There is no conflict of interest among authors.

### Author's Contribution

RK searched the literature and made the design of study, wrote the initial and final draft. MAE helped in designing of study and research methodology, review the initial and final draft. FI helped in collecting and reviewing data. KMA coded and entered the data in SPSS, proposed the appropriate statistical tests, analyzed the data and wrote the statistical report of results.

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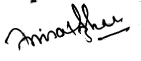
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*Let your dreams be bigger than your fears and your actions be louder than your words.*

– Unknown –

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**AUTHORSHIP AND CONTRIBUTION DECLARATION**

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Rizwana Kamran	RK searched the literature and made the design of study, Collected the data, Wrote the initial and final drafts.	
2	Mohamed Al-Eraky	MAE and FI helped in designing of study and research methodology, review the initial and final drafts.	
3	Faisal Izhaar	MAE and FI helped in designing of study and research methodology, review the initial and final drafts.	
4	Khalid Mahmood Anjum	KMA coded and entered the data in SPSS, proposed the appropriate statistical tests, Analyzed the data and wrote the statistical report of results.	