Brief report

The role of operating room educational climate in the moral distress of operating room technology students: A cross-sectional study

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Abstract

Background & Objective: The learning environment plays a vital role in shaping a student's academic success and overall satisfaction. In this study, we aimed to evaluate the impact of the educational climate in the Operating Room (OR) on the moral distress experienced by operating room technology students.

Material & Methods: In 2022, we conducted a descriptive-analytical study on 58 undergraduate operating room technology students from North Khorasan University of Medical Sciences. We utilized purposeful sampling in the form of a census from qualified academic departments. To collect information, we used three questionnaires: one for demographic information, one for IMOTEC, and one for moral distress. We analyzed the data using independent t-tests, one-way analysis of variance, and Pearson's correlation coefficient, as well as multiple linear regression analysis at a 95% confidence level using SPSS 26 software.

Results: The mean score for the OR educational climate was 71.14 ± 12.01. The rate of moral distress was measured in severity and frequency dimensions, with scores of 1.87 ± 1.08 and 1.79 ± 0.94, respectively. We found a significant inverse relationship between the mean of the educational environment and the severity ($p < 0.001$) and frequency ($p < 0.05$) of moral distress.

Conclusion: Given that the educational climate is one of the key factors affecting moral distress, it appears that enhancing the educational climate in the OR environment can play a significant role in reducing the moral distress experienced by students.

Keywords: educational environment, moral distress, ethical distress, operating room technology students, educational climate

Introduction

Education is an ongoing process that is developed through personal activity and experience in various situations. It is best fostered in a supportive and facilitating learning environment (1, 2). The educational setting and climate are crucial tools that have a significant impact on students' satisfaction and academic success (3), enabling them to behave and act appropriately in different scenarios and thus playing an essential role in their future careers (1).

Clinical learning is a critical and fundamental component of education in all medical science disciplines and plays an integral role in developing professional abilities in students. The primary objective of clinical education is to prepare students to perform clinical skills in diverse medical care conditions and provide a suitable platform for empowering them to apply their knowledge, attitude, and skills in clinical scenarios, ultimately leading to clinical competence (4-6).

As an inseparable and vital component of clinical education, the clinical setting plays a crucial role in achieving this goal, as a significant portion of teaching and learning occurs in this environment (7, 8). The operating room is also a suitable clinical setting that provides valuable opportunities for students to coordinate and integrate their theoretical and practical knowledge. They can develop and improve their clinical skills related to care before, during, and after surgery by

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practicing and repeating them in various areas, thereby increasing their skills in various ways (9).

Measuring the satisfaction level of trainees with the learning environment is crucial in identifying the characteristics of the training place and associated threats to the growth and progress of trainees (10). According to student reports, the firm and stressful nature of the OR (7, 11) has been one of the limitations of their learning, and they have experienced suboptimal learning situations (6).

Integrating theoretical and practical knowledge with the role of the educational environment, particularly the clinical education setting, is essential for students. Therefore, effective measures should be taken to improve and strengthen the educational environment, particularly the clinical education setting, to increase interest, improve productivity, and train specialist personnel (4). Quantitative and qualitative measurement of the clinical education setting plays a crucial role in defining and assessing colleges, identifying the strengths and weaknesses of educational programs, controlling behavior, surveying the standpoints of students, professors, and staff, and creating and improving a favorable educational environment within colleges and the clinical environment (9). It is also a significant indicator for predicting educational outcomes (12).

Moral distress occurs when a person knows what the right action should be, but a set of factors and obstacles convince them that doing the right thing is impossible. They are directed on a path that is contrary to ethical and professional values, undermining their health and integrity of mind (13, 14). Moral distress in educational environments can have many effects. Students in this condition will feel insecure and dissatisfied, and academic failure and school dropout rates will increase. The declining educational quality in these circumstances can lead to the clinical inadequacy of students and jeopardize the performance of the health system in achieving health goals (12).

Moral distress is not limited to clinical environments and can occur in educational settings. Factors such as violence against or between students, cheating and fraud, plagiarism, intimidation among students, incorrect common standards in the university, as well as cultural and professional matters, have undermined the ethical authenticity of educational environments and created conditions for moral distress in the training setting (15, 16).

The operating room is one of the most complex and specialized clinical departments that requires a high level of technology, knowledge, and expertise (17). It plays a significant role in building students' abilities to acquire clinical skills and competencies for their future careers. To improve and strengthen the educational environment, especially the clinical education setting, effective measures should be taken to enhance the clinical environment and reduce the moral distress of students, ultimately increasing interest, improving efficiency, and training specialist staff. Given the challenges that students face in achieving their goals, this study aims to measure and evaluate the OR educational environment in teaching hospitals at North Khorasan University of Medical Sciences and its relationship with students' moral distress to obtain basic information for the aforementioned purposes.

Material & Methods

Design and setting(s)

This descriptive study utilized a correlational cross-sectional design to evaluate the OR educational climate and its relationship with the moral distress of OR technology students at North Khorasan University of Medical Sciences during the academic year 2021–22.

Participants and sampling

The population of the study consisted of undergraduate students from the OR technology department of North Khorasan University of Medical Sciences. We utilized purposeful sampling and collected information from qualified academic departments in the form of a census (58 individuals). Inclusion in the study required passing at least one training unit in OR, and freshmen were excluded from the sampling since it was done in the second semester of the academic year. Guest or transfer students from other universities were also excluded from the study. We conducted this study after receiving the ethics code from North Khorasan University of Medical Sciences (IR.NKUMS.REC.1400.136) and obtaining informed consent from the students.

Tools/Instruments

The study utilized three questionnaires to collect information from the undergraduate OR technology students:

1. Demographic information questionnaire: This questionnaire includes questions about age, gender, marital status, academic semester, and grade point average.

2. Iranian Measure of Operating Theater Educational Climate (IMOTEC): This version of the questionnaire was customized by Karami et al. in 2017 for OR

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technology students in Iran and Alborz Medical Sciences Universities. We used exploratory factor analysis to make sure the tool was valid for its intended purpose and Cronbach's alpha and the intra-cluster correlation coefficient to check how reliable it was. Content validity was examined using the content validity ratio and content validity index. The STEEM questionnaire has five domains and 30 items that cover 55.6% of the total variance. The five domains are coaching (14 items), interaction with OR staff (5 items), learning opportunities (5 items), workload (3 items), and support (3 items). The items are answered using a five-point Likert scale ranging from 0 to 4. The scoring method is very unfavorable (0–29.9), unfavorable (30–59.9), favorable (60–89.9), and very favorable (90–120). Questions 11, 14, 17, 19, 24, 25, 27, and 28 have a negative meaning, and scoring is calculated in reverse.

3. Moral distress questionnaire: This questionnaire was developed by Somayeh Mohammadi and includes 20 questions in three areas: educational delinquency (5 questions), violence (7 questions), and educational deception (8 questions). The scoring is based on two dimensions: severity (0–5) and frequency (0–5), using a Likert scale ranging from very low to very high and never to frequently, respectively. The Content Validity Index (CVI) is 80%, and the reliability was measured using Cronbach's alpha (86% with a sample size of 30 students). The re-reliability of the domains of the moral distress questionnaire (in severity and frequency dimensions) was calculated using Cronbach's alpha in this study (Table 1).

Table 1. Reliability of moral distress questionnaire domains

Questionnaire domains	Severity dimension	Frequency dimension
Educational delinquency	0.82	0.75
Violence	0.90	0.90
Educational deception	0.95	0.90

Note: Cronbach's alpha coefficient was used to assess the internal consistency reliability of the moral distress questionnaire domains.

Data collection methods

The students completed the questionnaires in person, and a member of the research team distributed and collected the questionnaires to reduce the influence of intervening factors in completing the self-report questionnaire. The researcher provided necessary explanations to the students regarding the confidentiality of the information and non-judgment to encourage honest responses.

Data analysis

The collected data was analyzed using SPSS software (version 26). The normality of the data distribution was checked using the Kolmogorov-Smirnov test. If the data was normally distributed, parametric tests such as Pearson's correlation, independent t-test, and one-way ANOVA were used, and Bonferroni's post-hoc test was used for pairwise comparisons. If the normality assumption was not met, non-parametric tests such as Spearman's correlation test were employed. Multiple linear regression analysis was used to investigate the relationship between the studied variables while controlling for the effects of other variables. The significance level was set at $p < 0.05$.

Results

In the present study, 58 OR technology students with an age range of 20–24 years participated. The majority of the subjects were female and single. Since the students did not answer the average question, it was not possible to check this variable. The average score for the OR educational climate was 71.14 ± 12.01, and the highest score was related to the coaching domain. The severity and frequency of moral distress were reported as 1.85 ± 1.03 and 1.79 ± 0.94, respectively. In both dimensions of moral distress, the highest score was related to educational misconduct. Descriptive statistics for the studied variables are presented in Table 2.

According to the Pearson's correlation test results (Table 3), there was a significant inverse correlation between the severity of moral distress and the educational setting ($p < 0.001$), and there was also a significant inverse correlation between the frequency of moral distress and the educational climate ($p = 0.004$).

According to the results presented in Table 4, the average score of the educational climate was lower in males than females, and this difference was statistically significant ($p = 0.040$). In addition, there was a significant difference between the mean severity and frequency of moral distress and the educational climate among fifth- and seventh-semester students. No statistically significant relationship was observed between the educational climate and moral distress (severity and frequency) and the age variable (Table 5).

Based on the results of multiple linear regression analysis (Table 6), it was found that, after controlling for the effect of other variables, the academic semester variable had a significant impact on the severity of moral distress experienced by students. Specifically, the average score

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of moral distress severity was found to be 15.362 units higher in seventh semester students compared to fifth semester students ($p = 0.003$, $\beta = 15.362$). Additionally, after controlling for the effects of gender and academic year variables, it was found that the educational climate variable had a significant impact on the severity of moral distress experienced by students. Specifically, a one-unit increase in the score of educational climate was found to result in an average decrease of 0.365 points in the score of students' moral distress severity ($p = 0.034$, $\beta = -0.365$).

Based on the results obtained from multiple linear regression analysis (Table 7), it was found that, after controlling for the effect of other variables, the academic semester variable had a significant impact on the frequency of moral distress experienced by students. Specifically, the average score of frequency was found to be 9.594 units higher in seventh semester students compared to fifth semester students ($p = 0.043$, $\beta = 9.594$). However, after controlling for the effect of gender and academic year variables, it was found that the educational climate variable did not have a significant impact on the frequency of moral distress experienced by students ($p = 0.067$).

Table 2. Descriptive indices of the studied variables

Variables	Descriptive statistics
Age, Mean (SD)	21.64 (1.05)
Gender, Frequency (%)	
Female	39 (67.2)
Male	19 (32.8)
Marital status, Frequency (%)	
Single	55 (96.5)
Married	2 (3.5)
Semester, Frequency (%)	
3	21 (36.2)
5	21 (36.2)
7	16 (27.6)
Distress. Severity, Mean (SD)	1.85 (1.03)
Domain 1	1.22 (0.67)
Domain 2	1.14 (0.41)
Domain 3	1.74 (1.04)
Distress. Frequency, Mean (SD)	1.79 (0.94)
Domain 1	0.29 (0.69)
Domain 2	10.7 (0.79)
Domain 3	1.66 (0.97)
Educational Climate, Mean (SD)	71.14 (12.01)
Domain 1	2.75 (0.68)
Domain 2	2.17 (0.71)
Domain 3	1.8 (0.62)
Domain 4	1.89 (0.88)
Domain 5	2.42 (0.58)

Abbreviation: SD, standard deviation

Table 3. Relationship between educational climate and moral distress

		Moral distress (severity)	Moral distress (Frequency)	Educational Climate
Moral distress (severity)	Pearson Correlation	1	0.900**	-0.439**
	p-value		< 0.001	0.001
Moral distress (Frequency)	Pearson Correlation	0.900**	1	-0.377**
	p-value	< 0.001		0.004

Note: Pearson's correlation test was used to analyze the relationship between educational climate and moral distress.
Abbreviations: p-value, probability value indicating the significance level of the correlation coefficient.
** indicates significance at the 0.01 level (2-tailed).

Table 4. The relationship between educational climate and moral distress (severity and frequency) with demographic variables

Variables		Moral distress (severity)	Moral distress (Frequency)	Educational climate
Gender	Female	26.51 ± 17.19	25.54 ± 14.63	73.39 ± 11.54
	Male	31.26 ± 13.82	29.63 ± 12.75	66.53 ± 11.91
€P-value		0.299	0.302	0.040
Semester	3	[a]23.52 ± 10.20	24.76 ± 11.06	72.81 ± 13.39
	5	[a]22.19 ± 12.03	[a]22.43 ± 12.06	[a]74.95 ± 7.97
	7	[b]41.75 ± 19.73	[b]35.50 ± 16.77	[b]63.94 ± 12.02
*p-value		< 0.001	0.011	0.013

Notes: Correlation is significant at the 0.01 level. Different letters (a, b) indicate significant difference using Bonferroni's post hoc test.
Abbreviations: SD, standard deviation; p-value: probability value for semester comparison.
€P-value: Probability value for gender comparison.

Table 5. Correlation between age, moral distress (severity), moral distress (frequency), and educational climate

	Age	Moral distress (severity)	Moral distress (Frequency)	Educational climate
Age	Correlation coefficient	1.000	0.166	0.257
	p-value	.	0.222	0.055

Note: Correlation is significant at the 0.05 level.
Abbreviations: p-value: probability value indicating the significance level of the correlation coefficient.

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Table 6. The results of multiple linear regression analysis for the moral distress (severity) response variable

Variables	B	Std. Error	p-value	95.0% Confidence Interval for B	
				Lower Bound	Upper Bound
Gender	1.304	3.977	0.744	-6.674	9.281
Semester 3	0.365	4.234	0.932	-8.127	8.858
Semester 5	Reference	-	-	-	-
Semester 7	15.362	4.850	0.003	5.634	25.089
Educational Climate	-0.365	0.168	0.034	-0.702	-0.028

Abbreviations: B, regression coefficient; Std. Error, Standard error of the coefficient; p-value, probability value indicating the significance level of the coefficient; Confidence Interval for B, range within which the true population parameter is estimated to lie with a certain level of confidence.

Table 7. The results of multiple linear regression analysis for the moral distress (frequency) response variable

Variables	B	Std. Error	p-value	95.0% Confidence Interval for B	
				Lower Bound	Upper Bound
Gender	1.341	3.786	0.725	-6.252	8.934
Semester 3	1.501	4.030	0.711	-6.583	9.585
Semester 5	Reference	-	-	-	-
Semester 7	9.594	4.617	0.043	0.335	18.854
Educational Climate	-0.299	0.160	0.067	-0.620	0.021

Abbreviations: B, regression coefficient; Std. Error, Standard error of the coefficient; p-value, probability value indicating the significance level of the coefficient; Confidence Interval for B, range within which the true population parameter is estimated to lie with a certain level of confidence.

Discussion

The purpose of this study was to investigate the relationship between the educational climate and moral distress among OR technology students. The results showed that as the students' view of the educational setting and climate improved, their moral distress decreased. It is worth mentioning that no research with the same title as this study was found among OR technology students in Iran. However, other studies have looked into the relationship between ethical climate and moral distress. For instance, in Shadfard's study, there was no significant correlation between the hospital's ethical climate from the students' perspective and their perceived stress levels (19).

In a study conducted by Esmaelzadeh, an inverse and significant relationship was found between the ethical climate of the operating room and the moral distress of the operating room staff, which is consistent with the present study. Other studies have also shown that favorable ethical climates lead to increased job satisfaction, organizational culture, commitment, and privacy among operating room staff (21–24). Moreover, a review study conducted among health care professionals revealed that positive perceptions of ethical climate were associated with increased job satisfaction, while negative perceptions were associated with increased moral distress (25). Similarly, in Atia and Abdelwahid's study among nurses, ethical work climate was positively correlated with moral courage and organizational citizenship behavior and negatively correlated with moral distress (26). However, Asgari et al.'s study contradicts the results of the present study, as they found no relationship between the ethical climate and the moral distress of the operating room staff (27).

The results of the current study indicate that the average score of the OR educational climate is good according to the IMOTEC questionnaire score range of 60–89.9. A similar study conducted by Ghiami Keshtgar et al. using the IMOTEC questionnaire to investigate the OR clinical training environment found that the OR educational climate was favorable, with the coaching domain receiving the highest scores, which is consistent with the present study. Interestingly, the findings of the present study showed that there was no significant difference between the viewpoints of male and female students regarding the OR educational climate. However, female students were found to consider the educational environment to be more favorable compared to male students (28).

In the study conducted by Soomro et al. using the STEEM questionnaire to assess surgical residents' understanding of the OR environment, the total score reported was favorable. However, unlike the present study, male residents considered the educational environment to be more appropriate than female students (29). Furthermore, in Mahoney et al.'s study investigating the satisfaction of Australian surgical trainees with learning in the OR using the same

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questionnaire, a majority of the trainees reported satisfaction with the OR environment. However, senior students were found to have higher satisfaction than junior students. Interestingly, in the present study, the viewpoints of last semester students were more negative than those of lower semester students (10). Al-Qahtani's study, "Evaluation of OR Educational Climate in a Teaching Hospital of Saudi University," looked at how medical interns saw the important parts of the OR learning environment in a medical school's teaching hospital. The overall evaluation of the OR learning environment was also internally consistent. However, there was a significant gender difference in understanding "learning opportunities" and "teaching and training," with women considering these subscales to be lower than men (30). In Talat et al.'s study, pediatric surgery residents had a good understanding of their training and supervisors, learning opportunities in the OR, OR space, and self-monitoring, while in Elebute et al.'s study, most surgical residents expressed dissatisfaction with the OR educational environment. (31, 32) Moreover, in Kamran's study, urology residents in Saudi Arabia considered the OR learning environment to be lower than ideal (33).

Among the studies conducted using the DREEM educational climate questionnaire, Faghani et al.'s research examined the educational climate from the perspective of all students from nursing, midwifery, and paramedical faculties. The results showed that the educational setting was optimal according to the calculated total score, with male students having a more positive view of the university's educational climate than female students (34). Similarly, in Nasiri Ziba et al.'s study, the average score of the total questionnaire of undergraduate OR students was reported to be within the desired range, with male students having a more positive view than female students. Interestingly, the perception of educational environment quality improved with increasing age among the different age groups studied in this research (35). In Fathi and Valiee's study, a majority of OR students reported that the educational environment was somewhat favorable (36). Moreover, in Zarei's study, students' overall perception of the clinical education atmosphere was relatively favorable. However, the lowest correlation was reported between students' perceptions of teachers and students' perceptions of the social conditions of education (37).

Among the studies conducted using the Ethical Climate Olson questionnaire, Abdollah Zadeh et al.'s research found that the majority of OR students had a negative view of the ethical climate in the OR, with the highest negative score being related to doctors. (8) Conversely, in Heshmati and Darwishpour's study, the ethical climate of the OR was reported as positive from the students' perspective. (38) However, in Sani Jahormi et al.'s study, the ethical climate of the OR and its domains were reported to be unfavorable from the perspective of all OR technology students. (7) Moreover, in Hannani et al.'s study using Victor's ethical climate questionnaire, the overall ethical climate score from the perspective of OR and anesthesiology students was reported to be lower than average (39).

According to the results of the present study, the domain of coaching had a stronger role in reducing the moral distress of students than other domains of the educational climate. Factors related to the instructor have been identified as one of the factors affecting students' learning in the operating room (40). In Afrazandeh et al.'s study, the results showed a positive attitude of students towards the domain of teachers, which was attributed to the presence of young and capable faculty members and student-centered education (41). Similarly, Roshanzadeh et al.'s study entitled "Clinical Learning Challenge of OR Technology Students: A Qualitative Content Analysis" found that the main challenge students faced in clinical learning was the unfavorable learning environment. The researchers of this study suggested that recruiting experienced instructors who facilitate communication and learning of students in the OR environment would be effective in reducing fear and controlling inappropriate behavior of personnel towards students (42). Moreover, in some studies, the relationship between professors and students has been identified as a source of moral tension. Wojtowicz and colleagues investigated the factors that create ethical tension in students and found that the inability of instructors to support students was cited as a factor of ethical tension (43). Reno et al. classified the important aspects of ethical tension in the education of students into three categories and pointed out that the teacher or professor was a source of anxiety and ethical tension, stating that the moment students were assessed by the teacher or instructor during the teaching and learning process aggravated this problem. They also noted that students reported that the pressure of trainers and professors during professional training caused physical and psychological symptoms such as stress (44). Also, in Tazakori et al.'s study called "Factors Affecting the Quality of Clinical Education from the Standpoint of OR Students," more than half of the students said that the fact that clinical instructors didn't trust them was the

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biggest problem with the quality of clinical education and the lack of enthusiasm for their field (5).

The difference in the results may be due to the use of various research tools, dissimilarities in educational environments, motivation, scientific competence, individual differences between students, the multiplicity of clinical instructors, and differences in the implementation and teaching of curricula, facilities, and educational opportunities in the clinic.

In the present study, the rate of moral distress indicates lower moral distress among students compared to similar studies. For instance, in Mohammadi et al.'s study examining moral distress among paramedical students, the average moral distress was reported as moderate (18). Similarly, in Kamali et al.'s study, the average score of moral distress in OR students was higher than in the present study (45). However, in Shafipour et al.'s study using the Hamric Moral Distress questionnaire, the average moral distress of nursing students was reported at a low level, which may be attributed to the fact that the interns did not have direct responsibility when caring for patients, as well as solving existing moral problems by consulting other nurses (46). Although the findings of this study are consistent with the present study, the educational environment of the two groups was different.

One of the limitations of the present study was the small number of students participating in the research, despite the fact that all students were included in the study.

Conclusion

The results of this study indicated that the educational climate of the OR training environment at this university was favorable from the perspective of most students, which resulted in lower levels of moral distress compared to similar studies. The instructors played a significant role in creating a positive view of the OR educational climate among students. However, since the OR environment and the nature of work in it are different from other departments of the hospital, the results of this research cannot be generalized to other educational climates at this university. Therefore, it is suggested that this research be conducted in other academic departments and universities in the country to identify the strengths, weaknesses, and existing gaps in the educational climate.

Ethical considerations

The present study is derived from a research project approved by the North Khorasan University of Medical Sciences with the ethical code IR.NKUMS.REC.1400.136. This ensures that the research was conducted in accordance with ethical standards and guidelines.

Artificial intelligence utilization for article writing

Artificial intelligence is not used in this research.

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Conflict of interest statement

The authors declare that there is no conflict of interest in this study.

Author contributions

The authors have confirmed their contribution to the paper as follows: study conception and design: N.K., Z.A., K.K.; data collection: N.K., SM; analysis and interpretation of results: S.Gh.; draft manuscript preparation: N.K., F.A., Z.A. All authors have reviewed the results and approved the final version of the manuscript.

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Data availability statement

Not applicable.

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