



Frequency of Medical Errors and Their Reporting Barriers in Operating Room Students of Birjand University of Medical Sciences in 2024

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Abstract

Background: Health education centers are highly exposed to a range of medical errors due to the presence of students who are learning.

Objectives: This study aimed to assess the frequency of medical errors and their reporting barriers among operating room students at Birjand University of Medical Sciences in 2024.

Methods: This descriptive-sectional study was conducted on 71 operating room students who completed their fourth semester at Birjand University of Medical Sciences in 2024. Students were selected by the census method. The questionnaire used included three sections: "Demographic information", "Frequency of medical errors", and "Barriers to reporting medical errors". Data analysis was done using SPSS 26 and descriptive statistics.

Results: The frequency of errors among the studied students was evaluated. The most common medical errors were related to retained foreign bodies in the surgical site (3.00 ± 1.014), incorrect counting of surgical sponges (2.96 ± 0.992), and failure to identify the correct patient (2.94 ± 0.954). The most common reasons for not reporting errors were "some nursing errors are not important to report" (3.37 ± 1.174), "forgetting to report errors" (3.31 ± 1.178), and "nursing errors have no specific definition" (3.17 ± 1.207).

Conclusions: Error reporting effectively identifies and prevents errors because it helps identify them, especially frequent errors and errors of high importance. Therefore, an effective reporting system in operating rooms and the removal of barriers are necessary

Keywords: Medical Errors, Operating Room, Patient Safety

1. Background

Patient safety is one of the important issues in improving the quality of health care (1); however, medical errors are one of the most significant challenges to patient safety (2). Healthcare organizations define medical error as: "Patient injury due to inappropriate and unethical behavior and inadequate and negligent action of the health service provider specialist in job activities" (3). All health and care team workers, regardless of how skilled, committed, and meticulous, may make mistakes when performing professional skills (4). These mistakes occur in different professions of the medical staff, such as

doctors, nurses, and pharmacists (5). Medical science is based on the principle of "first do no harm"; however, despite technological advances, medical errors continue to threaten patient safety (6). Medical errors are the third most common cause of death in the United States (7). In Iran, the prevalence of errors in the health care system is not less than the prevalence of errors in other developing or developed countries, and between 50% and two-thirds of these errors occur in the operating rooms and emergency rooms of hospitals, with more than half being preventable (8).

The operating room is recognized as one of the most hazardous areas of the hospital due to its organizational, educational, environmental, and

technological requirements (9), as pressure and stress within the operating room increase the likelihood of errors (10). Every year, about 234 million surgeries are performed worldwide, meaning, on average, one out of every 25 people undergoes surgery (8); therefore, since surgery plays a major and important role in medical centers globally, the focus has been directed to a high degree on the safety of the environment, personnel, and patient care in the operating room (11). On the other hand, it is believed that due to the ineffectiveness of the error reporting system and some structural weaknesses in the health system, the amount of errors is high, such that, according to the results of studies, 11.9% of medical errors occur in the operating room. Therefore, the prevention of injuries related to health care is considered a key and general principle in care (11).

Error reporting and analysis are important to improve patient safety (12). In the meantime, error reporting by changing the error culture helps to prevent punitive measures and encourage learning from mistakes to avoid repetition (13) and is necessary to facilitate the recognition of the causes of errors (14); therefore, the prevention of errors depends on its accurate reporting (15). Seidi also reported in his study that only 45% of nurses report their mistakes to the supervisor (16). Operating room students may also make mistakes more than nurses due to low experience and skill, as well as the lack of proper and safe educational environments during clinical practice (5, 17). According to the results of this study, the most common errors include foreign material remaining in the surgical site, incorrect counting of surgical sponges, and failure to diagnose the correct patient. On the other hand, due to reasons such as the perceived lack of importance of reporting nursing errors, forgetting to report errors, and not having a clear definition of error, error reporting has not been done. According to the results of Shiyasi and Norouzinia, considering error reporting to be useless and forgetting to report errors are important reasons for not reporting errors (18). According to other studies, the lack of a single and standard definition of error and when errors are eligible for reporting is one of the main barriers to reporting and disclosing reported errors (19, 20). According to studies, only 16.7% of students report their mistakes to the instructor (5).

2. Objectives

Given the importance of errors in the operating room, this study, in response to the question of what errors are made by students in the operating room and what barriers exist to reporting them, evaluates the rate of medical errors and identifies barriers to reporting

them among operating room students at Birjand University of Medical Sciences in 2024.

3. Methods

3.1. Design Study

This descriptive-sectional study was conducted in 2024, encompassing a census of 71 operating room students at Birjand University of Medical Sciences.

3.2. Participants

The inclusion criteria for the study were undergraduate students in the operating room field who had not engaged in student work in the operating room, had completed their fourth semester, and had provided consent to participate. The exclusion criteria included students' withdrawal from the study and incomplete completion of the questionnaire.

3.3. Data Collection

The data collection tool in the study was a questionnaire designed to identify the frequency of nursing errors and the barriers to reporting them among the operating room students of Birjand University of Medical Sciences. According to the study conducted by Azarabad et al., the frequency section of Richard's Questionnaire and the section on barriers to error reporting were adapted from the questionnaire by Yaqoubi et al. (as cited by Azarabad et al.), with a reported Cronbach's alpha coefficient of 0.88 (5).

The first part of the questionnaire collected demographic characteristics, including age, gender, marital status, academic semester, and academic grade point average. The second part consisted of statements considered errors by the students, including 15 statements with response options of "completely agree", "agree", "disagree", and "completely disagree". The third part addressed the reasons for not reporting errors, comprising 17 statements with response options of "completely agree", "agree", "have no opinion", "disagree", and "completely disagree".

3.4. Scales

The questionnaire was designed based on the Likert Scale. Error cases were determined using a 4-point Likert scale, with response options ranging from "completely disagree" to "completely agree". The scoring was as follows: "Completely disagree" received a score of 1, "disagree" received a score of 2, "agree" received a score of 3, and "completely agree" received a score of 4.

The reasons for not reporting errors were determined using a 5-point Likert scale, with response options ranging from "completely disagree" to "completely agree". The scoring was as follows: "Completely disagree" received a score of 1, "disagree" received a score of 2, "have no opinion" received a score of 3, "agree" received a score of 4, and "completely agree" received a score of 5.

The questionnaire's validity was confirmed, with all items having a Content Validity Index (CVI) above 0.7 and a Content Validity Ratio (CVR) above 0.622 (21).

3.5. Data Analysis

Data were analyzed using descriptive statistics, including frequency, mean, and standard deviation. The independent *t*-test (or the non-parametric Mann-Whitney U test) was used to examine the relationship between binary demographic variables and the amount and barriers to error reporting. ANOVA (or the non-parametric Kruskal-Wallis test) was used to examine the relationship between multi-state demographic variables and the amount and barriers to error reporting. Additionally, the correlation coefficient was used to examine the relationship between age and barriers to error reporting. SPSS 26 was utilized for data analysis.

3.6. Ethical Considerations

Ethical considerations in this research included obtaining the necessary permits from Birjand University of Medical Sciences, providing full explanations about the goals and working methods to the participants, and obtaining informed consent from them at the beginning of the process. Participants were assured of their right to withdraw from the research at any time, and they were guaranteed that all their information would be kept confidential. Additionally, the results of the research would be made available to them upon request. Permission was also obtained from the Ethics Committee of Birjand University of Medical Sciences under the number [IR.BUMS.REC.1402.416](#).

4. Results

Out of 71 operating room students participating in the study, 42 (59.2%) were women and 29 (40.8%) were men. Among them, 65 students were single (91.5%) and 6 were married (8.5%). The average age of the students was 21.70 years, and they had a mean GPA of 16.79. Of the students participating in the study, 32 (45.1%) were in the 6th semester, 21 (29.6%) in the 8th semester, and 18 (25.4%) in the 4th semester. There was no significant

relationship between the academic semester and the cases of error and its reporting ($P > 0.05$).

The results of the present study showed that the reasons for not reporting the error had no significant relationship with any of the demographic variables (age, gender, marital status, academic semester, academic grade point average) ($P > 0.05$). The most common error cases included, in order, remaining foreign material in the surgical site (3.00 ± 1.014), incorrect counting of surgical sponges (2.96 ± 0.992), and failure to diagnose the correct patient (2.94 ± 0.954). The least common error case was the use of inappropriate equipment (2.31 ± 0.994) (Table 1).

Additionally, from the students' perspective, the most common reasons for not reporting errors were related to the options of "no importance of reporting nursing errors" (3.37 ± 1.174), "forgetting to report errors" (3.31 ± 1.178), and "nursing error does not have a clear definition" (3.17 ± 1.207). The least common reasons for not reporting errors were "fear of finding out the doctor and being blamed by him" (2.27 ± 1.195), "fear of revealing the mistake and creating legal issues after it" (2.30 ± 1.151), and "fear of informing the instructor and being blamed by him" (2.56 ± 1.118) (Table 2).

5. Discussion

The results of this study showed that from the perspective of operating room students, the highest average score among errors was related to the remaining foreign material in the surgical site and incorrect counting of surgical sponges, while the lowest average score was related to the use of inappropriate equipment. These findings align with Nnemati et al.'s study, where leaving a device in the patient's body was identified as one of the most significant errors (8). In contrast, Azarabad et al.'s study found that non-observance of sterile technique was the most common error (5). This discrepancy may be due to differences in the attitudes of the students in the two studies. However, Azarabad et al. also recognized the retention of foreign material in the surgical site as a significant error (5).

According to this study, the most common barriers to error reporting by students were "no importance of reporting nursing errors", "forgetting to report errors", and "nursing error does not have a clear definition". Similar findings were reported in other studies. Cramer's research indicated that nurses report an average of only 1.9% of their errors, with a third of them unsure about which errors to report (22). Zaboli et al. identified the lack of emphasis on the importance of recording and reporting errors and the lack of clarity in

Table 1. Distribution of the Frequency, Mean, and Standard Deviation of the Errors of Operating Room Students^a

| Error Cases | Completely Agree | Agree | Disagree | Completely Disagree | Values |
|--|------------------|-----------|-----------|---------------------|--------------|
| Remaining foreign material in the surgical site | 8 (11.3) | 12 (16.9) | 23 (32.4) | 28 (39.4) | 3.00 ± 1.014 |
| Incorrect counting of surgical sponges | 6 (7.0) | 21 (29.6) | 17 (23.9) | 28 (39.4) | 2.96 ± 0.992 |
| Failure to diagnose the correct patient | 6 (8.5) | 16 (22.5) | 25 (35.2) | 24 (33.8) | 2.94 ± 0.954 |
| Improper placement of electrosurgical pads | 6 (8.5) | 16 (22.5) | 29 (40.8) | 20 (28.2) | 2.89 ± 0.919 |
| Uncertainty of the surgical site | 9 (7.12) | 16 (5.22) | 21 (6.29) | 25 (2.35) | 2.87 ± 1.041 |
| Incorrect counting of surgical instruments | 7 (9.9) | 17 (23.9) | 25 (35.2) | 22 (31.0) | 2.87 ± 0.970 |
| Uncertainty of the side of surgery (right or left in bilateral operations) | 9 (12.7) | 18 (25.4) | 19 (26.8) | 25 (35.2) | 2.85 ± 1.051 |
| Incorrect preparation of the surgical site | 7 (9.9) | 16 (22.5) | 30 (42.3) | 18 (25.4) | 2.83 ± 0.926 |
| Wrong use of medicines | 9 (12.7) | 12 (16.9) | 33 (46.5) | 17 (23.9) | 2.82 ± 0.946 |
| Reaction to blood or blood products | 6 (8.5) | 18 (25.4) | 30 (42.3) | 17 (23.9) | 2.82 ± 0.899 |
| Improper patient position | 9 (12.7) | 15 (21.1) | 29 (40.8) | 18 (25.4) | 2.79 ± 0.970 |
| Unawareness of the patient's allergy | 11 (15.5) | 17 (23.9) | 23 (32.4) | 20 (28.2) | 2.73 ± 1.041 |
| Improper use of equipment | 6 (8.5) | 29 (40.8) | 23 (32.4) | 13 (18.3) | 2.61 ± 0.886 |
| Non-observance of sterile technique | 13 (18.3) | 31 (43.7) | 11 (15.5) | 16 (22.5) | 2.42 ± 1.037 |
| Use of inappropriate equipment | 15 (21.1) | 31 (43.7) | 13 (18.3) | 12 (16.9) | 2.31 ± 0.994 |

^a Values are expressed as No. (%) or mean ± SD.

defining work errors as significant barriers to error reporting (23). Nasirpour's research on "Medical Error Threats" highlighted poor understanding of what should be reported and disbelief in reporting as factors discouraging error reporting (24). Heidari et al. also found that forgetting the error was a key reason for not reporting it (25).

The present study showed no significant relationship between the reasons for not reporting errors and demographic variables (age, gender, marital status, academic semester, academic grade point average). In contrast, Azarabad et al. found that fear of negative impacts on evaluation scores and educational consequences was significantly related to gender, with male students more likely to experience this fear (5). This difference may stem from variations in experiences, knowledge, and previous training between the populations studied. Hannani et al. also reported significant differences in error reporting barriers by gender and work experience (11), a contrast that may be due to the focus on students in our study, unlike Hannani's.

The average score for the total reasons for not reporting errors was 78.2 with a standard deviation of 0.68 (out of 5 points), indicating the relative importance of error reporting barriers in hospitals. In Abu Shaiqah's study, the average score for barriers to reporting errors was 2.99 out of 5, which was considered average (26). Identifying obstacles and facilitators of error reporting is crucial in designing and implementing an error learning system to enhance safety (27). According to

Aristotle, honesty is a virtue in medical students, encouraging them to report clinical errors as a moral duty to maximize patient benefits (15). This positive approach to error reporting, along with modifying training methods, monitoring instructors, and employing non-punitive strategies, is necessary to reduce mistakes and ensure timely reporting (5).

5.1. Conclusions

It is suggested that future studies should be conducted on a broader scale and encompass more aspects of risk. Additionally, the impact of different training courses and methods on error reporting among students should be investigated, along with the development of educational content aimed at reducing the occurrence of errors. It is essential to enhance the scientific and practical skills of students to minimize errors in the future. In this regard, employing experienced instructors, avoiding punitive responses to students when they report errors, and fostering a culture of error reporting – especially among students – by providing support are crucial. It is recommended that error reporting should not negatively impact student evaluations. Furthermore, the creation of refresher courses for instructors is also suggested to maintain and improve their teaching effectiveness.

5.2. Limitation

Among the limitations of this study, the small sample size is notable. Additionally, the study focused solely on

Table 2. Distribution of the Frequency, Average, and Standard Deviation of Reasons for Not Reporting Errors in Operating Room Students ^a

| Reasons for Not Reporting Errors | Completely Agree | Agree | Have No Opinion | Disagree | Completely Disagree | Values |
|--|------------------|-----------|-----------------|-----------|---------------------|--------------|
| Fear that the news will be posted in the college, and other students will know about it | 14 (19.7) | 20 (28.2) | 16 (22.5) | 8 (11.3) | 13 (18.3) | 2.80 ± 1.380 |
| The nursing error does not have a specific definition. | 4 (5.6) | 21 (29.6) | 18 (25.4) | 15 (21.1) | 13 (18.3) | 3.17 ± 1.207 |
| Fear of finding out the doctor and being blamed by him | 20 (28.2) | 31 (43.7) | 5 (7.0) | 11 (15.5) | 4 (5.6) | 2.27 ± 1.195 |
| Fear of revealing the mistake and creating legal issues following it | 18 (25.4) | 30 (42.3) | 12 (16.9) | 6 (8.5) | 5 (7.0) | 2.30 ± 1.151 |
| Some nursing cases are not important to report. | 2 (2.8) | 20 (28.2) | 13 (18.3) | 22 (31.0) | 14 (19.7) | 3.37 ± 1.174 |
| Fear of informing the department staff and their lack of cooperation | 11 (15.5) | 24 (33.8) | 14 (19.7) | 17 (23.9) | 5 (7.0) | 2.73 ± 1.195 |
| Fear of being found out by department staff and being blamed by them | 15 (21.1) | 22 (31.0) | 11 (15.5) | 16 (22.5) | 7 (9.9) | 2.69 ± 1.305 |
| Because in the event of a problem, the coach shows a disproportionate reaction to the severity and importance of the mistake | 12 (16.9) | 29 (40.8) | 11 (15.5) | 14 (19.7) | 5 (7.0) | 2.59 ± 1.190 |
| Fear of revealing your mistake and the side effects on the patient | 10 (14.1) | 33 (46.5) | 8 (11.3) | 16 (22.5) | 4 (5.6) | 2.59 ± 1.154 |
| Because the instructor cares too much about patient care and considers it a measure of nursing quality | 3 (4.2) | 26 (36.6) | 24 (33.8) | 9 (12.7) | 9 (12.7) | 2.93 ± 1.087 |
| Because in the event of a problem, the instructor only focuses on the person who made mistakes and does not consider other factors | 11 (15.5) | 24 (33.8) | 13 (18.3) | 18 (25.4) | 5 (7.0) | 2.75 ± 1.204 |
| Fear that the patient will find out my mistake and develop a negative attitude towards me | 7 (9.9) | 23 (32.4) | 14 (19.7) | 17 (23.9) | 10 (14.1) | 3.00 ± 1.242 |
| When I inform the instructor about my mistake, he does not give me positive feedback. | 6 (8.5) | 19 (26.8) | 18 (25.4) | 21 (29.6) | 7 (9.9) | 3.06 ± 1.145 |
| Fear of informing the instructor and being considered incompetent by him | 13 (18.3) | 29 (40.8) | 9 (12.7) | 15 (21.1) | 5 (7.0) | 2.58 ± 1.215 |
| One of the reasons for not reporting errors is forgetting to report them. | 3 (4.2) | 18 (25.4) | 18 (25.4) | 18 (25.4) | 14 (19.7) | 3.31 ± 1.178 |
| Fear of informing the instructor and being blamed by him | 12 (16.9) | 27 (38.0) | 15 (21.1) | 14 (19.7) | 3 (4.2) | 2.56 ± 1.118 |
| Fear of the wrong effect on the evaluation score and its consequences | 12 (16.9) | 27 (38.0) | 15 (21.1) | 12 (16.9) | 5 (7.0) | 2.59 ± 1.166 |

^a Values are expressed as No. (%) or mean ± SD.

the frequency of nursing errors and the barriers to reporting them in the operating room, which may limit the generalizability of the findings to other settings or types of medical errors.

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Footnotes

Authors' Contribution: M. T. designed the study and supervised the implementation of mindfulness steps. F. N. contributed to writing and data collection. E. H. was involved in writing and statistical analysis. All authors reviewed and approved the final manuscript.

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Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication. The data is not publicly available due to privacy and ethics.

Ethical Approval: This research received approval from the Ethics Committee of Birjand University of Medical Sciences, Iran (code: [IR.BUMS.REC.1402.416](#)).

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