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PERCEPTIONS OF HEALTHCARE STUDENTS ABOUT OPERATION THEATER AS CLINICAL LEARNING ENVIRONMENT AND RELATED FACTORS AFFECTING LEARNING OUTCOMES

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ABSTRACT

Background: The operating theater (OT) offers a high-impact clinical learning environment where healthcare students integrate theoretical knowledge with practical skills. However, various challenges may hinder the effectiveness of this experience.

Objective: To assess healthcare students' perceptions of the OT as a clinical learning environment and identify key factors influencing learning outcomes in Saudi Arabia.

Methodology: A descriptive cross-sectional study was conducted between April and May 2025 using a self-administered questionnaire. A convenience sampling method was used to recruit students from various specialties and academic levels across Saudi Arabia. Data were analyzed using SPSS version 29. Ethical approval was obtained (IRB-2025-AT-045).

Results: A total of 250 students participated. Overall, the OT was perceived as a supportive environment for clinical training. Students reported high satisfaction with aspects such as trainer respect, emotional safety, and involvement in procedures. However, areas such as pre-rotation orientation, clarity of learning objectives, and structured feedback received lower ratings.

Conclusion: While the OT is recognized as a valuable clinical learning setting, improvements in preparatory orientation, communication of educational goals, and feedback mechanisms are essential. Addressing these factors may enhance the overall quality and effectiveness of clinical education within surgical settings.

CHAPTER 1: INTRODUCTION

Operation theatre (OT) or Operation room (OR) is a complex area and dynamic learning environment where the healthcare students (HCS), including anesthesia technology, nursing, and paramedic students develop essential clinical skills (Nestel et al., 2020). Moreover , the OT learning environment is characterized by high-stakes, high-pressure situations where students must apply theoretical knowledge to real-world scenarios (Flin et al., 2010). Therefore, the students should convert their theoretical knowledge to practice and improve their clinical thinking and skills throughout the different clinical situations(Gemihay et al, 2019). Thus, the majority of educators believe that teaching in the operating theater is the most typical form of medical education. (Bakhshialiabad et al, 2015) .

Furthermore, the OT learning environment is a critical area of importance for several reasons. Firstly, the OT is a high-stakes environment where errors can have serious consequences for patients. Ensuring that healthcare students have a positive learning experience in the OT is crucial for promoting patient safety (Flin et al. 2010). Secondly, the OT learning environment plays a critical role in shaping the clinical skills and competencies of future healthcare professionals. A positive learning experience in the OT can enhance student motivation, engagement, and ultimately, their ability to provide high-quality patient care (Bleakley 2013). Thirdly, the OT learning environment can impact the quality of care provided by healthcare professionals. A supportive and effective learning environment can promote the development of clinical skills and competencies, leading to better patient outcomes (Waterson et al. 2018). Finally, the OT learning environment is an essential component of healthcare education. An understanding of the factors that influence the learning environment in the OT can guide the development of effective educational strategies and interventions (Anton et al. 2018).

Despite the OT being a learning environment, various factors can affect the learning outcomes of healthcare students, such as inadequate facilities, the sensitivity of clinical situations, and the level of respect shown by supervisors. However, if the educational process is not properly managed, it can lead to cognitive overload for both learners and educators (Young et al ,2014).

Moreover , effective learning in the OT requires a supportive and inclusive environment that fosters student engagement, motivation, and confidence (Bleakley, 2013). Despite its importance, the OT learning environment has received relatively little attention in the literature, particularly in Saudi Arabia (Al-Mamun et al., 2017).

Therefore, it is essential to explore the perceptions of healthcare students in Saudi Arabia regarding the OT learning environment in order to identify areas for improvement and to inform the development of effective educational strategies.

Objective of the study: This study aims to explore the perceptions of the clinical learning environment in OT and identify the factors that affecting the learning outcomes among healthcare students in Saudi Arabia.

Hypothesis: The Operation Theater is a desirable learning environment for healthcare students in Saudi Arabia with some factors affecting the learning outcomes.

CHAPTER 2: LITERATURE REVIEW

Introduction:

The literature on perceptions of healthcare students about operations theatre as learning environments will be reviewed and addressed in this chapter. The purpose of a literature review is to demonstrate the researcher's familiarity with the existing body of information about the topic under the investigation, as well as to synthesize and summarize what has been done previously in that area in order to extract new ideas relating to the study topic (Neuman,2011). As there was limited literature relating to healthcare students perceptions' about Operations theatre as learning environment in Saudi Arabia , the literature review was expanded to include other studies on doctors or residents.

To accomplish the literature review different databases were used including Saudi digital library, Science Direct, and PubMed. The key words used to search the literature were: perceptions, healthcare students, Operation Theater, Operations room, learning environment, learning outcomes. These keywords should make finding studies and articles related to the content being researched easier. The limitations were set as studies between 2019 and 2024 that were related to the topic and were available as free full text and in English language. The exclusion criteria in the research were non-medical students because the study focuses on healthcare students , and studies that were published before 2019.

AlShammari et al.(2023) conducted a cross-sectional design included 194 undergraduate healthcare students in 2022 at Imam Abdulrahman Bin Faisal university in the following degree programs were invited to participate: nursing , medicine, paramedicine, physical therapy , medical imaging , respiratory care, clinical laboratory, cardiac technology and clinical nutrition.The study showed, that student satisfaction with the clinical learning environment is a multifactorial concept and there is positive relationship between student satisfaction and clinical outcomes and quality of patient care. However, the study were sourced the participants from only one university in Dammam within Saudi Arabia which might affect on the generalizability of the findings. According to (Luger and Goldstein, 2000), it is difficult to generalize study findings to the entire population when the sample size is limited. In addition, a convenience sampling method was utilized to recruit the participants. According to (Croucher and Cronn-Mills, 2015). Convenience samples have several disadvantages, including the fact that they are not random and tend to give nongeneralizable results.

Another study conducted by Wubshet et al.(2024) the aim of the study was to assess the perceptions of the operating theatre learning environment and associated factors among undergraduate anesthesia students in Ethiopian hospitals it is multi-center study including 313 anesthesia students who began operation room clinical practice at 13 higher education teaching hospitals. Moreover, the study showed none of the participants agreed that the operation theater was very undesirable as a learning environment , and 141 of the participants indicated that the operation theater learning environment in operation theater was desirable. However, there were some factors affecting the students perceptions' include the lack of teaching facilities in the operation room, the absence of trainer from the operation room, noise from the music played in the operation room, trainers' respect for their students, preoperative discussions with trainer, and the strict supervision of students.

According to (Bleakley, 2013), effective learning in the OT requires a supportive and inclusive environment that fosters student engagement, motivation, and confidence. In contrast, if the educational process not done properly it will lead to cognitive overload on both the learner and educator(Young et al ,2014).

Furthermore, Gemuhay et al.(2019) conducted cross-sectional study in Northern of Tanzania including 208 participants in which 123 nursing students and 85 nurse tutors. The data collected by using self-administered questionnaire which included information on sociodemographic characteristics and factors affecting clinical practice categorized in students' factors, hospital based factors ,and nurse tutors factors. The results showed that the majority of the students agreed the clinical placement gives students adequate opportunity for clinical practical learning. Moreover, the factors affecting the clinical learning regarding to student factors were self-confidence and absenteeism, other factors were improper supervision, lack

of facilities and poor preparation. Whereas, offering preclinical orientation , clarifying objectives to the students , and frequent visits and supervision of students in clinical area may improve student clinical learning experience in clinical area. However, this study was limited
since a self-reported questionnaire was used in the study, which could lead to response bias. According to (Demetriou et al., 2015) one of the biggest drawbacks of self-report questionnaires is the possibility of giving incorrect responses. Another limitation of the study according to (Nederhof, 1985) the study topic could be viewed differently by the participants raising the potential for bias in answering the questionnaires

Another study conducted by Rupani et al.(2022) ,aimed to explore the areas of strength and weakness in the educational environment in the operating room as perceived by surgical trainees' in one English region. The results showed 54 of surgical trainees completed the questionnaire and said the areas of improvement included better learning opportunities and conducting pre and postoperative teaching, but the trainees were most satisfied with the level of supervision and workload.

However, the study was limited to one region of England, meaning that the attitude of the trainees may be different in other regions within the country. In addition, the study done at the time of covid-19 that led to the dramatic reduction of operations learning opportunities.

Similar to the previous study conducted by Tayyba Sarfaz et al.(2024), was a cross-sectional study done at Liaquat College of Medicine and Dentistry a private medical college in Karachi,Pakistan. The study include 88 out of 100 participants have completed the given questionnaire and the date was collected from final year students who attended surgical rotation. The results showed, most of of the students were overall satisfied with the learning environment in the surgical theatre and had positive perceptions of instructions and training in surgical theatre. However, the study was limited since its done in a single center in Pakistan. Therefore, the result may not be generalizable. According to (Lee, 2000; Polit and Beck, 2008) Generalizability is a significant criterion for evaluating the quality of a study in quantitative research.

Whereas other cross-sectional online survey study by K. Wijesinghe et al. (2023) conducted among 390 medical students from four different medical faculties in SrinLanka representing all levels of surgical clinical rotations. This study clearly shows a significant correlation between positive emotions and welcoming attitudes towards the medical students and long standing hours were considered a negative emotions by a majority of students. Moreover, empathy, feeling welcome and giving breaks to refresh can go a long way in making the learning experience better. In addition, regular feedback to trainers on students' perception of the theater experience is important to improve the quality of the surgical theatre.

However, the major limitation of this study because of the participants were invited via online platform, this may have led to the differing sample size in the surgical rotations and related biases.

Another literature review conducted by Kent et al. (2021) focused on undergraduate medical students. This review aimed to help surgical faculty develop the operating theater's potential as a learning environment. Furthermore, the reports in the literature frequently mention the emotional aspects of attending theater and trying to fit in with the surgical team, and often report negative feelings such as feeling unwelcome, feeling confused about what they should be hoping to learn from their theater experience, and what their role is in theater as mentioned in previous study conducted by K. Wijesinghe et al.(2023). According to Kent et al.(2021) medical students should prepared by courses or workshops run before a surgical placement in order to help students be more prepared for the theater environment " for example teaching them about infection control, also invite them to the lunch or " Morbidity and Mortality " meetings that will make the students feel more welcome to be in the theater. According to Bowery et al.(2014), Evidence would suggest that students who feel welcome enjoy their time in theatre more, are more likely to try and attend theatre again and are more likely to be interested in a surgical career.

Moreover, the General Medical Council" GMC" and Royal College of Surgeons of England have written undergraduate surgical curricula which can be used to derive learning outcomes. As mentioned by (Lyon, 2003), In interviews with medical students, Lyon found that those that had the most useful theatre experience had a clear sense of their learning aims and they understood the relevance of attending theatre in the context of a broader undergraduate curriculum.

Furthermore, It may be more suitable for the student to just scrub in for parts of the operation, and opportunities for learning elsewhere in theatre should always be re-iterated. According to GMC and Royal College of Surgeons, identified may be that being scrubbed at the table gives students a better view of the operation. If the student can be taught some technical skills e.g. suturing, this would fulfill some of the learning needs and could potentially enthuse and en-courage the student.

As mentioned by Kent et al.(2021), the operating theatre is a potentially rich source of education for undergraduate students, but unfortunately there are well recognized barriers to learning in this environment. We believe that there are relatively simple steps department can take in order to increase the breadth and depth of the student's operating theatre learning experience.

CONCLUSION:

After reviewing the appropriate published studies, the majority of studies done in Saudi Arabia that focus on perceptions towards operating theatre as learning environment targeted the residents or doctors specifically. Furthermore, there is gap in the literature, as there is no study particularly in Saudi Arabia context targeted healthcare students and focused on their perceptions towards operating theater as learning environment and the factors affecting their learning outcomes. Therefore, this study will attempt to fill this gap.

CHAPTER 3: METHODOLOGY

3.1 Introduction

Bryman (2008, p.30) defines research design as "a structure that directs the conduction of a research technique and the analysis of the resulting data." In this study, the best technique available for the researcher to gather data from a large population of healthcare students who experienced clinical training in the operating theater within a limited timeframe and with minimal resources was a survey design (Vaus, 2002).

The survey serves two goals: first, to test associations between perceptions and influencing variables based on existing literature, and second, to evaluate multiple educational factors in a specific population (Bryman, 2008). Although researchers in other countries have investigated similar educational environments, there remains a gap in research regarding the OT as a clinical learning environment in Saudi Arabia. This study is observational in nature and aimed to assess students' satisfaction and perceptions regarding the OT based on various contributing elements. The results aim to provide a comprehensive snapshot addressing the primary research question.

Due to the need to reach a wide range of healthcare students across disciplines and institutions, a self-administered questionnaire was determined to be the most appropriate data collection method. This approach allowed for uniformity in responses and minimized interviewer bias. It also enhanced confidentiality and encouraged honest feedback (Bryman, 2008). Nevertheless, this method carries limitations, such as response bias and reliance on the participant's commitment to truthfulness (Denscombe, 2007).

In-depth interviews were considered but not chosen due to time constraints, potential interviewer bias, and impracticality for large-scale implementation. Additionally, no comparable prior studies from within Saudi Arabia were found to guide or validate such a qualitative design. Questionnaires, according to Cohen et al. (2007), offer greater reach and time efficiency than interviews, and were thus selected as the optimal instrument for this study. Longitudinal surveys were also deemed unfeasible due to time limitations. A cross-sectional survey was therefore conducted to capture a snapshot of student perceptions and satisfaction in the OT learning environment, allowing for timely data analysis and interpretation (Denscombe, 2007).

3.2 Study Design

This was a non-interventional, descriptive cross-sectional, questionnaire-based research study designed to evaluate healthcare students' perceptions of the operating theater (OT) as a clinical learning environment, and to identify the factors that affect their learning outcomes in this setting. The study was conducted in Saudi Arabia during the academic term from April to May 2025.

3.3 Study Population

The study targets healthcare students in Saudi Arabia with academic backgrounds in anesthesia technology, nursing, sterilization technology, and paramedics. All participants were selected from clinical institutions or training hospitals where operating room exposure was part of the curriculum.

3.4 Sample Size

The sample size for this study was determined using the standard formula for estimating proportions in descriptive cross-sectional research:

$n = (Z^2 \times p \times (1 - p)) / E^2$

Where:

- $Z = 1.96$ (Z-score for 95% confidence level)
- $p = 0.5$ (assumed population proportion for maximum variability)
- $E = 0.078$ (margin of error)

Substituting the values yields:

$n = (1.96^2 \times 0.5 \times 0.5) / (0.078^2) = 157.86$

Therefore, the minimum required sample size was approximately 158 participants. In this study, a total of 250 valid responses were collected, which exceeds the minimum threshold. This larger sample size improves the reliability of statistical analysis, enhances subgroup comparisons, and increases the

generalizability of the findings. The use of this formula aligns with best practices for ensuring statistical power in cross-sectional survey designs.

3.5 Selection Criteria

3.5.1 Inclusion Criteria

Healthcare Students: Currently enrolled in a healthcare program (anesthesia technology, nursing, sterilization technician, or paramedic), Clinical Experience: Completed at least one clinical rotation in the OT setting, Age: At least 18 years old, Language: Able to read, write, and understand Arabic or English, Consent: Provided informed consent and Availability: Available to complete the questionnaire during the data collection period.

3.5.2 Exclusion Criteria

Non-Healthcare Students: Not currently enrolled in a healthcare program, Insufficient Clinical Experience: No clinical rotation in the OT setting, Age: Under 18 years old, Language Barrier: Unable to read, write, or understand Arabic or English and Incomplete Questionnaire: Did not complete the questionnaire in its entirety.

3.6 Variables

3.6.1 Dependent Variables

Perceived quality of the clinical learning environment, Student-reported learning outcomes in the OT and Impact of OT-specific factors on clinical education

3.6.2 Independent Variables

Age, Gender, Academic discipline, Level of study, Previous clinical exposure, Perceived supervisor behavior, Presence of distractions (e.g., music, noise) and Availability of learning facilities

3.7 Data Collection Tools

3.7.1 Questionnaire

Data were collected using the Surgical Theatre Educational Environment Measure (STEEM) questionnaire, a validated tool developed to assess students' perceptions of the operating theater as a clinical learning environment. The STEEM questionnaire was used with permission from the original authors (Sarfraz et al., 2024). The questionnaire consisted of two main sections: 1. Demographic Information – including age, gender, academic year, specialty, exposure to the operating theater, and duration of clinical rotation. 2. STEEM Questionnaire Items – covering four key domains: Teaching and Training. Learning Opportunities. Atmosphere in the OT. Supervision, Workload, and Support Each item was rated on a 5-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), allowing quantitative assessment of students' perceptions. The bilingual format (English and Arabic) ensured clarity and comprehension for participants across different linguistic backgrounds. As the STEEM questionnaire has been previously validated in other studies, no pilot testing was performed.

3.8 Data Collection Procedure

Ethical approval was obtained from the Institutional Review Board (IRB) at Prince Sultan Military College of Health Sciences, Participants were recruited from multiple healthcare institutions through official channels, The questionnaire was distributed electronically or in person, and responses were collected, anonymously, Participants were briefed on the purpose of the study, and informed consent was obtained and Data collection was scheduled between April and May 2025.

3.9 Statistical Analysis

All collected data were analyzed using SPSS version 28. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize demographic and core questionnaire responses. Chi-square tests were used to examine associations between demographic factors and perception scores. ANOVA may be used to compare group means across disciplines or academic levels. A p-value of ≤ 0.05 was considered statistically significant.

3.10 Ethical Considerations

This study strictly adhered to ethical guidelines. Approval was obtained from the Institutional Review Board (IRB) at Prince Sultan Military College of Health Sciences. Participation was voluntary and based on informed consent. Responses were collected anonymously to ensure participant privacy. No personally identifiable information was recorded or published. Participants could withdraw at any stage without any consequences. The STEEM tool was selected due to its domain-specific focus on surgical learning environments and its established reliability and validity in assessing educational climates in operating theaters. Incomplete or partially filled responses were excluded from the final analysis to maintain the integrity and accuracy of statistical results. This study utilized a self-reported questionnaire, which may be subject to recall and response bias. Additionally, the cross-sectional design captures perceptions at a single point in time, limiting causal inference and temporal assessment.

3.11 Conclusion

To conclude, the researchers choose a quantitative utilizing a cross-sectional design survey with an online questionnaire. This method helped the researchers to find the material that required for data. Details about sampling, data collection, analysis were provided in this section. This prepared the researchers to present the results obtained in the next Chapter .

CHAPTER 4: RESULTS

4. Results

This chapter provides a detailed analysis of the responses collected from 250 healthcare students regarding their perceptions of the operating room (OR) as a clinical learning environment. The results are structured around two major sections: demographic characteristics and students' perceptions based on Likert-scale statements. Additional insights are included to offer context and interpret the visual and tabulated data.

4.1. Demographic Characteristics of Respondents

Understanding the background of the students who participated in the study is essential to contextualize the findings. Participants came from various academic years and healthcare specialties, and all had been exposed to OR clinical training, providing a solid foundation for evaluation.

Figure 1 shows the distribution of gender among respondents. The sample includes both male and female students, which helps ensure that gender-based bias is minimized in the findings.

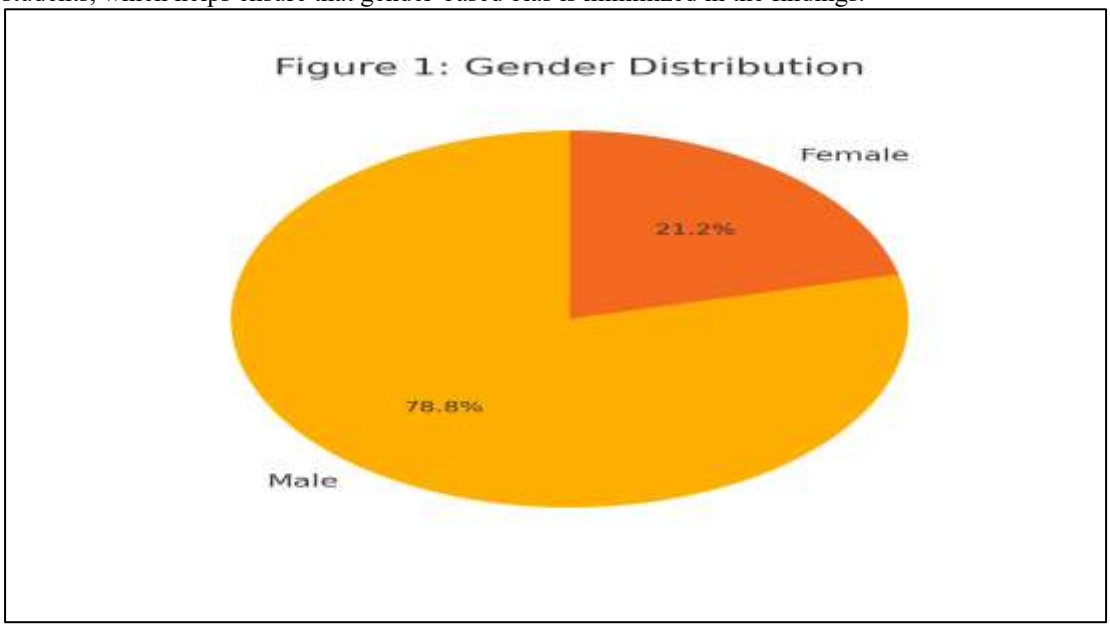


Figure 2 illustrates the distribution of students by academic year. This allows the assessment of perceptions across different levels of clinical exposure, such as junior students versus interns.

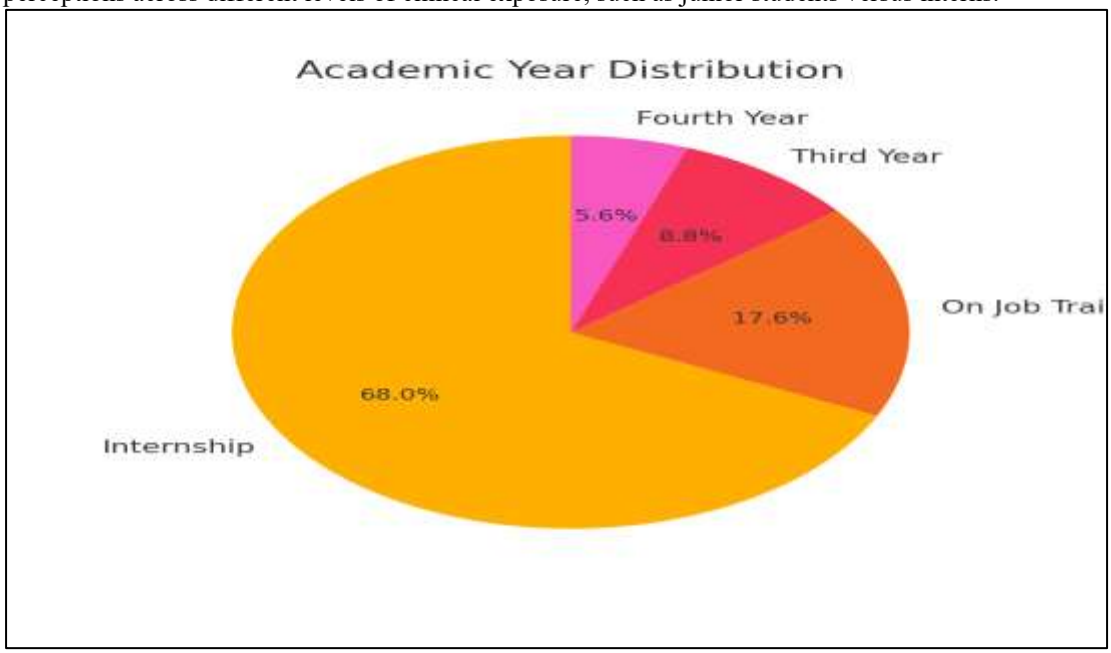


Figure 3 displays the distribution of specialties among respondents. A majority were enrolled in Anesthesia Technology program, while others came from fields like paramedicine , respiratory therapy , nursing and sterilization technicians. This broad representation helps validate that the feedback reflects cross-disciplinary OR learning environments.

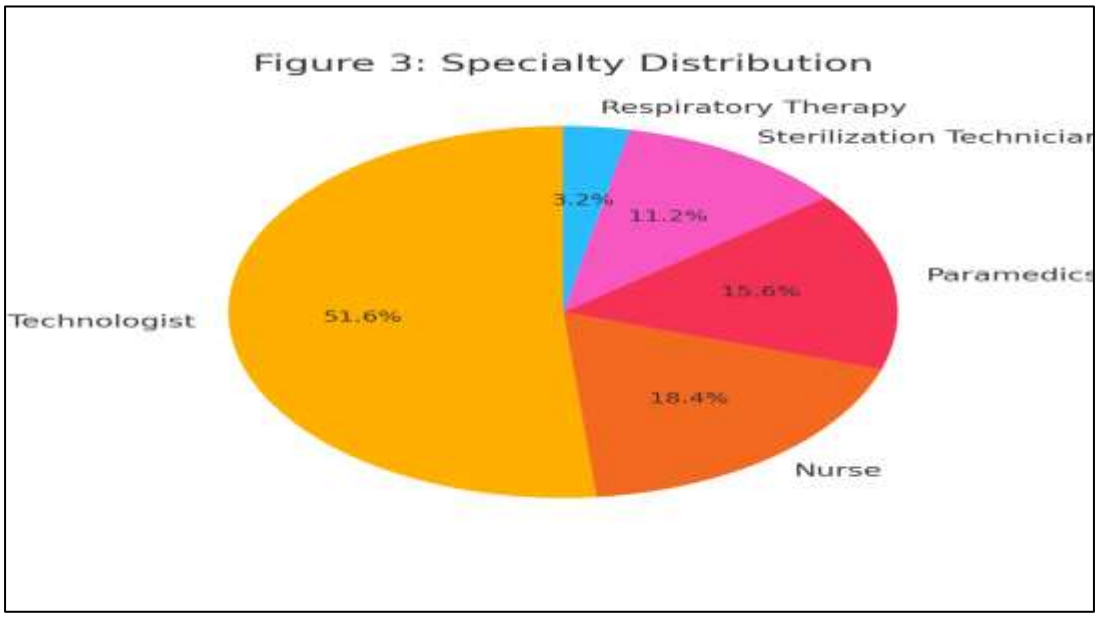
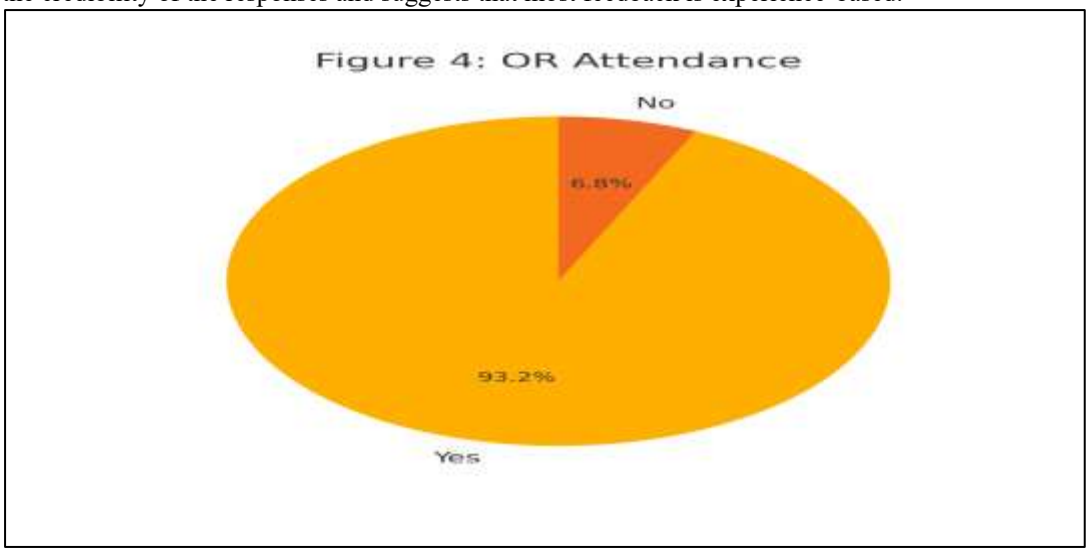


Figure 4 shows the proportion of students who had actual attendance in the OR. High attendance confirms the credibility of the responses and suggests that most feedback is experience-based.



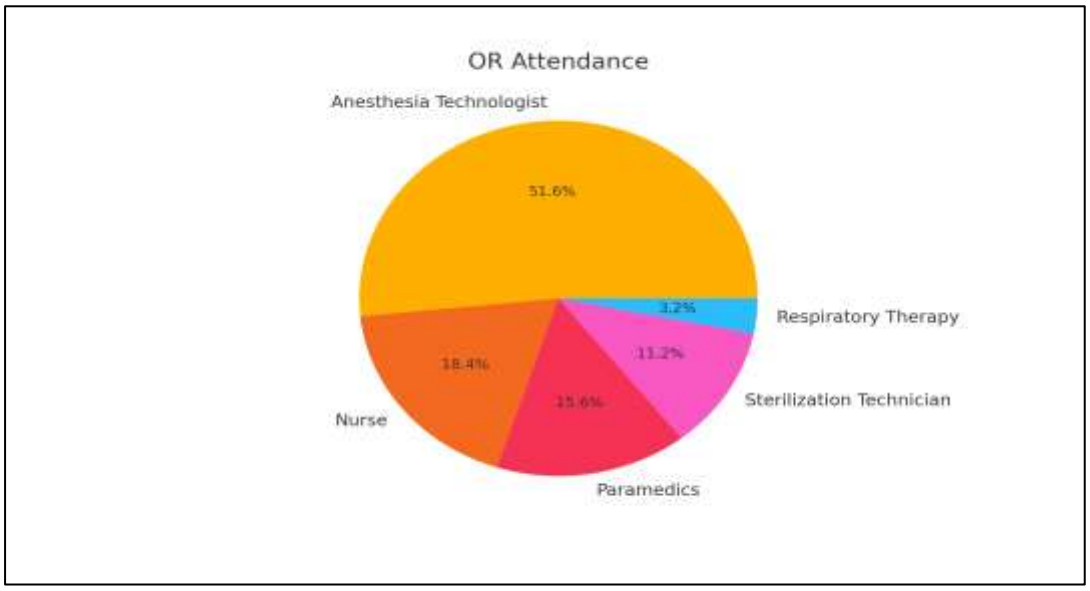
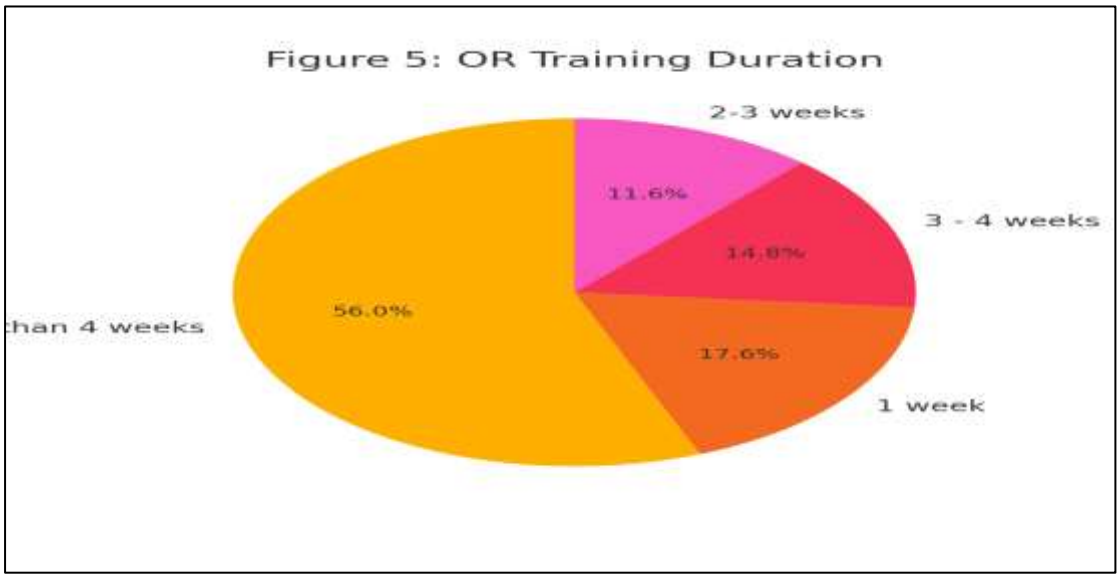


Figure 5 illustrates the duration of clinical exposure in the OR. Most students participated in more than 4 weeks, the other students rotations lasting 1 to 2 weeks. This short-term exposure, though limited, was sufficient to form perceptions about safety, support, and trainer involvement.



4.2. Students' Perceptions of the OR Environment

Students were asked to respond to several statements regarding their satisfaction with the OR as a clinical learning environment. These statements were designed to assess key domains including supervision, hands-on opportunities, emotional safety, trainer behavior, and general organization. Table 1 presents the five most positively rated statements across all respondents.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Trainers treated students with respect in the OR.	143	57	32	10	8
I felt safe to ask questions and express uncertainty during OR training.	142	56	36	9	7
I was allowed to participate or assist during procedures.	134	70	29	10	7
The learning environment in the OR was welcoming and non-judgmental.	132	61	33	14	10
Trainers were supportive and approachable during OR sessions.	130	65	34	16	5

As seen in Table 1, the highest satisfaction levels were reported for statements related to trainer respect, access to clinical opportunities, and emotional safety. This suggests that the OR environment is perceived not only as educational but also as inclusive and supportive. Students appreciated the chance to observe or assist in real procedures, and they felt encouraged to ask questions without judgment. These findings align with best practices in clinical education and underline the strength of current training practices.

4.3. Least Favorably Rated Statements

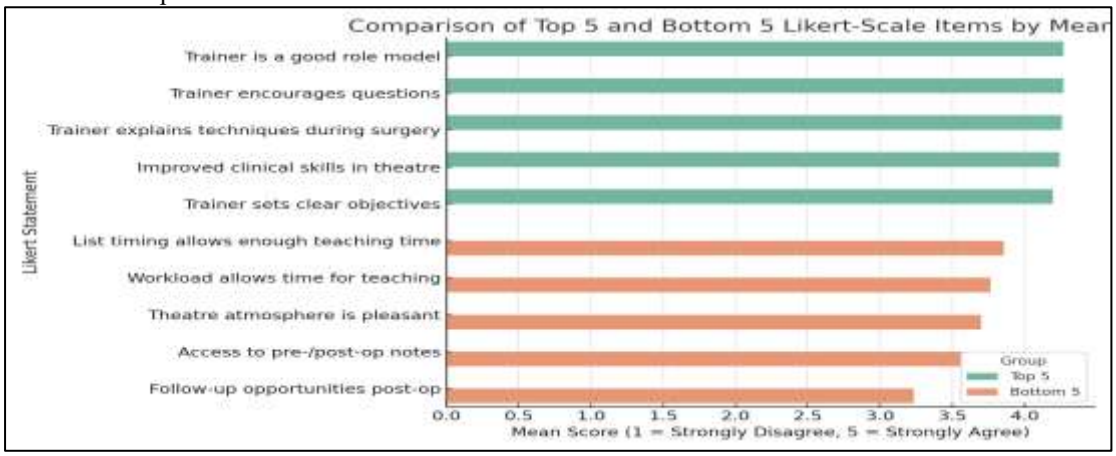
While the overall sentiment was positive, it is equally important to consider areas where students expressed lower levels of agreement. Table 2 highlights the five statements with the highest levels of disagreement, helping to identify potential areas for improvement in OR-based training.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Feedback on my performance in the OR was clear and constructive.	57	60	55	40	38
The goals and expectations for learning in the OR were explained in advance.	73	74	51	25	27
I was oriented about safety procedures before entering the OR.	117	74	27	16	16
I received guidance on how to participate actively in surgical cases.	69	87	59	20	15
Time allocated for learning in the OR was sufficient.	103	69	45	18	15

The statements with higher levels of disagreement often related to structural or organizational factors such as feedback mechanisms, clarity of roles, or logistical issues. These insights can serve as guidance for refining OR orientation sessions, enhancing communication, and setting clearer expectations among trainees.

4.4. Comparison of Top and Bottom Likert Items by Mean Score

Figure 6 illustrates a horizontal bar chart that compares the average scores of the five highest-rated and five lowest-rated Likert-scale items. Each bar represents the mean score for a particular statement on a 5-point scale (1 = Strongly Disagree, 5 = Strongly Agree). This visualization emphasizes which aspects of the OR clinical learning environment received the most and least favorable evaluations from students. Higher scores indicate strong satisfaction—for example, statements about respectful trainer behavior—while lower scores reflect areas requiring improvement, such as clarity of learning objectives and feedback quality. The figure serves as a succinct summary of performance extremes, aiding in targeted educational improvements.



4.5. Reliability of the Questionnaire

To ensure internal consistency of the Likert-scale items, Cronbach's Alpha was calculated. The result was 0.977, indicating an excellent level of reliability. This high value confirms that the survey items reliably measured students' perceptions about the operating room learning environment.

4.6. Thematic Analysis of Perception Domains

The Likert-scale items were categorized into key educational themes to better understand students' satisfaction across different learning domains. The following themes were analyzed: Trainer Support & Respect, Emotional Safety & Comfort, and Hands-On Learning & Involvement. Table 3 presents the average score for each theme.

Theme	Average Score
Trainer Support & Respect	4.10
Emotional Safety & Comfort	4.00
Hands-On Learning & Involvement	4.11

To improve clarity and interpretability, all Likert-scale statements were categorized into four key educational themes. These are:

1. Trainer Support & Respect
2. Emotional Safety & Comfort
3. Hands-On Learning & Involvement
4. Organization & Structure

Each theme represents a major component of the clinical education experience in the OR. By analyzing the average score for each group of questions, we can evaluate which areas students found most and least satisfactory. This thematic breakdown helps identify areas of strength and potential improvement in OR-based training.

CHAPTER 5: DISCUSSION

This chapter discusses the key findings of the study on healthcare students' perceptions of the operating room (OR) as a clinical learning environment in Saudi Arabia. It interprets the results in the context of existing literature, highlights educational implications, and outlines suggestions for future practice and research.

5.1 Overview of Key Findings

Overall, students reported positive perceptions of the OR as a clinical learning environment. High satisfaction was observed in domains related to trainer support, emotional safety, and opportunities for hands-on learning. However, notable dissatisfaction emerged in areas concerning feedback quality, clarity of learning objectives, and pre-rotation orientation processes.

5.2 Trainer Support and Respect

One of the most prominent findings was the high level of satisfaction regarding trainer respect and support. Statements such as "Trainers treated students with respect" and "Trainers were supportive and approachable" received the highest agreement levels. This finding aligns with prior research (Al-Mamun et al., 2017), which emphasizes that respectful trainer-student relationships foster psychological safety and increase student engagement. These results underscore the vital role of trainers in shaping positive clinical learning experiences.

5.3 Emotional Safety and Comfort

Students also reported strong perceptions of emotional safety, particularly in their comfort when asking questions and expressing uncertainty. This supports Edmondson's (1999) theory that psychological safety is a foundational element in effective learning environments. A non-judgmental climate enhances participation, encourages inquiry, and allows students to translate theory into practice more effectively. Emotional comfort may also facilitate deeper learning and improved skill retention.

5.4 Hands-On Involvement

Experiential learning emerged as another area of strength. Students expressed appreciation for opportunities to actively participate in surgical procedures, reinforcing Kolb's (1984) experiential learning theory. Such involvement builds technical competence and fosters integration into the surgical team. Nevertheless, some participants noted limited time allocated for learning, suggesting a need for extended exposure and improved integration strategies for student participation in the OR.

5.5 Areas Needing Improvement: Feedback and Structure

The most critical areas identified for improvement were related to feedback and organizational structure. Many students disagreed that feedback was timely, constructive, or clearly delivered. Similarly, the lack of pre-defined learning objectives and orientation activities emerged as a major concern. These findings are consistent with AlShammari et al. (2023), who also reported deficits in feedback quality in clinical education settings. These issues can hinder skill development and reduce the overall value of OR-based learning. To address this, structured feedback protocols and clearly communicated learning goals should be embedded in OR rotations.

5.6 Thematic Domain Reflections

Thematic analysis revealed that the "Hands-On Learning & Involvement" domain received the highest average rating, followed by "Trainer Support & Respect." In contrast, the "Organization & Structure" domain received lower scores. This pattern suggests that interpersonal and experiential aspects of OR training are well-established, while administrative and pedagogical frameworks require enhancement.

5.7 Implications for Practice

To enhance OR-based education, institutions should prioritize improvements in:

- Orientation protocols: Clear, consistent briefings before rotations
- Feedback mechanisms: Regular, structured sessions tailored to student progress
- Faculty development: Workshops to improve trainers' educational and communication skills

These steps can help standardize and elevate the quality of learning experiences across institutions.

5.8 Strengths and Limitations

A key strength of this study is the relatively large and diverse sample, which included students from multiple healthcare disciplines. This supports broader insight and relevance across training programs. However, reliance on self-reported data introduces the risk of recall and response bias, and the study's confinement to a single country limits its external validity and generalizability.

5.9 Future Research Directions

Further research is recommended in several areas:

- Supervisor perspectives: To compare and complement student views
- Longitudinal designs: To track how perceptions evolve over time and during clinical progression
- Multi-institutional comparisons: To assess institutional differences and promote national benchmarks for OR education

CHAPTER 6: CONCLUSION

This study examined healthcare students' perceptions of the operating room (OR) as a clinical learning environment in Saudi Arabia. Based on responses from 250 students across multiple specialties and academic levels, the findings provide meaningful insight into both the strengths and limitations of current OR-based education.

Key Findings

Positive Aspects:

The highest ratings were given to the domains of Trainer Support & Respect and Hands-On Learning & Involvement, indicating that students greatly valued mentorship, inclusion, and opportunities for practical engagement during their OR experiences. Emotional safety and a welcoming atmosphere were also recognized as contributing to effective learning.

Areas for Improvement:

The lowest-rated aspects involved the quality of feedback, clarity of learning objectives, and structured orientation. These areas represent critical gaps that could hinder learning outcomes and overall satisfaction with OR-based training.

Reliability:

The survey instrument used in this study demonstrated excellent internal consistency, with a Cronbach's Alpha score of 0.977, confirming the reliability of the data collected.

Statistical Analysis:

No statistically significant differences were observed in perceptions across gender, academic year, or healthcare specialty. This suggests a generally uniform experience among the students, regardless of demographic or academic background.

Summary and Implications

The results support the conclusion that the OR is widely perceived as a valuable and supportive clinical learning environment. However, in order to optimize its educational potential, institutions should invest in improving orientation procedures, clarifying learning objectives, and implementing structured, timely feedback systems. Addressing these areas could significantly enhance student preparedness, satisfaction, and clinical competence.

This study contributes to a deeper understanding of student experiences in surgical education and offers a foundation for improving training strategies in the OR setting.

CHAPTER 7: RECOMMENDATIONS

Based on the study's findings, the following actionable recommendations are proposed to enhance the quality and effectiveness of the operating room (OR) as a clinical learning environment for healthcare students in Saudi Arabia:

7.1 Establish Structured Orientation Protocols

Institutions should develop and implement standardized orientation programs for all students prior to their OR rotations. These programs should include training on safety protocols, infection control,

expected student roles, and clearly defined learning objectives. Structured orientation fosters preparedness and reduces anxiety during clinical exposure.

7.2 Integrate Continuous Feedback Mechanisms

Educational institutions should introduce formal, scheduled feedback sessions throughout OR placements. Constructive, real-time feedback can support reflective learning, improve clinical decision-making, and foster professional growth. Trainers should be trained in delivering effective, actionable feedback.

7.3 Enhance Hands-On Learning Opportunities

Students should be given increased opportunities to actively participate in procedures under appropriate supervision. These experiences should be tailored to the student's academic level and skill readiness, balancing patient safety with optimal learning outcomes.

7.4 Improve Clarity of Learning Objectives

Trainers and clinical educators must communicate clear, measurable learning objectives at the start of each OR rotation. This transparency ensures alignment between student expectations and intended learning outcomes, allowing for more focused engagement during the placement.

7.5 Foster an Emotionally Safe Learning Environment

A respectful, inclusive, and non-judgmental atmosphere should be actively cultivated within the OR. Students must feel comfortable asking questions, seeking clarification, and learning from their mistakes without fear of embarrassment or criticism. Promoting psychological safety is essential for effective experiential learning.

7.6 Encourage Interdisciplinary Team Collaboration

OR-based education should include exposure to interdisciplinary teamwork. Involving students from various specialties—such as anesthesia, nursing, and surgical technology—helps simulate real-life clinical dynamics and promotes collaborative competence.

7.7 Implement Post-Rotation Feedback Collection

Structured feedback should be collected from students at the conclusion of each OR rotation. This feedback can be used to evaluate the quality of teaching, identify systemic issues, and guide continuous improvement of the clinical education process.

CHAPTER 8: LIMITATIONS

While this study provides valuable insights into healthcare students' perceptions of the operating room (OR) as a clinical learning environment, several limitations must be acknowledged:

8.1 Cross-Sectional Design

The study utilized a cross-sectional research design, capturing data at a single point in time. This approach limits the ability to assess changes in perceptions over time or in response to educational interventions. A longitudinal design would be more appropriate to observe trends in satisfaction and learning outcomes throughout clinical training.

8.2 Self-Reported Data

Data collection relied on self-administered questionnaires, which introduces the risk of several forms of bias. These include recall bias, social desirability bias, and the misinterpretation of questions, especially among students in earlier academic years who may lack extensive clinical exposure.

8.3 Limited Generalizability

Although the study included participants from a variety of institutions and specialties, the results may not be generalizable to all healthcare institutions in Saudi Arabia, particularly private universities or hospitals not engaged in clinical education. Regional and institutional differences may influence educational experiences and student satisfaction.

8.4 Sample Distribution Bias

Some disciplines—such as sterilization technology or less commonly represented programs—had fewer respondents, resulting in an uneven distribution across specialties. This may limit the applicability of findings to underrepresented academic programs.

8.5 Language and Interpretation Barriers

Despite offering the questionnaire in both Arabic and English, language proficiency and terminology comprehension may have varied among students. Subtle differences in interpretation could affect how participants responded to specific items, particularly those involving complex clinical or educational concepts.

8.6 Institutional Variability

The study did not control for inter-institutional differences such as teaching styles, clinical supervision quality, hospital resources, or OR culture. These contextual variables may have independently influenced student perceptions and were beyond the scope of this research to evaluate.

CHAPTER 9: FINAL SUMMARY

This study explored the perceptions of healthcare students regarding the operating room (OR) as a clinical learning environment in Saudi Arabia. By surveying 250 students from diverse academic programs, the research provided a comprehensive understanding of the strengths and shortcomings within OR-based clinical education.

The findings revealed that the OR is widely perceived as a valuable and supportive setting for learning, particularly in areas such as trainer respect, emotional safety, and hands-on involvement. These elements contribute to students' confidence, skill development, and integration into the clinical team. However, notable areas requiring improvement were identified, including the quality of feedback, the clarity of learning objectives, and the structure of orientation programs.

Statistical analysis showed no significant differences in perception based on gender, academic year, or specialty, suggesting a relatively consistent experience across the student population. The instrument used in this study demonstrated excellent internal reliability, further supporting the validity of the findings.

The study's recommendations emphasize actionable strategies to enhance clinical education in the OR—such as structured orientation protocols, improved feedback mechanisms, interdisciplinary collaboration, and fostering emotionally safe environments. Despite its contributions, the study also acknowledged several limitations, including the cross-sectional design, self-report bias, and institutional variability.

In conclusion, this research contributes meaningful insight into the learning experiences of healthcare students in surgical settings and highlights clear opportunities for educational enhancement. By addressing the identified gaps, academic institutions and clinical educators can significantly improve the effectiveness, equity, and impact of OR-based training in healthcare education.

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Appendix I: Questionnaire

Invitation to participate in research

This study aims to explore the perceptions of the clinical learning environment in Operating Theater and identify the factors that affecting the learning outcomes among healthcare students in Saudi Arabia.

We kindly invite you to complete this survey. Be assured that your participation is voluntary and anonymous and that all information collected in this study will be kept confidential. We sincerely appreciate your time and efforts spent completing this survey.

تهدف هذه الدراسة إلى استكشاف تصورات بيئة التعلم السريري في غرف العمليات، وتحديد العوامل المؤثرة على نتائج التعلم لدى طلاب الرعاية الصحية في المملكة العربية السعودية. ندعوكم للمشاركة في هذا الاستبيان. يرجى العلم بأن مشاركتكم تطوعية وسرية، وأن جميع المعلومات المُجمعة في هذه الدراسة ستُحفظ بسرية تامة. نشكركم جزيل الشكر على وقتكم وجهدكم في إكمال هذا الاستبيان.

Declaration

I have gone through the details of the study and I am well informed about the purpose of this survey. I understand that all of my responses would be maintained strictly confidential, and my participation in this study is purely voluntary. I hereby give my consent to participate in this study.

□ Agree

□ Disagree

Perceptions of Healthcare Students about Operation Theater as Clinical Learning Environment and Related Factors Affecting Learning Outcomes

A Cross-Sectional Study Among Healthcare Students in Saudi Arabia

Prince Sultan Military College of Health Sciences (PSMCHS)

تصورات طلاب الرعاية الصحية حول غرفة العمليات كبيئة تعليمية سريرية والعوامل المتعلقة التي تؤثر على نتائج التعلم

دراسة مقطعية بين طلاب الرعاية الصحية في المملكة العربية السعودية

كلية الأمير سلطان العسكرية للعلوم الصحية (PSMCHS)

Surgical Theatre Educational Environment Measure (STEEM) Questionnaire / استبيان بيئة التعليم في غرفة العمليات الجراحية

Instructions / التعليمات

Please indicate the degree to which you agree with each of the following statements based on your experience in the surgical theatre. Use the following scale:
1 = Strongly Disagree 2 = Disagree 3 = Neutral 4 = Agree 5 = Strongly Agree

يرجى تحديد مدى موافقتك على كل من العبارات التالية بناءً على تجربتك في غرفة العمليات .استخدم المقياس التالي:
1 = أعارض بشدة 2 =أعارض 3 =محايد 4 =أوافق 5 =أوافق بشدة

Section A: Demographic Information / القسم أ :المعلومات الديموغرافية

1. Age / العمر: _____

2. Gender / الجنس: Male / ذكر Female / أنثى

3. Academic Year when the training taken/ السنة الدراسية حين تلقيك للتدريب : _____

4. Specialty/Program / التخصص/البرنامج: _____

5. Have you attended any clinical rotation in the Operation Theater? / هل حضرت أي تدريب سريري في غرفة العمليات؟ Yes / نعم No / لا

6. Duration of OT rotation (in weeks) /)بالأسابيع(مدة التدريب في غرفة العمليات: _____

Section B: STEEM Questionnaire / القسم ب :استبيان STEEM
Teaching and Training / التدريس والتدريب
1. My trainer is enthusiastic about teaching. / مدربي متحمس للتدريس.
2. Before the operation, my trainer discusses the surgical technique planned. / قبل العملية، يناقش مدربي التقنية الجراحية المخطط لها.
3. My trainer uses the operating list as a learning opportunity. / يستخدم مدربي قائمة العمليات كفرصة تعليمية.
4. I receive constructive feedback on my performance. / أتلقى ملاحظات بناءة حول أدائي.
5. My trainer is patient when teaching. / مدربي صبور أثناء التدريس.
6. My trainer encourages questions. / يشجع مدربي على طرح الأسئلة.
7. My trainer explains procedures and techniques during operations. / يشرح مدربي الإجراءات والتقنيات أثناء العمليات.
8. My trainer is a good role model. / مدربي قدوة جيدة.
9. The theatre staff are willing to teach. / طاقم غرفة العمليات على استعداد للتدريس.
10. Teaching is tailored to my level of training. / يتم تكييف التدريس مع مستوى تدريبي.
11. My trainer sets clear learning objectives. / يحدد مدربي أهداف تعليمية واضحة.
12. My trainer involves me in decision-making. / يشركني مدربي في اتخاذ القرار.
13. My trainer discusses errors in a supportive way. / يناقش مدربي الأخطاء بطريقة داعمة.
Learning Opportunities / فرص التعلم
1. There are enough theatre sessions per week for me to gain the appropriate experience. / هناك عدد كافٍ من الجلسات الأسبوعية في غرفة العمليات لأكتسب الخبرة المناسبة.
2. I get enough opportunity to assist. / أحصل على فرص كافية للمساعدة.
3. I get enough opportunity to perform procedures under supervision. / أحصل على فرص كافية لأداء الإجراءات تحت الإشراف.
4. The elective operating list has the right case mix to suit my training. / تحتوي قائمة العمليات الاختيارية على مزيج مناسب من الحالات لتدريبي.
5. The variety of emergency cases gives me appropriate exposure. / توفر الحالات الطارئة المتنوعة تعرّضًا مناسبًا.
6. The timing of lists allows enough time for teaching. / تسمح مواعيد الجلسات بوقت كافٍ للتدريس.
7. I get the opportunity to follow up patients post-operatively. / أحصل على فرصة لمتابعة المرضى بعد العملية.
8. I have access to pre-operative and post-operative notes. / لديّ إمكانية الوصول إلى الملاحظات قبل وبعد العملية.
9. My clinical skills have improved during my time in theatre. / تحسنت مهاراتي السريرية خلال وقتي في غرفة العمليات.
Atmosphere / الجو العام
1. The atmosphere in theatre is pleasant. / الجو في غرفة العمليات مريح.
2. I feel like a part of the team in theatre. / أشعر أنني جزء من الفريق في غرفة العمليات.
3. The theatre staff are friendly. / طاقم غرفة العمليات ودود.
4. Communication among team members is good. / التواصل بين أعضاء الفريق جيد.
5. I am treated with respect by staff. / يتم التعامل معي باحترام من قبل الطاقم.
6. Theatre sessions are well organized. / جلسات غرفة العمليات منظمة جيدًا.
7. I feel confident asking questions in theatre. / أشعر بالثقة في طرح الأسئلة في غرفة العمليات.
8. I feel safe expressing uncertainty or concerns. / أشعر بالأمان عند التعبير عن الشكوك أو المخاوف.
Supervision/Workload/Support / الإشراف/عبء العمل/الدعم
1. I receive adequate supervision during procedures. / أتلقى إشرافًا كافيًا أثناء الإجراءات.
2. There is always someone available to guide me if needed. / يوجد دائمًا شخص متاح لتوجيهي عند الحاجة.
3. I am not too busy with other tasks to attend theatre. / لست مشغولًا جدًا بمهام أخرى تمنعني من حضور غرفة العمليات.
4. The workload allows time for teaching. / يسمح عبء العمل بوقت للتدريس.
5. I do not feel discriminated against because of my sex or race. / لا اشعر بالتمييز في غرفة العمليات بسبب جنسي او عرقي
6. The trainer is supportive of clinical teaching. / يدعم طبيب التخدير عملية التعليم الجراحي.

Citation / المرجع
Sarfraz T, Azfar SM, Azim SR, Majeed M. Assessing students' perception of the surgical theatre educational environment of a private medical college in Pakistan. Journal of University Medical & Dental College. 2024;15(3):847-854.

Appendix II: Time Frame

Work Stages According to The Plan	Durational Progress in weeks																							Name of The Researcher Assigned in Each Work
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	

																						24	
Topic selection/ Objectives																							
Submission of proposal for approval																							
Developing the tool																							
Final submission of the toolh Validity of the tool																	I						
Chapter 1&2																							
Data collection																							
Chapter 3&4																							
Final submission of the research																							

Appendix III: IRP approval

IRB-2025-AT-045
08/05/2025

المملكة العربية السعودية
وزارة الدفاع
وكالة الوزارة لخدمات التميز
الإدارة العامة للخدمات الصحية

وزارة الدفاع
MINISTRY OF DEFENSE

Institutional Review Board (IRB)

IRB Number	IRB-2025-AT-045	Research Proposal # IRB Acknowledgment	IRB-2025-AT-045
Project Title	Perceptions of healthcare students about Operation Theater as Clinical Learning Environment and related factors affecting learning outcomes: A Cross-Sectional Study Among Healthcare Students in Saudi Arabia.		
Principal Investigator (PI)	Dr. Hassan Shaalb	Co-Investigators	Nada Hussain Almalki Asya Faisal Aldossari Salem Jaber Alyatimi Mashari Mohammad Algarzai Ahmed Saleh Alqahtani
College	PSMCHS	Department	Anesthesia Technology
Approval Date	08-May-2025		
Expiration Date	07-May -2026		

Thank you for submitting your application to the Institutional Review Board (IRB) office at the Prince Sultan Military College of Health Science. This application is eligible for being expedited review.

On completion of the research, the Principal Investigator is required to advise the Institutional Review Board if any changes are made to the protocol, a revised protocol must be submitted to the Institutional Review Board for reconsideration. If an unexpected situation or adverse event happens during your investigations, please notify the PSMCHS IRB as soon as possible. Please refer to the IRB number denoted above in all communications related to your application and this approval.

Projects, which have not commenced within one year of the original approval, must be Re-submitted to the college Institutional Review Board (IRB) Committee. If you are unable to complete your research within the validation period, you will be required to request an extension from the IRB Committee.

Approval is given on the understanding that the "Guidelines for Ethical Research Practice" are adhered to. Where required, a signed written consent form must be obtained from each participant in the study group. Furthermore, you are required to submit final report to IRB office once your study is completed.

Dr. SAAD AL RABEEAH
Chairman of the Institutional Review Board

HA-05-D-046