Operating Room Nurses' Training and Work Experience on Aseptic Procedure Adherence

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ABSTRACT

Operating room nurses are responsible for maintaining strict aseptic procedures to prevent surgical site infections. Understanding the role of their training and work experience is essential in examining factors that influence adherence to these practices. This study looked into the operating room nurses' training and work experience on aseptic procedures adherence among nurses in Zamboanga del Norte. This study employed a descriptive-correlational design and was conducted in three hospitals in Zamboanga del Norte. Using purposive sampling, 120 operating room nurses from selected public and private hospitals were selected as respondents. Data were gathered through validated questionnaires on OR nurses' training, work experience and adherence to aseptic procedures. Statistical analyses including average weighted mean, Pearson's r correlation and regression analysis were used to interpret the findings. The study found that nurses perceived their operating room training as very adequate and their work experience as very great extent. All adherence indicators were rated very high, reflecting strong awareness of infection risks. Strong positive correlations were observed between OR training and adherence domains, while work experience was positively associated with compliance to aseptic procedures. Communication skills, confidence in decision-making, clinical judgment and team collaboration were identified as key predictors of adherence to aseptic practices. It is concluded that OR training and work experience enhance nurses' skills and awareness, while judgment, proficiency and teamwork promote adherence to aseptic procedures. Operating Room nurses may engage in training, hands-on experience and teamwork to enhance skills and adherence to aseptic procedures. Infection prevention education may be reinforced and future research should examine team dynamics and leadership in sustaining aseptic practices.

Keywords: adherence, aseptic technique, collaboration, infection prevention, nurses

INTRODUCTION

Operating room (OR) nurses play a pivotal role in safeguarding patient outcomes during surgical procedures, as they are directly responsible for maintaining a sterile environment, ensuring adherence to safety protocols, and supporting the surgical team throughout perioperative care. The operating room is inherently a high-risk and high-pressure environment, requiring sustained concentration, rapid decision-making, and precise technical execution. However, the demanding nature of this setting often exposes nurses to significant levels of occupational stress, which may adversely affect performance and compromise patient safety. Empirical evidence suggests that heightened stress among OR nurses may contribute to lapses in aseptic technique, thereby increasing the risk of surgical site infections (SSIs) and other postoperative complications.[1] Furthermore, excessive workload, fatigue, and burnout have been associated with instances of negligence and procedural violations, ultimately leading to adverse patient outcomes.[2] These concerns highlight the importance of examining the factors that influence OR nurses' adherence to aseptic practices, as such adherence is critical in minimizing preventable harm and improving the quality of surgical care.[3]

Training is widely recognized as a fundamental determinant of nurses' competence and performance in the operating room. Structured educational programs equip OR nurses with the essential knowledge and skills required to maintain sterility, implement infection control measures, and respond effectively to intraoperative challenges. Continuous professional development, including simulation-based training and evidence-based education, has been shown to significantly enhance nurses' adherence to aseptic protocols and reduce the incidence of SSIs.[4] For instance, nurses who undergo regular training in aseptic techniques demonstrate higher compliance with infection prevention standards compared to those with limited training exposure.[5] Simulation-based learning further strengthens clinical preparedness by enabling nurses to practice emergency scenarios in a controlled environment, thereby improving their responsiveness during high-risk surgical procedures.[6] Additionally, formal training programs reinforce proper hand hygiene, sterile field maintenance, and adherence to surgical safety guidelines, all of which are essential in preventing infection and ensuring patient safety.[7]

Beyond technical skill development, training also enhances critical competencies such as clinical decision-making, communication, and teamwork. Operating room nurses must collaborate closely with surgeons, anesthesiologists, and other healthcare professionals, making effective communication and coordination indispensable. Evidence indicates that interdisciplinary training programs significantly improve team dynamics and reduce the likelihood of surgical errors by fostering shared understanding and mutual accountability among team members.[8] Moreover, nurses who receive comprehensive training in both clinical and interpersonal skills exhibit improved judgment and are better equipped to anticipate potential complications during surgery, thereby contributing to more favorable patient outcomes.[9] The integration of teamwork-focused education into nursing practice has likewise been associated with enhanced patient safety and reduced procedural errors.[10]

The adoption of evidence-based practices through training further strengthens the quality of care delivered in the operating room. Training programs that emphasize current clinical guidelines, antimicrobial stewardship, and infection prevention strategies enable nurses to align their practices with the latest standards in healthcare. Studies have demonstrated that nurses trained in evidence-based infection control measures are more effective in reducing hospital-acquired infections, including SSIs, by adhering to recommended protocols for sterilization and patient care.[11] Continuous education ensures that nurses remain updated with evolving surgical practices, thereby minimizing the risk of complications and improving postoperative recovery outcomes.[12] These findings underscore the critical role of sustained training initiatives in promoting adherence to aseptic procedures and enhancing overall surgical safety.

In addition to training, work experience is another crucial factor influencing the competence and effectiveness of OR nurses. Experience gained through prolonged exposure to diverse surgical procedures enables nurses to refine their technical skills, deepen their clinical knowledge, and develop the ability to respond effectively to unexpected situations. Experienced OR nurses have been found to demonstrate superior proficiency in maintaining sterile fields and preventing infections, thereby contributing to improved patient safety.[13] Moreover, exposure to a wide range of clinical scenarios enhances adaptability and enables nurses to manage complex surgical cases with greater confidence and efficiency.[14] As nurses accumulate experience, they become more adept at identifying potential risks and implementing timely interventions, ultimately reducing the likelihood of adverse outcomes.[15]

Work experience also plays a significant role in strengthening nurses' clinical judgment and decision-making abilities. Experienced nurses are better equipped to recognize early signs of complications, such as infection or hemorrhage, allowing for prompt and appropriate responses.[16] Their confidence in making critical decisions contributes to improved coordination within the surgical team and enhances overall workflow efficiency.[17] Furthermore, nurses with extensive experience tend to perform more effectively under pressure, demonstrating resilience and sound judgment in high-stakes situations, which is essential in the operating room environment.[18]

Another important dimension of work experience is its impact on teamwork and collaboration. Over time, OR nurses develop strong professional relationships with other members of the surgical team, facilitating effective communication and coordination. Familiarity with team dynamics allows experienced nurses to anticipate the needs of surgeons and anesthesiologists, thereby streamlining surgical processes and minimizing errors.[19] Additionally, experienced nurses often assume mentorship roles, guiding less experienced colleagues and

contributing to the development of a competent and cohesive healthcare workforce.[20] Such collaborative environments are essential for ensuring high-quality patient care and optimal surgical outcomes.

Adherence to aseptic techniques remains a cornerstone of patient safety in the operating room, as it directly influences the prevention of SSIs and other healthcare-associated infections. Strict compliance with aseptic protocols, including proper hand hygiene, sterilization of instruments, and maintenance of sterile fields, has been consistently associated with reduced infection rates.[21] Studies indicate that vigilant adherence to these practices significantly minimizes the introduction of pathogens during surgical procedures, thereby lowering the risk of postoperative complications.[22] Moreover, adherence to aseptic techniques has been linked to improved recovery outcomes, including shorter hospital stays and reduced healthcare costs.[23] Patients who undergo procedures in environments where aseptic protocols are rigorously followed are less likely to experience complications such as wound infections and dehiscence.[24]

Despite the established importance of training and work experience in promoting aseptic adherence, there remains a notable gap in localized research examining these relationships within specific healthcare settings. Much of the existing literature has been conducted in developed countries or in contexts that differ significantly from the conditions present in many regions, including parts of the Philippines. Variations in healthcare infrastructure, institutional policies, and resource availability may influence how training and experience affect nurses' adherence to aseptic procedures. In provinces such as Zamboanga del Norte, where public and private hospitals operate under diverse conditions, there is limited empirical evidence on how these factors interact to shape infection control practices. This lack of context-specific data hinders the development of targeted interventions that address the unique challenges faced by healthcare providers in such settings.

The present study was therefore undertaken to address this knowledge gap by examining the relationship between operating room nurses' training, work experience, and their adherence to aseptic procedures within the context of Zamboanga del Norte. The findings are expected to provide valuable insights for healthcare institutions, policymakers, and educators in designing strategies that enhance training programs, strengthen institutional support, and promote a culture of safety in the operating room.

Ultimately, improving adherence to aseptic procedures among OR nurses has far-reaching implications for patient safety and healthcare quality. By addressing the factors that influence compliance with infection control protocols, healthcare systems can reduce the incidence of surgical site infections, improve patient outcomes, and optimize resource utilization. This study contributes to the growing body of knowledge on perioperative nursing by providing context-specific evidence that can inform practice, policy and future research in the field.

METHODS

Research Design

This study employed a quantitative research approach utilizing a descriptive–correlational design. The design was selected to investigate the relationship between operating room (OR) nurses' training, work experience, and their adherence to aseptic procedures.

Research Setting

The study was conducted in selected public and private hospitals located in the province of Zamboanga del Norte, Philippines. These institutions were chosen due to their essential roles in delivering healthcare services within the region and their capacity to provide surgical care in diverse operating room environments. The inclusion of both public and private hospitals allowed for a more comprehensive assessment of variations in institutional practices, training opportunities, and resource availability.

The selected hospitals varied in terms of size, level of licensure, number of personnel, patient demographics and organizational structure. Differences were also observed in the volume and type of surgical procedures performed, ranging from elective surgeries to emergency interventions. Additionally, variations in training programs, availability of resources and implementation of infection control measures were considered important

contextual factors that could influence nurses' adherence to aseptic techniques. These diverse characteristics made the selected settings appropriate for examining how training and work experience relate to aseptic practice adherence across different healthcare environments.

Participants and Sampling

The participants of the study were operating room nurses employed in the identified hospitals. A total of 120 OR nurses were selected using purposive sampling, a non-probability sampling technique that involves selecting individuals based on predefined inclusion criteria relevant to the research objectives. This approach ensured that only participants with direct exposure to the operating room environment and relevant professional experience were included.

The inclusion criteria were as follows: (1) registered nurses currently assigned to the operating room; (2) nurses who had provided informed consent to participate; and (3) nurses categorized as "new nurses," defined in this study as those with not more than three years of operating room experience. The focus on relatively less experienced nurses allowed the study to capture variability in training exposure and early-stage professional development, which are critical in shaping adherence behaviors.

Research Instruments

Data were collected using three structured, researcher-developed questionnaires designed to measure the key variables of the study: OR nurses' training, work experience and aseptic procedure adherence. All instruments utilized a 4-point Likert scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree).

The Operating Room Nurses' Training Questionnaire consisted of 28 items distributed across four constructs: clinical competence, knowledge of aseptic techniques, communication skills, and confidence in decision-making. Each construct included seven items. The instrument underwent content validation by experts, including a nursing adviser, nursing supervisor, and experienced OR nurses. Pilot testing was conducted among 30 nurses with similar characteristics to the study participants. Reliability analysis yielded Cronbach's alpha coefficients of 0.8822 for clinical competence, 0.8660 for aseptic knowledge, 0.8492 for communication skills, and 0.8037 for decision-making confidence, indicating good internal consistency.

The Operating Room Nurses' Work Experience Questionnaire comprised 21 items covering three constructs: clinical judgment and decision-making, technical skill proficiency, and team collaboration. Reliability testing demonstrated strong internal consistency, with Cronbach's alpha values of 0.8688, 0.9014, and 0.8908, respectively.

The Operating Room Nurses' Aseptic Procedure Adherence Questionnaire included 28 items assessing four constructs: knowledge of infection control guidelines, perceived severity and susceptibility to infection, environmental and institutional support, and attitudes and behavioral intentions. The instrument demonstrated acceptable reliability, with Cronbach's alpha coefficients of 0.7325, 0.7635, 0.8184, and 0.7465, respectively.

Interpretation of responses was based on predefined ranges corresponding to qualitative descriptors (e.g., very adequate, adequate, high, low), facilitating meaningful analysis of the data.

Data Collection Procedure

The data collection process began with securing formal approval from the Graduate School Dean of Misamis University, followed by obtaining permission from hospital administrators and chief nurses of the selected institutions. These approvals were necessary to ensure institutional support and access to participants.

After obtaining the required permissions, the researcher coordinated with chief nurses to identify eligible participants. The purpose and procedures of the study were explained to prospective respondents, and informed consent was obtained prior to questionnaire distribution. Participants were given sufficient time, approximately 30 minutes, to complete the survey instruments.

Upon completion, the questionnaires were collected, checked for completeness, and organized for data processing. The collected data were then encoded, tabulated, and prepared for statistical analysis with the assistance of a statistician.

Ethical Considerations

The study adhered to ethical standards and was approved by the Misamis University Research Ethics Committee. Participation was voluntary, and informed consent was obtained from all respondents. Participants were assured of confidentiality and anonymity, and no identifying information was included in the data analysis or reporting.

Respondents were informed of their right to withdraw from the study at any time without penalty. Measures were taken to minimize any potential risks, ensuring that participation did not cause physical or psychological harm. Data were securely stored and accessible only to the researcher, and all records were scheduled for disposal six months after the completion of the study.

The study upheld the principles of beneficence and respect for persons by ensuring that the findings would contribute to improving nursing practice, enhancing infection control compliance, and promoting patient safety.

Data Analysis

Data analysis was conducted using appropriate statistical techniques to address the research objectives. The Average Weighted Mean was used to determine the central tendency of responses and to describe the levels of training, work experience, and aseptic procedure adherence.

To examine relationships between variables, Pearson's Product–Moment Correlation Coefficient (r) was employed. This statistical method measured the strength and direction of linear relationships between continuous variables, allowing the researcher to determine whether significant associations existed between training, work experience, and aseptic adherence.

Furthermore, multiple regression analysis was utilized to identify predictors of aseptic procedure adherence. This technique enabled the examination of the combined and individual effects of training and work experience on the dependent variable.

RESULTS

The findings of this study present a comprehensive profile of operating room (OR) nurses' training, work experience, adherence to aseptic procedures, and the relationships among these variables. The results reveal consistently high levels across all measured domains, indicating a well-prepared and competent nursing workforce within the perioperative setting.

In terms of operating room training, the results demonstrate that nurses perceive their training to be highly adequate across all four competency domains: clinical competence, knowledge of aseptic techniques, communication skills, and confidence in decision-making. Among these, clinical competence emerged as the most strongly developed domain, suggesting that nurses feel well-equipped to perform essential perioperative tasks and responsibilities. This indicates that training programs have effectively strengthened nurses' technical capabilities, procedural skills, and readiness to function in high-stakes surgical environments.

Knowledge of aseptic techniques also registered a very high level, reflecting strong familiarity with infection prevention protocols such as sterilization, hand hygiene, and maintenance of a sterile field. This finding suggests that nurses possess a solid theoretical and practical understanding of infection control standards, which is critical in minimizing surgical site infections and ensuring patient safety. The strong rating in this domain indicates that training programs are successfully reinforcing essential infection prevention competencies.

Communication skills, although still rated highly, were slightly lower compared to technical competencies. This suggests that while nurses feel generally prepared to communicate within the surgical team, there may be relatively less confidence in aspects such as interprofessional coordination, information exchange, and teamwork

under pressure. Similarly, confidence in decision-making, while also high, received the lowest rating among the four domains. This indicates that decision-making confidence may develop more gradually and may require continued exposure to complex clinical scenarios. Overall, the results suggest that while technical competencies are strongly established through training, non-technical skills such as communication and decision-making may require further experiential reinforcement.

The overall findings on training indicate that OR nurses perceive their educational preparation as comprehensive and aligned with clinical demands. However, the slight variation between technical and non-technical domains highlights the nuanced nature of competency development, where procedural skills are more readily acquired through structured instruction, while cognitive and interpersonal skills evolve through practice and experience.

Table 1 Level of Operating Room Training

Nurses OR Training	Weighted Mean	StDev	Interpretation
Clinical Competence	3.57	0.3998	VA
Aseptic Technique Knowledge	3.52	0.4004	VA
Communication Skills	3.51	0.8988	VA
Confidence in Decision Making	3.50	0.4002	VA
Overall Weighted Mean	**3.53**	**0.287**	**VA**

Legend: 3.26-4.00 – Very Adequate (VA)

1.76-2.50 – Less Adequate (LA)

2.51-3.25 – Adequate (A)

1.00-1,75 - Inadequate

With respect to work experience, the findings reveal that nurses perceive their clinical exposure as having a very strong influence on their professional competence. All three domains—clinical judgment and decision-making, technical skills proficiency, and team collaboration—were rated at a very high level, indicating that experience plays a critical role in shaping nurses' capabilities.

Among these, team collaboration was identified as the most strongly developed aspect of work experience. This suggests that continuous interaction within multidisciplinary teams enhances nurses' ability to coordinate effectively, communicate clearly, and participate in shared decision-making. The findings imply that collaborative competence is largely developed through immersion in real-world clinical environments, where nurses engage with surgeons, anesthesiologists, and other healthcare professionals.

Clinical judgment and decision-making also showed a very strong level, indicating that accumulated experience enhances nurses' ability to assess patient conditions, anticipate complications, and make informed decisions in perioperative settings. This reflects the role of experiential learning in refining critical thinking and situational awareness. Similarly, technical skills proficiency was rated highly, suggesting that repeated performance of procedures contributes to mastery and efficiency in clinical tasks.

The overall pattern of results in work experience demonstrates that experiential learning contributes holistically to the development of cognitive, technical, and interpersonal competencies. The consistency of high ratings across all domains indicates a strong consensus among respondents regarding the value of experience in enhancing professional performance.

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Table 2 Extent of Nurses' Work Experience

Nurses' Work Experience	Weighted Mean	StDev	Interpretation
Clinical Judgement and Decision Making	3.50	0.4223	VGE
Technical Skills Proficiency	3.49	0.3979	VGE
Team Collaboration	3.52	0.4058	VGE
Overall Weighted Mean	**3.50**	**0.0153**	**VGE**

Legend: 3.26-4.00 – Very Great Extent (VGE)

1.76-2.50 – Less Extent (LE)

2.51-3.25 – Great Extent

1.00-1,75 – Very Low Extent (VLE)

In terms of adherence to aseptic procedures, the findings show that nurses exhibit a very high level of compliance across all measured domains, including knowledge of infection control guidelines, perceived severity and susceptibility to infection, environmental and institutional support, and attitudes and behavioral intentions. This suggests that adherence to aseptic protocols is deeply embedded in both the knowledge base and professional behavior of the respondents.

Among the domains, perceived severity and susceptibility to infection emerged as the most prominent factor. This indicates that nurses have a strong awareness of the risks associated with healthcare-associated infections and recognize the serious consequences of non-compliance. Such heightened risk perception likely serves as a motivational driver for strict adherence to aseptic practices.

Knowledge of infection control guidelines was also rated very high, confirming that nurses are well-informed about standard precautions and evidence-based practices. This suggests that adherence is supported by a strong cognitive foundation, where nurses understand the rationale behind infection prevention measures.

Environmental and institutional support likewise received a very high rating, indicating that respondents perceive their workplace as conducive to maintaining aseptic standards. This includes the availability of resources, enforcement of policies, and organizational emphasis on patient safety. The findings suggest that adherence is not solely an individual responsibility but is reinforced by systemic and institutional factors.

Attitudes and behavioral intentions toward aseptic procedures were also highly positive, reflecting a strong internal commitment to infection prevention. This indicates that nurses not only possess the knowledge and resources necessary for adherence but also demonstrate a professional disposition that prioritizes patient safety.

Overall, the results indicate that adherence to aseptic procedures is multidimensional, influenced by knowledge, perception of risk, institutional support, and personal commitment. The consistently high ratings across all domains suggest a strong culture of safety and compliance within the operating room environment.

Table 3 Level of Nurses' Adherence to Aseptic Procedure

Nurses' Adherence to Aseptic Procedure	Weighted Mean	StDev	Interpretation
Knowledge of Infection Control Guidelines	3.55	0.4102	VH
Perceive Severity and Susceptibility to Infection	3.66	0.3795	VH

Environmental and Institutional Support	3.55	0.2021	VH
Attitudes and Behavioral Intentions	3.61	0.3999	VH
Overall Weighted Mean	**3.59**	**0.0532**	**VH**

Legend: 3.26-4.00 – Very High (VH)

1.76-2.50 – Low (L)

2.51-3.25 – High (H)

1.00-1,75 – Very Low (VL)

The analysis of relationships between operating room training and adherence to aseptic procedures revealed significant positive associations across all domains. This indicates that higher levels of training are consistently associated with stronger adherence to infection control practices. Nurses who reported greater competence in clinical skills, aseptic knowledge, communication, and decision-making also demonstrated higher levels of knowledge, risk perception, engagement with institutional support, and positive attitudes toward aseptic behavior.

Among the training components, clinical competence and aseptic technique knowledge showed the strongest relationships with adherence domains. This suggests that technical training plays a central role in reinforcing both the cognitive and behavioral aspects of infection control. However, non-technical competencies such as communication skills and decision-making confidence were also significantly related to adherence, indicating that these skills contribute to how nurses interpret, apply, and sustain aseptic practices within the clinical environment.

The uniformly positive relationships across all variables suggest that training exerts a comprehensive influence, shaping not only technical proficiency but also perceptions, attitudes, and behavioral intentions. These findings highlight the importance of a multidimensional training approach that integrates both technical and non-technical competencies.

Table 4 Significant Relationship between the Level of Nurses' Operating Room Training and their Level of Adherence to Aseptic Procedure

Nurses Training Attended	Knowledge of Infection Control Guidelines	Perceived Severity and Susceptibility to Infection	Environmental and Institutional Support	Attitudes and Behavioral Intentions
Clinical Competence	r=0.644 p=0.00** Reject Ho	r=0.486 p=0.00** Reject Ho	r=0.458 p=0.00** Reject Ho	r= 0.501 p=0.00** Reject Ho
Aseptic Techniques Knowledge	r=0.620 p=0.00** Reject Ho	r=0.589 p=0.00** Reject Ho	r=0.516 p=0.00** Reject Ho	r=0.575 p=0.00** Reject Ho

Communication Skills	r=0.642 p=0.00** Reject Ho	r=0.558 p=0.00** Reject Ho	r=0.502 p= 0.00** Reject Ho	r=0.607 p= 0.00** Reject Ho
Confidence in Decision Making	r=0.629 p=0.00** Reject Ho	r=0.544 p=0.00** Reject Ho	r=0.561 p=0.00** Reject Ho	r=0.596 p=0.00** Reject Ho

Ho. There is no significant relationship between the nurses' Operating Room Training and their Adherence to Aseptic Procedure

Legend: 0.00-0.01-Highly Significant** 0.02-0.05 Significant* above 0.05 Not Significant

Similarly, the relationship between work experience and adherence to aseptic procedures was found to be significant across all domains. The results indicate that as nurses' experience increases, their adherence to infection control practices also improves. Clinical judgment and decision-making, technical skills proficiency, and team collaboration were all positively associated with knowledge of guidelines, risk perception, institutional engagement, and behavioral commitment.

Clinical judgment and decision-making showed particularly strong relationships with knowledge and risk perception, suggesting that experienced nurses are better able to interpret and apply infection control standards in real-time situations. Technical skills proficiency was associated with both knowledge and attitudes, indicating that hands-on competence reinforces confidence and commitment to aseptic practices. Team collaboration was strongly linked with perceptions of institutional support and behavioral intentions, highlighting the role of teamwork in sustaining adherence.

These findings demonstrate that experience enhances not only technical execution but also cognitive understanding and attitudinal commitment to infection prevention. The consistent positive relationships across all domains underscore the integral role of experiential learning in promoting safe clinical practice.

Table 5 Significant Relationship between the Extent of Nurses' Work Experience and their Level of Adherence to Aseptic Procedure

Nurses' Work Experience	Knowledge of Infection Control Guidelines	Perceived Severity and Susceptibility to Infection	Environmental and Institutional Support	Attitudes and Behavioral Intentions
Clinical Judgement and Decision Making	r=0.664 p=0.00** Reject Ho	r=0.504 p=0.00** Reject Ho	r=0.506 p=0.00** Reject Ho	r=0.496 p=0.00** Reject Ho
Technical Skills Proficiency	r=0.560 p=0.00** Reject Ho	r=0.481 p=0.00** Reject Ho	r=0.523 p=0.00** Reject Ho	r=0.532 p=0.00** Reject Ho

Team Collaboration	r= 0.690 p=0.00** Reject Ho	r= 0.590 p=0.00** Reject Ho	r= 0.545 p=0.00** Reject Ho	r= 0.677 p=0.00** Reject Ho

Ho. There is no significant relationship between the extent of nurses' work experience and their level of adherence to aseptic procedure

Legend: 0.00-0.01-Highly Significant** 0.02-0.05 Significant* above 0.05 Not Significant

Finally, the regression analysis revealed that operating room training and work experience collectively explain a substantial proportion of the variance in nurses' adherence to aseptic procedures, particularly in the domain of attitudes and behavioral intentions. Among the predictors, team collaboration emerged as the strongest positive contributor, indicating that effective teamwork is the most influential factor in promoting adherence. This suggests that collaborative environments foster shared responsibility, mutual monitoring, and reinforcement of aseptic practices.

Communication skills and confidence in decision-making also showed significant positive contributions, indicating that nurses who communicate effectively and feel confident in their clinical decisions are more likely to adhere to infection control protocols. These findings highlight the importance of non-technical competencies in shaping behavioral outcomes.

In contrast, clinical judgment and decision-making demonstrated a negative association when considered alongside other variables. This suggests a more complex relationship, where higher levels of independent judgment may, in some cases, be associated with deviations from standardized protocols. This finding indicates that while clinical judgment is essential, it must be balanced with adherence to established guidelines to ensure patient safety.

Overall, the regression results indicate that adherence to aseptic procedures is influenced by a combination of interpersonal, cognitive, and experiential factors. The strong predictive capacity of the model suggests that training and experience, particularly in communication and collaboration, play a critical role in shaping nurses' infection control behaviors.

In summary, the findings of this study demonstrate that operating room nurses exhibit high levels of training adequacy, extensive experiential competence, and strong adherence to aseptic procedures. Both training and work experience are significantly associated with adherence, with teamwork, communication, and decision-making confidence emerging as key contributing factors. These results underscore the multifaceted nature of competence and highlight the importance of integrating technical skills, experiential learning, and collaborative practice in promoting effective infection control in perioperative settings.

Table 6 Level of Nurses' Operating Room Trainings and Extent of Work Experience are not Predictors of their Level of Adherence to Aseptic Procedure

Term	Coef	SE Coef	T-Value	P-Value
Constant	0.807	0.255	3.16	0.00
Communication Skills	0.2753	0.0967	2.85	0.00
Confidence in Decision Making	0.2961	0.0973	3.04	0.00
Clinical Judgment and Decision Making	-0.225	0.103	-2.18	0.03

Team Collaboration	0.451	0.102	4.41	0.00

Regression Equation

udes and Behavioral Intentions = 0.807 + 0.2753 communication skills + 0.2961 confidence in decision making - 0.225 clinical judgement and decision making + 0.451 team collaboration

Model Summary

S	R-sq	R-sq(adj)	R-sq(pred)
0.277490	53.47%	51.85%	46.48%

Ho: Level of nurses' operating room trainings and extent of work experience are not predictors of their level of adherence to aseptic procedure.

DISCUSSION

The findings of this study provide strong evidence that operating room (OR) nurses demonstrate high levels of training adequacy, extensive work experience, and very high adherence to aseptic procedures, with all variables significantly interrelated. Taken together, these results underscore the critical role of both formal training and experiential learning in promoting safe perioperative practice and minimizing infection risks. The overall pattern of results suggests that nurses are not only technically prepared for their roles but are also able to translate their competencies into consistent adherence to infection control standards, thereby reinforcing patient safety within the surgical environment.

The results indicate that OR nurses perceive their training as very adequate across all domains, particularly in clinical competence and aseptic technique knowledge. This suggests that existing training programs effectively equip nurses with the technical skills required to perform perioperative tasks with precision and confidence. Such findings are consistent with recent literature demonstrating that structured clinical education and competency-based training significantly enhance both perceived and actual nursing competence.[25] Simulation-based education and continuous professional development have likewise been shown to improve technical proficiency and readiness in high-risk clinical environments.[26] However, the slightly lower ratings observed in communication skills and decision-making confidence suggest that while technical competencies are well developed through formal training, non-technical skills may require more sustained experiential reinforcement. This aligns with existing evidence indicating that competencies such as communication, teamwork, and clinical judgment are not fully developed through didactic instruction alone but evolve through repeated exposure to real-world clinical scenarios.[27]

These findings are well supported by Benner's Novice to Expert Theory, which posits that nurses develop competence progressively through experiential learning, reflective practice, and clinical immersion. According to this framework, technical skills can be acquired relatively early through structured training, while higher-order competencies such as decision-making and communication develop gradually as nurses gain experience and move toward proficiency and expertise.[28] The pattern observed in this study, where technical domains received slightly higher ratings than non-technical domains, reflects this developmental progression and highlights the importance of integrating experiential learning strategies into training programs.

In addition to training, the study demonstrates that work experience plays a significant role in shaping nurses' competence, as evidenced by the very great extent ratings across clinical judgment, technical skills, and team collaboration. Among these, team collaboration emerged as the most strongly influenced domain, suggesting that interpersonal and interprofessional competencies are largely developed through workplace exposure rather than formal instruction. This finding is consistent with research indicating that longer clinical experience is associated with improved teamwork behaviors, communication clarity, and shared decision-making in multidisciplinary settings.[29] Similarly, experienced nurses have been shown to exhibit greater adaptability and situational awareness, enabling them to respond effectively to complex and dynamic clinical situations.[30] The

strong influence of experience on collaboration further supports the notion that teamwork skills are cultivated through continuous interaction within the healthcare environment, where nurses learn to coordinate effectively with surgeons, anesthesiologists, and other team members.

The relationship between experience and competence is further explained by Benner's theoretical framework, which emphasizes that expertise is developed through accumulated clinical encounters that allow nurses to move beyond rule-based practice toward intuitive and context-sensitive decision-making. As nurses gain experience, they are better able to integrate theoretical knowledge with practical application, resulting in enhanced clinical judgment, technical efficiency, and collaborative performance.[28] This reinforces the importance of retaining experienced nurses within healthcare systems and providing opportunities for continuous experiential learning to sustain high levels of clinical competence.

A key finding of the study is the very high level of adherence to aseptic procedures across all measured domains, including knowledge of infection control guidelines, perceived severity and susceptibility to infection, environmental and institutional support, and attitudes and behavioral intentions. The highest rating in perceived severity and susceptibility suggests that nurses have a strong awareness of the risks associated with healthcare-associated infections and the consequences of non-compliance. This heightened risk perception serves as a critical motivator for adherence to infection control practices. Supporting this finding, recent studies have demonstrated that healthcare workers who perceive a higher risk of infection are more likely to comply with standard precautions and aseptic protocols.[31] Similarly, strong knowledge of infection prevention guidelines has been consistently associated with higher levels of compliance, indicating that cognitive understanding plays a foundational role in shaping behavior.[32]

The high rating for environmental and institutional support further highlights the importance of organizational factors in promoting adherence to aseptic procedures. Healthcare institutions that provide adequate resources, enforce infection control policies, and foster a culture of safety are more likely to achieve high levels of compliance among staff.[33] This suggests that adherence to aseptic practices is not solely dependent on individual competence but is also influenced by systemic and environmental conditions that facilitate or hinder safe practice. These findings align with the Health Belief Model, which posits that individuals are more likely to engage in preventive behaviors when they perceive a high level of threat and believe that appropriate actions can effectively reduce that threat.[34] In this context, nurses' strong perception of infection risk, combined with adequate knowledge and institutional support, contributes to their consistent adherence to aseptic procedures.

Moreover, the findings can be interpreted through the lens of Orem's Self-Care Deficit Theory, which emphasizes the role of deliberate and purposeful actions in maintaining health and well-being. In the professional context, adherence to aseptic procedures can be viewed as a form of self-care behavior that protects both patients and healthcare providers from harm. Nurses who possess the necessary knowledge, motivation, and environmental support are more likely to engage in these protective behaviors consistently.[35] This highlights the interplay between individual capability and organizational support in sustaining high standards of infection control.

The study further revealed significant positive relationships between OR training and adherence to aseptic procedures, indicating that nurses who receive comprehensive training are more likely to comply with infection control protocols. Both technical competencies and non-technical skills were found to be significantly associated with adherence, suggesting that a multidimensional approach to training is essential. These findings are supported by research demonstrating that training enhances not only knowledge and skills but also attitudes, risk perception, and behavioral intentions toward infection prevention.[36] Additionally, communication and teamwork training have been shown to improve adherence by promoting shared responsibility and enhancing situational awareness within clinical teams.[37]

These relationships can be effectively explained by Bandura's Social Cognitive Theory, which emphasizes the dynamic interaction between personal factors, behavior, and environmental influences. Training enhances nurses' knowledge and self-efficacy, which in turn influences their behavior and their ability to engage with institutional support systems. As nurses apply their training in practice, they reinforce their competence and

confidence, creating a positive feedback loop that sustains adherence to aseptic procedures.[38] This theoretical perspective underscores the importance of designing training programs that address both individual and environmental factors to achieve optimal outcomes.

Similarly, the study found that work experience is significantly associated with adherence to aseptic procedures, further reinforcing the importance of experiential learning. Experienced nurses are more likely to recognize infection risks, apply protocols effectively, and maintain adherence under pressure, as supported by recent studies.[39] Additionally, teamwork developed through experience fosters collective accountability, ensuring that adherence to aseptic practices is maintained consistently across the surgical team.[40] These findings highlight the role of experience in strengthening both the cognitive and behavioral aspects of infection control.

One of the most notable findings of the study is that team collaboration emerged as the strongest predictor of adherence to aseptic procedures, followed by decision-making confidence and communication skills. This underscores the critical role of interpersonal and team-based competencies in ensuring patient safety within the operating room. Effective collaboration enhances communication, promotes shared situational awareness, and facilitates immediate correction of errors, all of which contribute to improved adherence to infection control protocols. This is supported by evidence indicating that high-quality teamwork is a key determinant of patient safety and compliance with clinical guidelines.[41] Furthermore, decision-making confidence, which reflects self-efficacy, has been linked to proactive engagement in infection prevention behaviors, particularly in high-pressure environments.[42]

Interestingly, clinical judgment demonstrated a negative coefficient in the regression model, suggesting that when other variables are controlled, higher self-perceived judgment may be associated with slight deviations from strict adherence. This counterintuitive finding may reflect the complexity of clinical practice, where experienced nurses rely on intuition and adaptability to manage competing demands. In some cases, this may lead to modifications of standard protocols based on situational judgment. Similar patterns have been observed in previous studies, where highly experienced practitioners occasionally deviate from guidelines in response to contextual factors.[43] This finding highlights the need to balance clinical autonomy with adherence to established protocols to ensure patient safety.

Overall, the findings of this study have important implications for nursing practice, education, and policy. Training programs should adopt a holistic approach that integrates both technical and non-technical competencies, including communication, teamwork, and decision-making. Simulation-based learning, mentorship, and interprofessional training should be emphasized to support the development of higher-order skills. Healthcare institutions should also prioritize the retention of experienced nurses and create supportive environments that promote continuous learning and adherence to safety standards. By strengthening both individual competencies and organizational support systems, healthcare providers can enhance adherence to aseptic procedures and improve patient outcomes.

In conclusion, this study demonstrates that operating room training and work experience are critical determinants of nurses' adherence to aseptic procedures, with teamwork emerging as the most influential factor. The integration of training, experience, and organizational support creates a synergistic effect that enhances infection control practices and patient safety. These findings contribute to the growing body of knowledge in perioperative nursing and provide valuable insights for the development of evidence-based strategies to improve clinical practice and healthcare quality.

LIMITATION

While the study focused primarily on novice operating room nurses, which may limit broader generalizability and the variability needed to fully examine the effects of extensive work experience, it offers valuable insight into the perspectives of early-career perioperative practitioners. Additionally, the use of purposive sampling and self-reported questionnaires allowed for targeted data collection from relevant respondents, though these methods may introduce response bias and warrant cautious interpretation of the uniformly high ratings reported.

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