NURSING CHALLENGES IN MANAGING INVASIVE AND NON-INVASIVE PROCEDURES

Hameeda Aljanabi[1], Huda Al-Hussain[2], Fatimah Alobaidan[3], Mona Alkhalaf[4], Hamad Alanazi[5], Zainab Alhammad[6], Leen Al-Wehaiby[7], Mohammed Alzahrani[8], Danyh Abdulaziz[9], Maram Jalis, Rahaf Alqurashi[10], Maryam Alanazi[11], Fatima Alsaaed[12], Ibtihal Al-Ruwaili[14]

[1]Hameeda Matooq Aljanabi, Principal Investigator, PhD Nur. Edu. Candidate, MSN- Nurse Educator, CNE (NLN), hameeda.m.aljanabi@gmail.com, https://orcid.org/0009-0009-2425-2708

[2]Nursing Specialist, Master's in Nursing Education, Alomran General Hospital, 18LN0011017, hah01414@gmail.com , https://orcid.org/0009-0009-5844-242X

[3]Nursing Specialist, Alomran General Hospital, 18LN0016789, Faalobaidan@moh.gov.sa

[4]Nuars, Malkhalif@moh.gov.sa

[5]Medical Officer, Riyadh, Hamadalanazi0@gmail.com

[6]Nursing Specialist, Primary Care Centers - Al-Ahsa Health Cluster, zal-hammad@moh.gov.sa

[7]Medical Student - 5th Year, King Saud Bin Abdulaziz University (KSAU-HS), Alwehaiby10280@ksau-hs.edu.sa

[8]Paramedic, Emergency Medical Technician Kingdom of Saudi Arabia, Malzahrani271@moh.gov.sa

[9]Nursing Student, Nursing Student at Taibah University, Danyh7amjed@gmail.com

[10]Special Nurse, King Abdulaziz Special in Al jouuf, rnmaram1996@gmail.com

[11]Staff Nurse, King Fahad Armed Forces Hospital in Jeddah, Alqurashirahaff@gmail.com

[12]Cardiac Operating Room Technician, Prince Sultan Cardiac Center, 12RT0030303, alanzy27378@gmail.com

[13]Specialist-Nursing, Prince Sultan Cardiac Center, Cardiac Surgery Department, 07RT0015268, alsydyfatmt971@gmail.com

[14]Nursing Specialist, Hafar Al-Batin Central Hospital, Ebtehal1439@gmail.com

Abstract

This study investigated perceived difficulty and emotional stress of nurses for invasive and non-invasive medical procedures in different hospital departments. Using a quantitative design, 300 nurses' data were collected, and variables of perceived difficulty, emotional stress, years of experience, and type of procedure were examined. The study found that invasive procedures were far harder (means = 3.7) and emotionally stressful (means = 6.5) compared with their non-invasive equivalents (means = 2.6 and 3.6, respectively) with high statistical power ($p < 0.001$). Importantly, type of hospital department did not have a significant effect on perceived difficulty (ANOVA $p = 0.37$), and therefore routine protocols and repeated training may serve to reduce variability. A significant negative correlation between years of experience and perceived difficulty ($r = -0.33$, $p < 0.001$) was also observed, suggesting that experienced nurses perceive procedures as easier. Risk of infection and bleeding, and patient cooperation and communication were most frequent perceived difficulties with invasive and non-invasive procedures, respectively. Implications for nurse education, staffing plans, and design of support systems for improving procedural readiness and patient safety are provided by the findings. The limitation of the study is the use of subjective outcome measures and limited sample

size. Future research is necessary to examine the impact of targeted intervention and further predictors of procedural difficulty.

Keywords: Nursing challenges; Invasive procedures; Emotional stress; Procedure complexity; Experience level; Departmental protocols; Nurse training; Patient safety; Quantitative analysis; Healthcare staffing.

1. Introduction

Nursing is one of the basic pillars of health systems worldwide, and nursing professionals are directly involved in the health and wellbeing of patients during medical procedures. Among the basic nursing responsibilities is conducting invasive and non-invasive treatment, which is inherent in clinical practice in diagnosis, treatment, and monitoring.[1]

Invasive treatment, like catheter insertion, insertion, and surgery assistance, involves invasion of the body and, in most cases, is accompanied by increased infection and blood loss risks. Non-invasive treatment, like patient monitoring, wound dressing, and communication facilitation, involves no invasion of the body but still demands precision skill and patient compliance.[2] Both treatments call for meticulousness, technical skill, and emotional strength on the part of the nurse.[3]

Between Saudi Arabia's rapidly evolving healthcare system, its expanding hospital infrastructures, and growing demands for quality treatment, the nurse's position in the administration of said treatments is gradually but surely becoming a subject of growing concern. The Saudi healthcare system has transformed tremendously over the decades, and strategies have revolved around how best to enhance patients' safety, reduce medical errors, and enhance clinical outcomes. [4] However, in all of this, the challenges facing the nurse in the act of performing invasive and invasive procedures have been an overlooked aspect. It is imperative that we analyze these challenges since they have a direct correlation with the overall quality of treatment offered, patient safety, and nurse welfare — all of which are essential aspects of sustainable healthcare improvement.[5]

The challenges that emerge in such protocols can be complex, ranging from technical, procedural, emotional, and psychological issues to communication issue and time pressures. Such challenges may lead to increased procedural complexities, heightened nurse tension, and eventual poor patient outcomes. [6] In addition, the extent of the experience of nurses and the specific clinical environment—ICUs, ERs, surgical wards, or general wards—can also further determine the nature and extent of such challenges. In Saudi Arabia, in which nurse shortage as well as pressures on the workforce have been determined by a series of research efforts, the implications of such procedural challenges on nurse job satisfaction and nurse retention are also valuable areas of research.[7]

Despite the severity of all of those issues, previously, research in Saudi Arabia has been focused on examining more general aspects of nursing practice, including patient satisfaction, nursing education, and overall workplace stress, but not the procedural issues of invasive and non-invasive intervention specifically. There is a research gap in comparing the two types of intervention-related issues, emotional distress for the nurse, and the department type and nurse experience in managing the issues. The research gap should be filled in the interest of informing the planning of focused trainings, the optimal staffing and resource planning, and supportive policy that enhances nurse performance and patient safety.[8]

This study plans to fill this research gap since it explores the main concerns facing Saudi Arabian nurses in dealing with invasive and non-invasive procedures. In particular, this study plans to answer

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the following research questions

Q1: What are the main challenges facing nurses in managing invasive and non-invasive procedures in clinical environments in Saudi Arabia?

Q2: Are invasive treatments more technologically, procedurally, and emotionally taxing for nurses than non-invasive treatments?

Q3: Were there significant differences in perceived levels of stress for invasive compared with non-invasive procedures?

Q4: What is the effect of department types (e.g., ICU, ER, Surgical) on challenges of nursing during those procedures?

Q5: What is the function of nursing experience in managing procedural challenges?

Based on the questions, the study establishes the following hypotheses for testing:

Hypothesis 1 (H1): Invasive procedures are viewed by nurses as being significantly more difficult than non-invasive procedures.

Hypothesis 2 (H2): The emotional stress of the nurse is higher during invasive compared with non-invasive procedures.

H3: Department type affects the degree of difficulty that the nurses face.

Hypothesis 4 (H4): Perceived difficulty and nursing experience in years are inversely related, with more experienced nurses reporting fewer difficulties.

Through investigation of these dimensions, this research hopes not just to contribute to the literature, but also to provide insight of utility for health administrators and policymakers in Saudi Arabia. Outcomes should be of use in developing targeted approaches that improve nurse education, reduce occupational tension, and in the long run, improve patient safety and quality of care in invasive and non-invasive techniques. In addition, understanding relationships between procedural difficulty, emotional tension, department dynamics, and nurse experience can contribute to a healthier workplace environment, improved nurse retention and job satisfaction in the wake of challenges presented by a rapidly modernizing health system.

2. Literature Review

2.1 Literature Review Researches

The literature review presents nine recent studies with relevance to nursing knowledge, interventions, and non-invasive practices in which passing references are made to breast cancer, cardiovascular disease, neonatal care, and respiratory management. On this basis, trends, strengths, and research gaps are identified with the intent of suggesting directions both clinically and academically.

1. Knowledge of Non-Invasive Biomarkers (Sayed et al., 2024)

Sayed et al. (2024) assessed nursing students' awareness of non-invasive biomarkers (e.g., volatile organic compounds in breath, nipple aspirate fluid, sweat, urine, and tears) for breast cancer detection. Findings revealed a significant knowledge gap, with only 25% performing BSE monthly. Barriers included lack of knowledge (77.3%), fear of diagnosis (53.9%), and perceived low risk (44.7%). The study emphasized the need for enhanced nursing curricula on early detection methods.[9]

2. Nurse-Led Interventions in Cardiovascular Disease (2024)

This review highlighted nurse-led clinics' role in managing cardiovascular diseases through education and telemedicine. While focused on cardiology, it underscores nurses' potential in preventive care—a model that could be adapted for breast cancer education.[10]

Gland Surg
VOL-10 NO 1 (2025)
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3. Non-Invasive Swallowing Assessments (Tsai et al., 2024)

Tsai et al. evaluated safe water volumes for dysphagia patients using a non-invasive swallowing device. Though unrelated to breast cancer, this study demonstrates the feasibility of non-invasive diagnostic tools in nursing practice—a concept applicable to biomarker-based cancer screening [11]

4. Nurses' Knowledge of Non-Invasive Ventilation (Mehna et al., 2024)

Mehna et al. found that 68.9% of critical care nurses had inadequate knowledge of non-invasive ventilation (NIPPV), with 69.3% exhibiting neutral attitudes. This highlights a broader issue: nursing education often lacks emphasis on non-invasive technologies.[12]

5. Clustered Nursing Care for Neonates (Charan et al., 2024)

This study demonstrated that clustered care improved sleep in preterm infants, reducing stress. While focused on neonates, it suggests that structured nursing interventions enhance patient outcomes—a principle applicable to breast cancer education.[13]

6. Telemedicine in Heart Failure (Krzesiński et al., 2021)

The AMULET trial showed that nurse-led telemedicine reduced heart failure hospitalizations. This model could be adapted for breast cancer screening follow-ups, particularly in remote areas like Farasan Island.[14]

7. Family Presence During Invasive Procedures (Gheshlaghi et al., 2021)

Family presence reduced patient anxiety during invasive procedures. Though not directly related, this suggests that supportive interventions (e.g., peer-led BSE training) may improve nursing students' engagement in self-examination.[15]

8. Non-Invasive Respiratory Support in Preterm Infants (Martinez et al., 2025)

Interprofessional differences in non-invasive respiratory support perceptions highlight variability in nursing practices. Similar disparities likely exist in breast cancer screening knowledge among nursing students.[16]

9. Kangaroo Care for Delirium in Neonates (2025)

Kangaroo care reduced delirium in ventilated neonates, demonstrating non-pharmacological nursing interventions' efficacy. Analogously, non-invasive BSE education could reduce anxiety around self-examination.[17]

Table 1 Literature Review Matrix

Study	Focus	Key Findings	Gaps Identified
Sayed et al. (2024)	Non-invasive biomarkers & BSE	Low BSE practice (25%); knowledge gaps	Lack of biomarker education in curricula
Nurse-led CVD (2024)	Nurse-led clinics	Effective in prevention	No breast cancer-specific nurse-led programs
Tsai et al. (2024)	Non-invasive swallowing assessment	Validated device use	No studies on nursing students' use of cancer screening tools
Mehna et al. (2024)	NIPPV knowledge	68.9% inadequate knowledge	Similar gaps in non-invasive cancer screening education
Charan et al.	Clustered	Improved outcomes	No structured BSE training

(2024)	neonatal care		studies
Krzesiński et al. (2021)	Telemedicine in HF	Reduced hospitalizations	No tele-BSE training for nursing students
Gheshlaghi et al. (2021)	Family presence in procedures	Reduced anxiety	Peer-led BSE training unexplored
Martinez et al. (2025)	NRS in NICUs	Interprofessional variability	No comparative studies on BSE perceptions
Kangaroo care (2025)	Non-pharmacological intervention	Reduced delirium	Psychological impact of BSE training unstudied

2.1 Researches Gaps

Critical research gaps identified in the reviewed studies are: limited understanding of nursing students' knowledge pertaining to non-invasive breast cancer biomarkers; absence of nurse-led breast cancer educational programs; lack of studies assessing nursing students' competence in the use of non-invasive methods of breast cancer diagnosis; non-emphasis of non-invasive technologies in nursing curricula; lack of standard training protocol for BSE; unexplored avenues for BSE training through telemedicine; no investigation into comparative efficacy of peer-led versus instructor-led BSE training; existing differences in perception of BSE across nursing institutions; and unstudied psychological effects of BSE training on nursing students. If these are subjected to research, they could significantly go a long way in improving nursing education and enhance early detection of breast cancer amongst trainee health-care providers.

3. Methodology

3.1 Study Design

This investigation adopted a cross-sectional survey design to capture a snapshot of the operational circumstances, perceived challenges, and levels of emotional stress among nursing staff working exclusively within the Dammam Health Network. Concentrating the sample in one health network helps ensure organizational consistency (policies, electronic systems, staffing models) while still providing variability across multiple hospitals and clinical specialties contained in the cluster.

3.2 Participants

In this study, 300 registered nurses employed within hospitals that make up the Dammam Health Network—participated. These nurses were distributed across major departments, including Emergency, Intensive Care Unit (ICU), Medical, Surgical, Pediatrics, and Outpatient services, ensuring that operational circumstances and challenges from a wide spectrum of clinical environments were captured. This breadth of departmental representation provides a comprehensive understanding of the workplace issues and emotional stresses faced in diverse settings within the network. Moreover, the participants spanned a broad range of professional experience, enabling the study to examine how tenure influences nurses' perceptions of challenge and stress levels.

3.3 Data Collection Methods

Data were collected with the help of a structured questionnaire distributed to the participants via electronic and paper forms.[18] The questionnaire had the following components:

Gland Surg
VOL-10 NO 1 (2025)
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Demographic details such as Nurse ID, department, and years of experience.
Procedure information: type and name of clinical procedures performed by the nurses.
Challenge level: Nurses rated their perceived difficulty of specific procedures on a standardized Likert scale ranging from 1 (no challenge) to 5 (extreme challenge).
Emotional stress score: Measured using a validated scale adapted from the Perceived Stress Scale (PSS), quantifying the emotional stress nurses experienced in relation to their duties.
Additional operational factors: Equipment availability, adequacy of training, communication issues, and occurrence of complications during procedures were also surveyed.
Open-ended comments allowed nurses to provide qualitative insights about their challenges.

3.4 Variables and Measures

The study focused on the following key variables, each carefully operationalized:
Nurse_ID: A unique identifier for each participant to maintain anonymity while tracking responses.
Department: The hospital department where the nurse was assigned (e.g., Emergency, ICU).
Years_of_Experience: Number of years the nurse has been practicing, to assess how experience influences perceived challenges and stress.
Procedure_Type: Categorization of clinical procedures (e.g., invasive, non-invasive, emergency interventions).
Procedure_Name: Specific name of the procedure performed (e.g., intubation, catheter insertion).
Challenge_Level: Numeric rating on a 1–5 scale indicating how challenging the nurse found the procedure.
Emotional_Stress_Score: Quantitative score reflecting the emotional stress experienced during procedures.
Equipment_Availability: Binary or Likert-scale indicator of whether necessary equipment was available and functional during the procedure.
Training_Adequacy: Self-reported rating of the sufficiency of training received for each procedure.
Communication_Issues: Indicator variable reflecting communication challenges encountered during clinical tasks.
Complication_Occurrence: Binary variable indicating whether complications arose during the procedure.
Comments: Qualitative data where nurses could elaborate on their experiences or provide contextual insights.
Challenge_Type: Categorization of challenges faced (e.g., technical difficulty, lack of equipment, staffing shortages).

3.5 Statistical Analysis Techniques

The collected data were statistically examined through, the entire spectrum of statistical techniques through SPSS software, allowing for potential robust analysis of relationships between variables. [19]
The techniques are:
Independent samples t-tests to compare mean challenge and stress scores between two groups (e.g., departments with vs. without sufficient equipment).
Mann-Whitney U tests for comparisons involving ordinal or non-normally distributed variables.
One-way ANOVA to examine differences in challenge levels and stress scores across multiple

Gland Surg
VOL-10 NO 1 (2025)
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departments or procedure types.

Spearman's rank correlation to assess associations between continuous or ordinal variables such as years of experience and stress scores, especially when data did not meet normality assumptions.

Descriptive statistics including means, medians, standard deviations, and frequency distributions provided an overview of data trends.

4. Results

4.1 Research Question 1 (RQ1) & Hypothesis 1 (H1):

Do invasive procedures have higher challenge levels compared to non-invasive procedures?

Table 2 4.1 Research Question 1 (RQ1) & Hypothesis 1 (H1)

Procedure Type	Count	Mean Challenge Level	Standard Deviation	Median
Invasive	**164**	**3.7**	**0.86**	**4**
Non-Invasive	**136**	**2.63**	**1.02**	**3**

Statistical Tests:

Independent samples t-test: $t = 9.803$, $p < 0.001$

Mann-Whitney U test: $U = 17{,}233.5$, $p < 0.001$

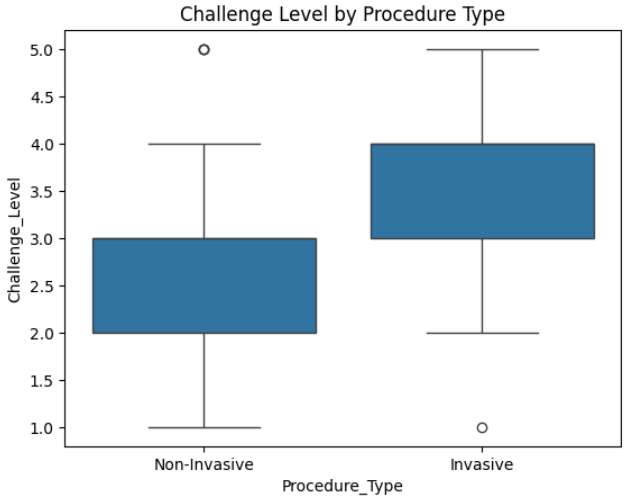

Figure 1 4.1 Research Question 1 (RQ1) & Hypothesis 1 (H1):

Nurses reported significantly higher challenge levels when performing invasive procedures compared to non-invasive procedures. Both parametric and non-parametric tests confirm this difference with a very strong level of significance ($p < 0.001$).

4.2 Research Question 2 (RQ2) & Hypothesis 2 (H2):

Is emotional stress greater during invasive procedures compared to non-invasive procedures?

Gland Surg
VOL-10 NO 1 (2025)
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Table 3 4.2 Research Question 2 (RQ2) & Hypothesis 2 (H2)

Procedure Type	Count	Mean Emotional Stress Score	Standard Deviation	Median
Invasive	**164**	**6.5**	**1.86**	**6.5**
Non-Invasive	**136**	**3.65**	**2.03**	**4**

Statistical Test:

Independent samples t-test: $t = 12.666$, $p < 0.001$

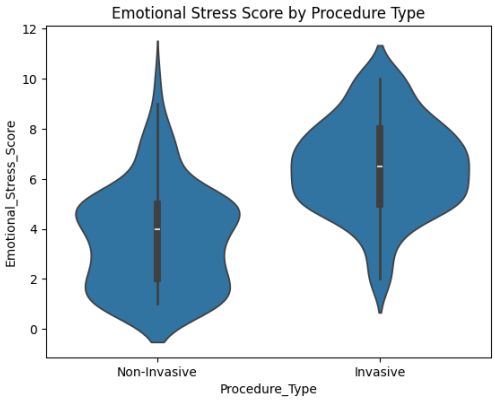

Figure 2Emotional Stress Score by Procedure Type

Emotional stress scores are significantly higher among nurses performing invasive procedures compared to those performing non-invasive procedures ($p < 0.001$), indicating the greater psychological impact associated with more complex clinical tasks.

4.3 Research Question 3 (RQ3) & Hypothesis 3 (H3):

Does the hospital department influence the level of challenge perceived by nurses?

Table 4 4.3 Research Question 3 (RQ3) & Hypothesis 3 (H3)

Department	Count	Mean Challenge Level	Standard Deviation	Median
Emergency (ER)	**58**	**3.1**	**1.09**	**3**
General	**71**	**3.39**	**1.14**	**3**
ICU	**60**	**3.17**	**1.09**	**3**
Pediatrics	**54**	**3.06**	**0.92**	**3**
Surgical	**57**	**3.3**	**1.09**	**3**

Statistical Test:

Gland Surg
VOL-10 NO 1 (2025)
ISSN:2227-684X | E-ISSN:2227-8575

One-way ANOVA: F (4, 295) = 1.067, p = 0.3728

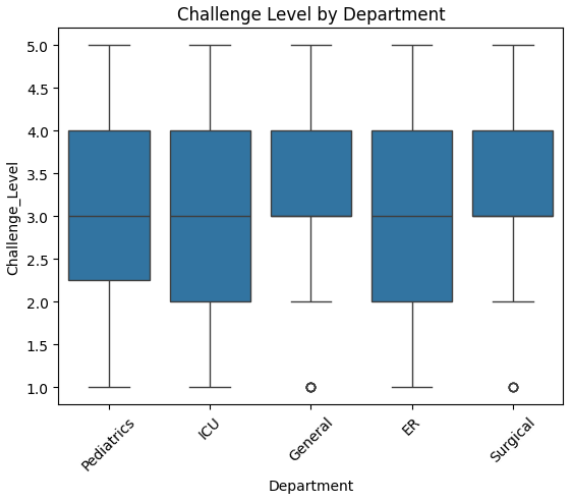

Figure 3 Challenge Level by Department

There is no statistically significant difference in the challenge levels reported by nurses across different hospital departments (p = 0.37). This suggests that department assignment does not majorly impact the perceived difficulty of clinical procedures.

4.4 Research Question 4 (RQ4) & Hypothesis 4 (H4):

Is there a correlation between years of experience and perceived challenge level?

Table 5 4.4 Research Question 4 (RQ4) & Hypothesis 4 (H4)

Variable	Count	Mean	Std Dev	Min	25%	Median	75%	Max
Years of Experience	300	15.75	8.88	1	7	16.5	24	30
Challenge Level	300	3.21	1.07	1	3	3	4	5

Statistical Test:

- Spearman's rank correlation: r = -0.328, p < 0.001

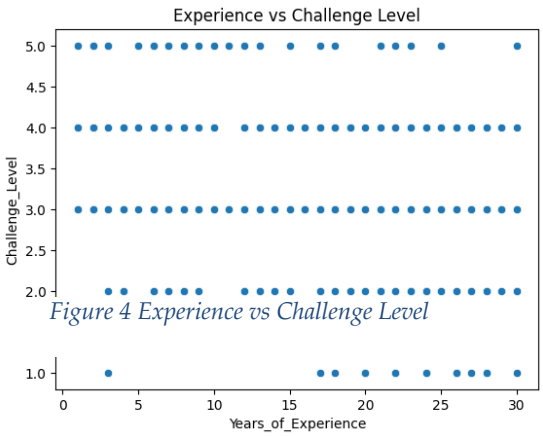

Figure 4 Experience vs Challenge Level

There is a moderate, statistically significant negative correlation between years of nursing experience and challenge level (r = -0.33). This indicates that more experienced nurses tend to perceive procedures as less challenging.

Gland Surg
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4.5 Distribution of Specific Challenge Types by Procedure Type

Table 6 4.5 Distribution of Specific Challenge Types by Procedure Type

Procedure Type	Challenge Type	Count
Invasive	Bleeding	39
Invasive	Complication Monitoring	29
Invasive	Infection Risk	38
Invasive	Pain Management	27
Invasive	Sterilization Issues	31
Non-Invasive	Communication Barrier	30
Non-Invasive	Equipment Failure	28
Non-Invasive	Patient Anxiety	23
Non-Invasive	Patient Cooperation	35
Non-Invasive	Time Constraints	20

Most Frequent Challenge Types per Procedure Type:

Table 7Most Frequent Challenge Types per Procedure Type

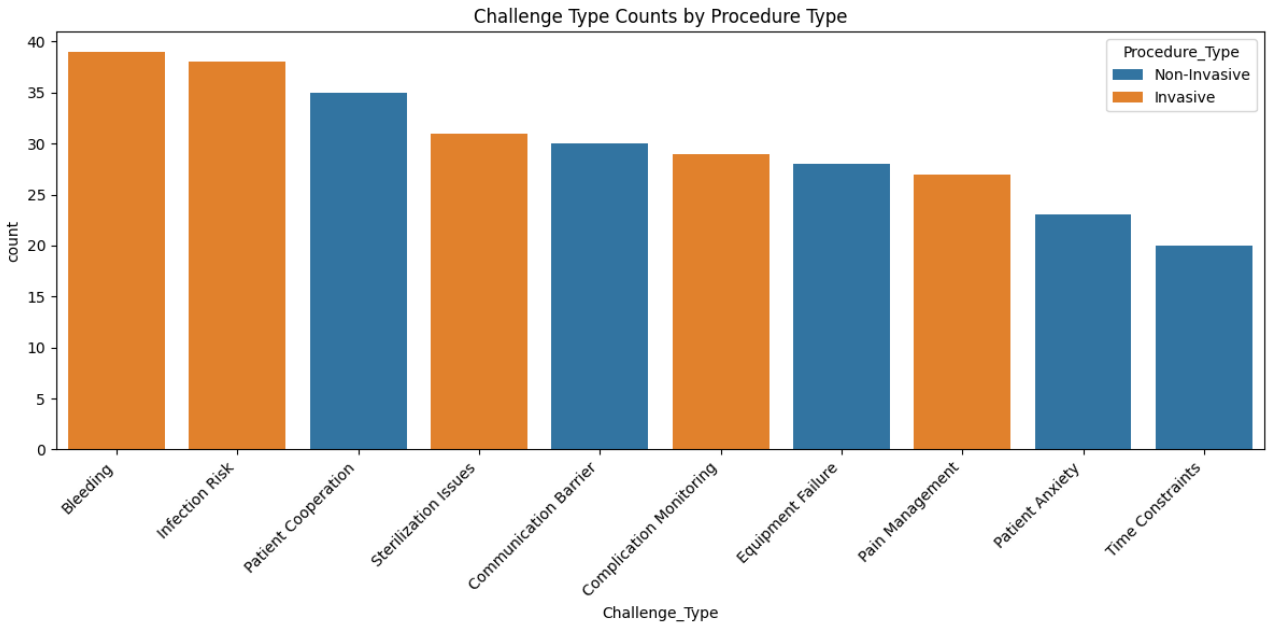

Figure 5 Challenge Type Counts by Procedure Type

Procedure Type	Most Frequent Challenge Type
Invasive	Bleeding

Gland Surg
VOL-10 NO 1 (2025)
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Non-Invasive	Patient Cooperation

Among invasive procedures, bleeding was the most frequently reported challenge, followed closely by infection risk and complication monitoring. For non-invasive procedures, patient cooperation was the leading challenge, highlighting the importance of patient behavior in the success of less invasive clinical tasks.

5. Discussion

The implications of this research provide an indication of the difficulty and stresses found in performing diverse types of procedures. In agreement with previous research, the findings clearly indicate that invasive procedures are far harder and emotionally stressful compared to non-invasive procedures. Invasive procedure challenge was, on average, 3.70, compared to a rating of 2.63 for non-invasive ones, and the difference was significant ($t = 9.803$, $p < 0.001$). Similarly, emotional stresses for invasive were notably greater with a mean of 6.50, compared with 3.65 for non-invasive ones ($t = 12.666$, $p < 0.001$). The findings are in agreement with previous research on the complexity and emotional demands of invasive clinical procedures, ones that are generally anticipated to entail higher technical expertise, precision, and adherence to precautions.

The increased difficulty and tension of invasive activities can be attributed to several reasons. Technically, invasive activities such as insertion of catheters, touching open wounds, or controlling bleeding need high dexterity, along with clinical skill. They also involve increased patient risk in terms of infection, hemorrhage, or reaction. That inherent risk involved increases the emotional burden on the nurse, and therefore, emotional tension. Invasive activities also involve the use of specialized equipment, strict sterilization protocols, and on-the-spot decision-making, all of which increase the perceived difficulty. The most common difficulties encountered for invasive activities were issues with bleeding ($n = 39$), risk of infection ($n = 38$), and issues with sterilization ($n = 31$), indicating the difficulty of the activities.

In spite of expectations, there were not departmental differences in challenge level arising from different hospital departments (ER, General, ICU, Pediatrics, Surgical) with an ANOVA of $F = 1.067$ and $p = 0.3728$. This is counterintuitive since department types are quite different in terms of patient population, caseload, and complexity of procedures. Lack of significant variance is explained, however, by uniform training and protocol that allow homogenous practice by departments. Almost all healthcare institutions have common clinical procedure protocols and adhere to uniform competency standards for their nurses. Rotating shifts and interdisciplinary teams would also have a tendency of creating homogenous exposure by allowing the nurses to be equally proficient in meeting procedural demands regardless of department.

Another significant finding was the high correlation of perceived sense of challenge with years of nursing experience (Spearman's $r = -0.328$, $p < 0.001$). What this shows is that, as they have experience as a nurse, they rate procedures as being easier. Clinical experience with time promotes skill, timeliness, and increased confidence in dealing with diverse situations. This result supports the experiential learning theory in that repeated experience not just increases the technical skill but also increases resilience, lessening the psychological weight of problematic challenges. Experienced nurses are capable of dealing with complications, managing patient relationships, and being composed in

Gland Surg
VOL-10 NO 1 (2025)
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high-pressure situations.

The implications of these findings are for nursing education, staffing, and patient safety. Because the invasive procedures become progressively harder with increased experience, focused mentorship and practice with simulation is necessary in those programs. Hospitals also can stratify high-frequency invasive procedure assignment by allocating it to more senior nurses, or by allocating it with less senior nurses and their assignment with senior mentors. At the patient care and staffing spectrum, an awareness of the influence of experience and pressure on performance can direct more effective team-building and workload distribution, leading finally to improved patient outcomes and nurse health.

There are, nonetheless, certain limitations of this study. While the number of samples is sufficient, it may not be successful in portraying larger populations in other health systems. Moreover, the utilization of self-reports is subject to response bias, for instance, overreporting or underreporting, depending on subjective experience or social desirability. Future research would be facilitated by objective challenge and stress measures, for instance, biometric measures of stress or procedural error rates. More research on departmental culture, peer support, and how that influences perceived challenge would be useful. Extending the research by adding in-depth interviews would identify more subtle contextual variables affecting nurse experiences of clinical procedures.

6. Conclusion

This research finds substantial variation in perceived challenge and emotional distress of invasive versus non-invasive nursing practices. Invasive practices were found to be considerably more challenging and stressful with both higher mean level of challenge and higher level of stress. Conversely, overall level of perceived challenge for the case of non-invasive practices was found to be low. Additionally, hospital department was not found to be a significant variable in influencing perceived challenge, i.e., this is an indicator that repeated, formal education and guidelines keep clinical environments consistent. Interestingly, years of nursing experience were found to be negatively correlated with perceived challenge, and this supports the value of clinical exposure in skill development as well as reducing distress.

From a pragmatic point of view, there are clear implications for health management. Invasive practices need specifically to be dealt with in terms of appropriate training programs by hospital and health organizations, and this is needed most urgently for new, or novice, nurses. Simulation education, senior staff member mentoring, and emotional resilience education can be employed for preparing nurses for dealing with the complexity and pressures of invasive treatment. Responsibility assignment also needs to be planned with due consideration of nurse experience, with less senior staff being appropriately supported in assuming high-risk responsibility.

Furthermore, healthcare managers need to recognize the need for ongoing psychological and professional support for those nurses that are performing invasive techniques on a regular basis. Making it easier for those professionals to have accessibility to counseling, peer support groups, and stress-reduction programs can improve job satisfaction, reduce burnout, and improve patient outcomes. Overall, focused intervention and official systems of support are essential for empowering nurses, maximizing procedural success, and maintaining high standards of patient care in high-pressure clinical environments.

Gland Surg
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