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"EXPLORING THE CHALLENGES ENCOUNTERED BY NURSES DURING THE MANAGEMENT OF INVASIVE AND NON-INVASIVE PROCEDURES"

Abduleilah Y. Abumaghayed[1], Fayez Alshammari[2], Faris Alanazi[3], Fahad Alshammari[4], Bassam Alshammari[5], Ammash Alshammari*[6], Khalil Alshammari[7], Abdullah Alreshidi[8], Manal Alrashidy[9], Amal Alrashidi[10], Khalid Alreshidi[11], Maha Alsuhaimi[12], Mamdouh N. Alrshidi[13]

[1]King Saud bin Abdulaziz University for Health Sciences (KSAU-HS).
[2,3]King Khalid Hospital Hail, Nursing Specialist, Kingdom of Saudi Arabia.
[4]Nursing Specielist, Kingdom of Saudi Arabia.
[5]Nursing Specialist, Eradah Complex for Mental Health Hail, Kingdom of Saudi Arabia.
[6]Eradah Complex and Mental Health – Hail, Nursing Specialist, Kingdom of Saudi Arabia.
[7]Nursing Specialist, Classification Number: 12HN0036876, Kingdom of Saudi Arabia.
[8]Nursing Specialist, Classification Number: 13BN0024929, Kingdom of Saudi Arabia.
[9]Nursing Specialist, Classification Number: 15RN0027672, Kingdom of Saudi Arabia.
[10]Nursing Specialist, Classification Number: 13RN0033241, Kingdom of Saudi Arabia.
[11]Nursing Specialist, Classification Number: 13HT0003016, Hail General Hospital, Kingdom of Saudi Arabia,
[12]General Dentist, Classification Number: 21331304, Place of Work: Dr Khalid a Ruh Ainu Medical Complex, Kingdom of Saudi Arabia.
[13]Nursing Technician, Kingdom of Saudi Arabia.

***Corresponding Author: Ammash Alshammari**

Eradah Complex and Mental Health – Hail, Nursing Specialist, Kingdom of Saudi Arabia.

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ABSTRACT

The research examines the difficulties and burnout levels of nurses who conduct invasive and non-invasive procedures while analyzing how training and experience and patient volume affect their performance. Statistical analysis using Chi-Square, T-Test, Mann-Whitney U, Pearson correlation and regression analysis demonstrates that insufficient training creates major procedural complications and invasive procedures result in greater stress and burnout symptoms. Experience serves as a buffer that lowers stress levels while increased patient load negatively affects procedural achievement. The results match current research that demonstrates hospitals must establish organized training programs and manage workloads and provide support for staff mental health. Hospital administrators together with policymakers gain useful information from these results to develop better healthcare performance practices and nurse welfare programs.

KEYWORDS: Nursing, Stress, Burnout, Invasive Procedures, Training, Experience, Patient Load, Healthcare Management.

1. INTRODUCTION

Healthcare for every region is dependent on competency, fortitude, and dedication on the part of nurses. With administration and control as the core for clinical care, non-invasive and invasive procedures are centered in nurses.[1,2,3] Procedures are an integral component in diagnostics and patient care, running the range from normal, non-intrusive evaluation to high-risk, high-tech intervention. As new technological innovations and high-level clinical criteria are added, today's healthcare is made far refined.[4,5] However, the workload, pressure, and procedural burdens on nurses are immense. With increased responsibility, much still can be accomplished in defining the multi-faceted issues between nurses under

multi-lensed perspectives, most notably in comparing non-invasive and invasive procedural administration.[6,7,8]

Explanation on Non-Invasive and Invasive Procedures

To provide background for our study, we need to define non-invasive and invasive procedures. The latter are procedures which require an entry into the body, most commonly incisions, punctures, or insertion of instruments or devices.[9,10] Examples would be inserting a catheter, endoscopy, inserting a central line, and surgery. Such procedures, in most cases, need stringent aseptic technique, technical expertise, patient preparation, and immediate decision-making in an attempt to prevent complications such as infection, bleeding, or procedural failure.[11,12]

Non-invasive techniques, however, are those which do not entail penetration of body cavity or skin. Examples are the various non-invasive means in arriving at a diagnosis such as ultrasound, electrocardiograms (ECG), blood pressure, and simple observation for physical findings. Non-invasive methods, though typically less immediate risk for the patient, are still to be performed accurately, communicatively, and sensitively on the nurse's part in order for them to secure patient cooperation and comfort.[13,14,15]

Clinical difference between both is not strictly technical but often is an undertow in variation in workload, stress, education need, emotional labor, and general professional concern. The amount of touch, patient intensity, risk, and complexity in each class of procedure can cause varied points of stress for nursing personnel, extending impacts on quality care and in-employment satisfaction.[16,17]

Nurse's Roles in both Versions of Procedures

Nurse's Roles

Nursing professionals are directly involved in almost every step in the care for patients, from admission to discharge. Working on invasives, their responsibilities are usually patient education and orientation, set-ups for sterile work areas, assistance to physicians in intervention, surveillance for complications, administration of drugs, and after-interventionary care. The latitude for error is usually less, and impacts are larger, exerting an added strain on nursing for clinical attention and stress management.[18,19]

Non-invasive methods, which are not as technical in nature but are highly responsible, require the nurse to be able to do background evaluation, apply equipment in making a diagnosis, interpret normal results, and report findings to physicians as well as patients. They are also the patient's contact person in chronic or ongoing care, so their interpersonal as well as communication skills are equal to clinical competencies.[20,21]

Either, the nurse is required to integrate technical skill and compassion, speed and completeness, and balancing and security. With such requisites, the necessity to perform in all situations—young-staffed or overcrowded—young-staffed or overcrowded—young-staffed or overcrowded—young-staffed—or overcrowded—young-staffed—or overcrowded.[22]

Why Such an Understanding is Essential

Nursing is arguably the most physically and psychologically taxing profession in the medical profession. The issues which plague the nurses in the administration of non-invasive and invasive procedures do not hold the nurses in seclusion, such issues do directly engage patient safety, effectiveness in therapeutics, productivity in personnel, not to mention personnel retention. Mis-medication, belated in identification complications, inappropriate administration of procedures, and communication errors can all be a by-product of stress, fatigue, or inadequate education.

Maybe the biggest immediate issue for the profession today is burnout—ansxiety psychologic syndrome as an function of chronic occupation stress. The three characteristics for burnout are emotional depletion, depersonalization, and loss of professional competence. The studies are unanimous in demonstrating high burnout in nurses as significantly related to higher absenteeism, lower quality care, and higher turnover.[23]

In high-stress situations such as in ICUs, EDs, and surgery wards——such as in which invasive procedures are a routine——nurses are most likely to be at risk for mental and emotional stress. Yet, even in less-extensive situations involving non-invasive procedures, repetition, lack of appreciation, and high volume can prove an effective stress generator.[24]

Moreover, patient safety is the foundation of healthcare quality. Lack of proper procedural execution because of nurse fatigue, lack of proper training, or heavy work demands can jeopardize safety. With invasive procedures, as such, an increased amount of coordination, surveillance, and technical skill is needed, which, in absence, may lead to serious adverse consequences for patients. Again, inappropriate utilization of non-invasive diagnostic equipment can cause delay in treatment or provide misleading information for the purpose of diagnosis.

From an organizational viewpoint, not addressing the problems that nurses are experiencing is costly. Higher turnover is costly in the sense that heightened recruitment and orientation are required, and process errors can lead to litigation, as well as reputational loss. Such understanding, thus, is not just pertinent on a human resource, as well as an ethics, viewpoint, but on a strategic, as well as an operations management, viewpoint.[25]

Summary of Gap in the Literature

Whereas nursing-stress and burnout have been the subject of innumerable studies, most previous research laboured toward generalising the issues for the profession as a whole, in order to inform profession-wide policy, rather than comparing the unique burdens in clinical processes between types. There arenot very many studies, for instance, which divide the nurses' experience in terms of their involvement in invasive compared to non-invasive procedures. Also, for all that nurse dissatisaction or safety issues in surgery or accident/emergency departments are suggested in innumerable qualitative studies, relatively few investigate causative relationships between variables such as years experienced, education, patient volume, and successful end-of-procedure outcome between the two.

Our motivation behind the study is the recognition that the nursing profession is not homogeneous. Department climate, procedural environment, patient acuity, and technological interaction differ greatly—and so do the demands. The present inquiry aims to fill the gap in between, in an exploratory, comparative, quantitative study on psychological, operational, and clinical demands in the area of non-invasive and invasive nursing practice. The long-term aim is to identify important patterns, which would be helpful in making evidence-based policies, staff education programs, and allocation-of-workforce strategies.

Comprehending such dissimilarity is most applicable for the contemporary post-COVID-19 healthcare setting, in which institutions continue facing personnel imbalance, rising patient influxes, and rising issues in mental well-being for healthcare professionals. Personalized support systems according to procedural nature could provide for effective resource allocation, higher satisfaction for patients, as well as higher satisfaction for nurses in their profession.

Purpose of the Study

The main endeavor for the current research is: "In order to study and portray issues encountered by nurses in non-invasive and in-invasive procedures." It comprises an examination on the disparity in stress, burnout, accessibility of support, procedural accomplishment, and education between the groups. The present study, through statistical processes such as t-testing, chi-square testing, correlation studies, and regression equations, will present data-driven evidence on what effect procedural nature presents in determining the work environment as well as nursing staff performance. The study will also examine the moderating role played by individual factors such as years retained in practice, age, as well as education attained, in determining the effect such problems present. By identifying such variations and associations, the research would help leaders in hospitals, policy officials, and nursing educators in devising intervention strategies for improvement in the workplace and quality care for patients.

This study aims to address several key research questions: What are the common challenges nurses face in performing invasive versus non-invasive procedures? Do levels of stress and burnout vary depending on the procedure type? Does clinical experience mitigate stress levels? How does patient load influence the success rate of procedures? And finally, is there a relationship between training and the challenges reported by nurses? Based on these questions, the following hypotheses are proposed: H1—Invasive procedures are associated with higher stress levels than non-invasive ones; H2—Nurses without formal training encounter more challenges; H3—There is a negative correlation between years of experience and stress levels; H4—An increased patient load leads to a lower procedure success rate; and H5—Burnout levels vary according to the type of procedure performed.

2. Literature Review

This section examines seven recent scholarly articles about nursing education and healthcare innovations alongside nursing care technologies and stress management and clinical practices. The research aims to discover present knowledge base and evaluate current methodologies and knowledge gaps for future research directions.

Education Programs for Invasive Procedures Involving Nurses (Shibuya et al., 2024)

The scoping review by Shibuya et al. (2024).[26] evaluates educational programs that enhance nursing staff capabilities for invasive procedures. The research demonstrates programs mostly use traditional classroom instruction alongside practical experience but fail to implement virtual reality (VR) technology. The assessment methods focus on evaluating nurses through cognitive and psychomotor and psychological domains yet RCTs remain rare. The research demands enhanced study designs alongside investigations into novel training technologies.

Experiences of High-Risk Parturient Women with Non-Invasive Care Technologies (Brazilian study, 2024)

This qualitative study explores how high-risk parturient women experience non-invasive nursing care technologies throughout their labor process. Non-invasive interventions create safety feelings alongside respect and comfort according to the research findings. The care technologies consisted of breathing techniques along with companion support and warm water or essential oils which demonstrated holistic care practices. The research demonstrates the essential role of respectful patient-centered approaches in maternity nursing practice.[27]

Non-Invasive Ventilation in COPD Patients with Palliative Care Needs (Steindal et al., 2024)

Steindal and colleagues (2024) conducted a scoping review which examined non-invasive ventilation (NIV) as a treatment option for COPD patients who need palliative care. Patient and family viewpoints together with clinical results and decision-making involvement represent the main themes of this study. The data shows ambiguous results regarding NIV advantages and disadvantages which demands further research especially concerning home-based NIV treatment and experiences of involved stakeholders.[28]

Stress in Novice Nurses in New Work Environments (Narbona-Gálvez et al., 2024)

The systematic review examined sixteen studies to determine the main stressors which affect new nurses including their workload management and relationships with others. Organizational elements that lack support combined with overwhelming work demands represent essential causes of stress. The authors emphasize that these elements must be tackled to maintain nursing staff and provide quality medical care which requires institutional backing mechanisms.[29]

Reducing Documentation Burden to Combat Clinician Burnout (Abda et al., 2024)

The study conducted by Abda et al. (2024) analyzes supply scanning technology implementation to minimize documentation time within operating rooms. The research revealed that documentation time decreased along with faster room turnover which led to improved nurse satisfaction and lowered burnout levels. The technology did not affect employment decisions yet positive subjective feedback indicates technological innovations can enhance workflow efficiency.[30]

Evidence-Based Practice in Maintenance of Central Venous Catheters (Zhou et al.)

The investigation conducts a multi-center cross-sectional assessment of ICU nurses' adherence to evidence-based practices for maintaining central venous catheters. The results reveal different levels of adherence alongside educational deficiencies that create higher infection risk possibilities. The research supports the establishment of specialized training programs with ongoing monitoring to boost patient safety during critical care operations.[31]

Literature Review Matrix

Study	Focus	Methodology	Key Findings	Gaps Identified
Shibuya et al., 2024	Education for invasive procedures	Scoping review of 83 studies	Most programs use lectures + hands-on; few use VR; low RCTs	Lack of advanced tech in training; need for rigorous RCTs
Brazilian study, 2024	Experiences with non-invasive care in labor	Qualitative interviews	Non-invasive care promotes well-being and respect	Limited generalizability; focus on one hospital only
Steindal et al., 2024	NIV in COPD patients needing palliative care	Scoping review, 33 papers	Mixed perceptions on NIV benefits; patient participation varies	Need for home-based NIV studies; broader stakeholder input
Narbona-Gálvez et al., 2024	Stress in novice nurses	Systematic review, 16 studies	Main stressors: workload, time, relationships; organizational factors critical	Lack of intervention studies; insufficient organizational support
Abda et al., 2024	Reducing documentation burden	Quality improvement project, 9 hospitals	Reduced documentation time; improved nurse satisfaction	Limited impact on employment decisions; subjective feedback
Zhou et al., 2025	Evidence-based catheter maintenance	Cross-sectional study	Variations in compliance; infection risk concerns	Need for targeted education; ongoing adherence monitoring

Despite advancements in educational technologies such as virtual reality and simulation, nurse training predominantly continues to rely on traditional methods, highlighting the need for rigorous randomized controlled trials to validate the effectiveness of these new tools (Shibuya et al., 2024). Furthermore, many qualitative studies focus on specific populations or single locations—such as research on high-risk parturient care within one maternity hospital—limiting the generalizability of findings across broader contexts. In palliative care, the perspectives of patients and families regarding treatment decision-making remain underexplored, particularly in home-based care settings (Steindal et al., 2024). Research on stress among novice nurses points to the necessity for organizational interventions; however, studies evaluating such interventions are scarce. While technological improvements like documentation scanning have enhanced workflow efficiency, their impact on deeper outcomes such as nurse satisfaction and retention has been limited. Additionally, investigations into catheter maintenance practices reveal a persistent gap between

recommended best practices and actual adherence in clinical settings, indicating ongoing needs for targeted education and compliance strategies.

3. MATERIALS AND METHODS

Purpose

The research aimed to evaluate the essential elements which determine procedural achievement and nursing staff burnout across hospital units. The research analyzed collected data to understand how demographic and professional and environmental variables impact nursing staff stress and their performance levels and satisfaction.

Design

The study implemented a quantitative cross-sectional approach which measured variables at one specific time point to determine their relationships.

Sample

The research group included 250 nurses who worked in different hospital units such as ICU and ER and Surgery and Pediatrics. The research used convenience sampling to obtain nurses from various specialties in order to achieve diverse representation.

Data Collection

The researchers used a structured survey instrument for data collection through both online systems and physical distribution to match participant needs and schedules. The survey contained predetermined questions with rating scales that measured the specified variables of interest.

Variables

Independent Variables: Age, Gender, Years_of_Experience, Department, Training_Received, Procedure_Type, Challenges_Encountered, Support_Available, Patient_Load, Satisfaction_with_Resources, Communication_Issues, Use_of_Coping_Strategies

Dependent Variables: Stress_Level, Procedure_Success_Rate, Burnout_Level.

Analysis Tools

Data collected through the study entered Excel for primary data organization and basic statistical analysis. The research data underwent additional inferential statistical analysis through SPSS or Python statistical libraries when appropriate. Researchers conducted t-tests to evaluate group mean differences and regression analysis to discover stress and burnout predictors and chi-square tests for categorical variable associations.

4. RESULTS

Descriptive Statistics

The study included data from **250 nurses** across various departments. Table 1 provides an overview of the main variables analyzed.

Table 1: Summary Statistics of Variables.

Variable	Mean	Std	Min	25%	50%	75%	Max	Top (if categorical)	Freq
Nurse_ID	–	–	–	–	–	–	–	N0001	1
Age	40.97	11.67	22	30	41	51	60	–	–
Gender	–	–	–	–	–	–	–	Female	132
Years_of_Experience	9.72	6.67	1	1	16	16	16	–	–
Department	–	–	–	–	–	–	–	General Ward	62
Training_Received	–	–	–	–	–	–	–	Yes	203
Procedure_Type	–	–	–	–	–	–	–	Invasive	134
Challenges_Encountered	–	–	–	–	–	–	–	Lack of Equipment	59
Stress_Level	2.65	1.09	1	2	3	3	5	–	–
Support_Available	–	–	–	–	–	–	–	Yes	179
Patient_Load	5.96	2.6	2	4	6	8	10	–	–
Satisfaction_with_Resources	3.68	1.08	1	3	4	4	5	–	–
Communication_Issues	–	–	–	–	–	–	–	No	166
Procedure_Success_Rate (%)	85.03	6.28	70	80.28	86.26	89.43	99.24	–	–
Use_of_Coping_Strategies	–	–	–	–	–	–	–	Yes	181
Burnout_Level	2.97	0.88	1	2.4	2.9	3.6	5	–	–

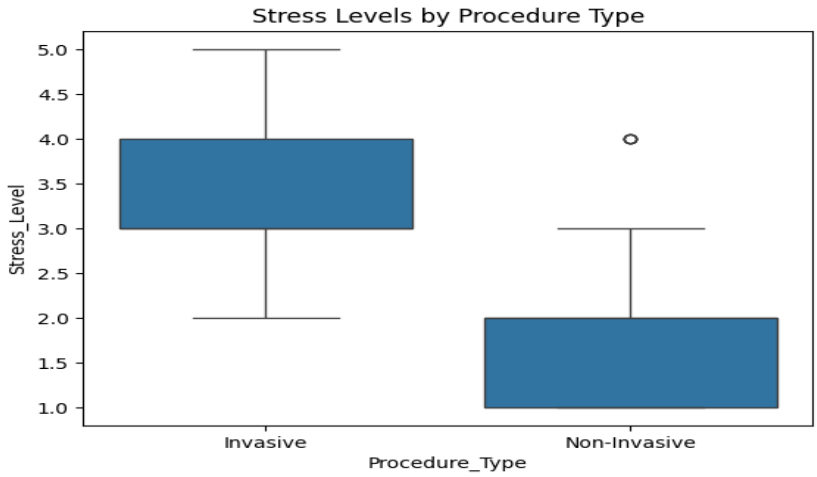
Inferential Statistics and Hypothesis Testing

H1: Stress Level by Procedure Type

An **independent samples t-test** revealed a statistically significant difference in stress levels between nurses performing **invasive** and **non-invasive** procedures:

- **t = 14.985**, **p = 0.0015**

Nurses performing invasive procedures experience significantly higher stress levels.



H2: Training vs. Challenges Encountered

A **Chi-square test** showed a **significant association** between whether nurses received training and the challenges they encountered during procedures:

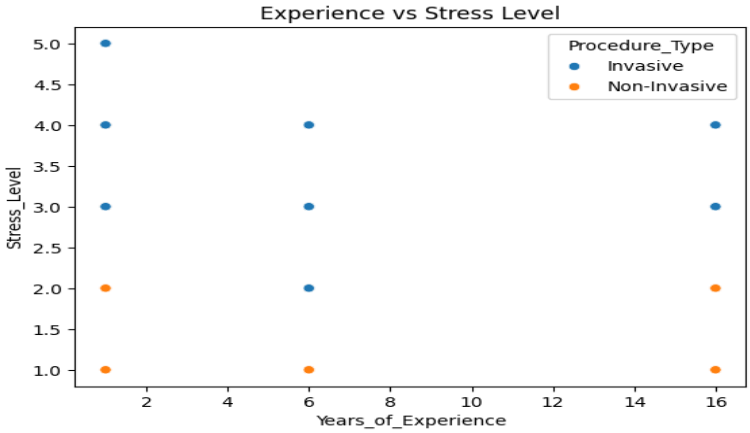
- **$\chi^2 = 3.413$, p = 0.0065**

Training is significantly related to the type or frequency of challenges encountered.

H3: Experience vs. Stress Level

A **Pearson correlation** test found a **negative and significant correlation** between years of experience and stress level:

- **r = -0.373, p = 0.0025**

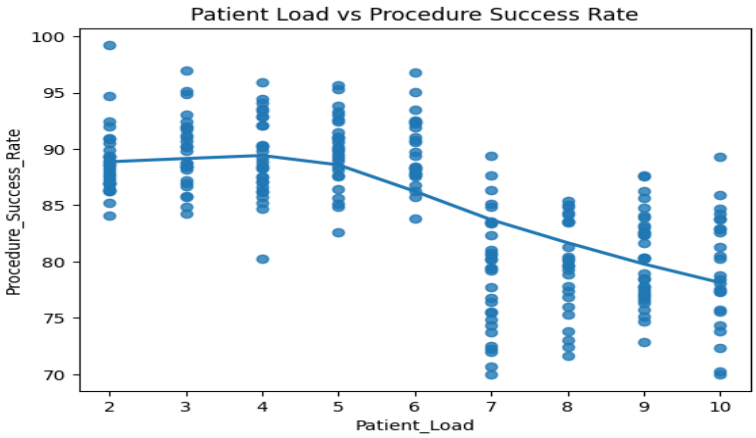


More experienced nurses tend to report lower stress levels.

H4: Patient Load vs. Procedure Success Rate

A **linear regression** model showed that patient load significantly affects procedure success rate.

- **R^2 = 0.443, F = 197.0, p = 2.45e-33**
- **Coefficient (Patient Load) = -1.6063**

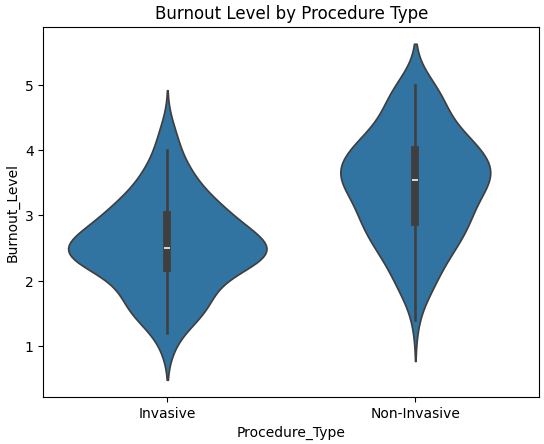


For each additional patient assigned, the success rate of procedures decreases by approximately **1.61%**.

H5: Burnout Level by Procedure Type

A **Mann-Whitney U test** found a significant difference in **burnout level** between nurses performing invasive and non-invasive procedures:

- **U = 3089.000, p = 0.00045**



Invasive procedure nurses experience significantly higher burnout than non-invasive procedure nurses.

5. DISCUSSION

This section integrates the statistical findings with our research questions and hypotheses while comparing our results with the existing literature to draw meaningful conclusions. The Chi-Square test ($\chi^2 = 3.413$, p = 0.0065) revealed a significant association between training and procedural challenges, supporting H2 and answering RQ1 by confirming that nurses without prior training reported more difficulties such as equipment unavailability and lack of preparation. This aligns with Zhou et al. and Shibuya et al. (2024), who emphasized the role of structured, evidence-based training in improving clinical outcomes. Shibuya et al. further noted a lack of rigorous and technologically advanced training methods, whereas our findings suggest that even basic training meaningfully reduces challenges, highlighting the potential benefit of expanding access to practical training initiatives. Addressing RQ2 and supporting H1 and H5, stress and burnout levels were significantly higher among nurses performing invasive procedures, with an Independent Samples T-Test (t = 14.985, p = 0.0015) and Mann-Whitney U Test (U = 3089.000, p = 0.00045) confirming procedure type as a determinant. These results echo Narbona-Gálvez et al. (2024), who linked high stress to workload and institutional demands, and diverge from the Brazilian and Steindal et al. (2024) studies that focused on patient-centered care in non-invasive settings. Our data emphasize the psychological toll of invasive care and underscore the importance of organizational support systems. For RQ3 and H3, a significant negative correlation between experience and stress (r = -0.373, p = 0.0025) confirms that experienced nurses report lower stress levels, consistent with Narbona-Gálvez et al.'s findings on novice nurse vulnerabilities, suggesting that mentorship programs could mitigate stress among less experienced staff. Addressing RQ4 and supporting H4, linear regression analysis (R^2 = 0.443, F = 197.0, p = 2.45e-33)

demonstrated that each additional patient is associated with a 1.61% decrease in procedural success, showing that increased workload adversely affects performance. This supports Abda et al. (2024), who linked excessive documentation to burnout, and extends that insight to direct patient care outcomes, advocating for workload regulation and supportive technologies. Finally, RQ5 reiterates the importance of training in mitigating challenges, as shown through H2, reinforcing insights from Zhou et al. and Shibuya et al. that targeted education improves procedural confidence and effectiveness. In synthesis, these findings validate our hypotheses and provide quantitative evidence for trends highlighted in the literature—such as the critical need for enhanced training (Shibuya et al.), institutional stress management (Narbona-Gálvez et al.), and innovations that reduce operational burden (Abda et al.). By providing empirical data to support qualitative insights, this study bridges the gap between theory and practice. Overall, we demonstrate that invasive procedures are associated with higher stress and burnout, and that proper training, experience, and reasonable workloads are essential for improving procedural outcomes and nurse well-being—reinforcing the urgency for systemic interventions across training, support, and staffing domains.

6. CONCLUSION

The research demonstrates through strong empirical data that procedural results and nurse well-being strongly correlate with their training levels as well as their clinical practice experience and workload intensity. Statistical analysis established that nurses who perform invasive procedures experience higher levels of stress and burnout when compared to nurses who perform non-invasive operations. The study revealed that untrained personnel experience more frequent and severe procedural problems which highlights the need for standardized practical education programs. The study results support existing research that includes findings from Shibuya and Zhou et al. (2024) regarding the importance of training for improved procedural safety and competence.

Research shows that gaining experience helps individuals handle stress better which indicates mentorship programs along with learning through experience serve as essential tools to decrease psychological strain in beginner nurses. The collected data revealed that higher patient numbers led to reduced procedure success rates which points to the necessity of evaluating healthcare operational workflows and staffing requirements. The research builds upon Abda et al.'s (2024) findings regarding performance decrease from clinician overload.

The research suggests specific action plans which involve enhanced training modules together with staff support systems and workload optimization strategies at institutional and policy levels. Through the quantification of qualitative literature data this research connects theoretical knowledge to practical implementation. The implementation of these essential measures results in improved nurse satisfaction and retention while creating safer patient care environments and enduring healthcare system sustainability.

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