

Effectiveness of an Educational Program on Pressure Injury Prevention Among Staff Nurses and Its Impact on Core Dimensions of Nursing Service Quality

Ayman Mohammed Alhubayshi

School of Nursing & Applied Science, Lincoln University College, Malaysia

Regidor III Dioso

School of Nursing & Applied Science, Lincoln University College, Malaysia

Abstract

This study examined the effectiveness of an educational program on pressure injury prevention among staff nurses and its impact on core dimensions of nursing service quality in a hospital setting in Saudi Arabia. A quasi-experimental post-test-controlled design was used to compare an experimental group and a control group. The intervention consisted of a five-day educational program on pressure injury prevention delivered to staff nurses, followed by a 30-day implementation period before patient evaluation. Data were collected from 223 adult inpatients, including 112 in the experimental group and 111 in the control group, using an Arabic questionnaire that measured four dimensions of nursing service quality: patient safety, patient-centered care, efficient service, and effective service. The instrument demonstrated acceptable to good internal consistency. Descriptive statistics, reliability testing, normality assessment, and analysis of covariance were used to analyze the data. The findings revealed statistically significant differences between the experimental and control groups across all four dimensions. The experimental group reported higher adjusted mean scores in patient safety, patient-centered care, efficient service, and effective service, indicating that the educational intervention contributed positively to perceived nursing service quality. These results suggest that a structured pressure injury prevention educational program can strengthen not only preventive nursing practice but also broader aspects of care quality. The study highlights the value of targeted nurse education as a practical strategy for improving patient-related service outcomes in hospital settings.

Key Words: Pressure Injury Prevention, Nursing Education, Patient Safety, Patient-Centered Care, Nursing Service Quality

1. Introduction

Pressure injuries remain a major indicator of nursing-sensitive quality outcomes because they are largely preventable when evidence-based nursing care is delivered consistently and correctly. They continue to pose a serious challenge in hospital settings due to their association with pain, infection, prolonged hospitalization, increased costs, and avoidable deterioration in patient outcomes. Because nurses are the healthcare professionals most directly involved in repositioning, skin assessment, risk monitoring, documentation, patient education, and

timely preventive interventions, the quality of nursing care has a central influence on pressure injury prevention outcomes (Oner et al., 2025). Current evidence shows that effective preventive practices include routine skin assessment, frequent repositioning, use of support surfaces, moisture management, nutritional support, and accurate clinical documentation, all of which depend heavily on nursing knowledge, clinical judgment, and adherence to prevention protocols (Alshahrani et al., 2021). When these practices are not implemented consistently, pressure injuries may develop even in settings where policies and resources are available, highlighting the importance of staff competence and sustained education (Li et al., 2022).

Educational interventions have increasingly been recognized as a practical strategy for strengthening nurses' competence in pressure injury prevention and improving care delivery. Studies have shown that targeted training can improve nurses' knowledge, attitudes, and preventive practices, especially when the intervention is structured, clinically relevant, and supported by evaluation mechanisms (Alshahrani et al., 2023). Multifaceted and practice-oriented educational approaches have also been associated with stronger implementation of prevention measures and better consistency in routine nursing care (Kandula, 2025). Quasi-experimental evidence further suggests that sustained educational exposure can raise staff knowledge and improve pressure ulcer prevention practices over time, indicating that education is not only an academic activity but also an operational quality-improvement tool in clinical settings (Mäki-Turja-Rostedt et al., 2024). In the same direction, staff education has been identified as a necessary means of enhancing nurses' capability to recognize risk, apply preventive interventions appropriately, and support safer outcomes among vulnerable patients (Foster, 2025).

The significance of educational interventions extends beyond pressure injury prevention alone, as such programs may also influence broader dimensions of nursing service quality. Patient safety education has been shown to strengthen safety culture and professional awareness among healthcare workers, which can translate into improved care processes and more reliable clinical performance (Agbar et al., 2023). Nursing education initiatives have also been linked to better patient experiences and improved care outcomes when the learning content is translated into clinical practice effectively (Li et al., 2025). In addition, evidence on person-centered educational interventions indicates that educational preparation can improve responsiveness to patient needs, communication quality, and individualized care delivery, which are important elements of high-quality nursing service (Gruden et al., 2021). Patient-centered care has itself been associated with better inpatient outcomes, supporting the idea that improvements in nursing education may have meaningful downstream effects on patient perceptions of care quality (Yu et al., 2023).

Within hospital environments, the quality of nursing service may be reflected in key dimensions such as patient safety, patient-centered care, efficient service, and effective service. These dimensions capture both the technical and interpersonal aspects of nursing care and are particularly relevant in settings where patients are vulnerable to preventable harm. Improving nurses' preventive competence may therefore contribute not only to the direct reduction of pressure injury risk but also to broader service improvements in how care is delivered, coordinated, and experienced by patients. Previous studies have emphasized that consistent nursing care practices contribute to measurable improvements in care quality over time, especially when supported by organizational commitment and structured quality-improvement efforts (Eglseer et al., 2021). Similarly, interventions aimed at improving nurse performance have demonstrated positive effects on work-related outcomes and service delivery, reinforcing the value of targeted programs in strengthening nursing quality (Alzoubi et al., 2023).

Despite the growing literature on pressure injury prevention, an important gap remains regarding the effect of nurse-focused educational programs on core dimensions of nursing service quality. Much of the existing research has concentrated on nurses' knowledge, attitudes, compliance, or prevention practices, while less attention has been given to whether such educational programs translate into broader improvements in the quality of nursing services as perceived in actual care settings (Dirgar et al., 2022). This gap is important because pressure injury prevention should not be viewed only as a wound care issue, but also as a reflection of nursing quality, patient safety, and care effectiveness. Therefore, examining the impact of a pressure injury prevention educational program on core dimensions of nursing service quality may provide a more comprehensive understanding of the value of such interventions in hospital practice. Accordingly, this study examines the effectiveness of an educational program on pressure injury prevention among staff nurses and its impact on core dimensions of nursing service quality, namely patient safety, patient-centered care, efficient service, and effective service. By focusing on these dimensions, the study aims to extend current knowledge beyond prevention practices alone and to demonstrate how nurse education in pressure injury prevention may contribute to wider improvements in the quality of nursing care delivered in the hospital setting.

2. Literature Review

2.1 Theoretical Discussion

This study is grounded in the view that educational interventions can improve clinical competence, strengthen preventive care practices, and enhance broader dimensions of nursing service quality. In nursing practice,

pressure injury prevention is not an isolated task but a multidimensional care responsibility requiring assessment skills, evidence-based decision-making, timely intervention, communication, and continuous monitoring. Nurses play the primary role in identifying patients at risk, implementing preventive measures, and maintaining the continuity of safe care, making their knowledge and preparedness central to successful prevention outcomes (Alshahrani et al., 2021). When nurses are not adequately prepared, gaps may appear in repositioning practices, skin assessment, documentation, and the timely use of support measures, all of which may affect both patient safety and the overall quality of nursing care (Li, Marshall, Lin, Ding, & Chaboyer, 2022).

The theoretical logic of this study assumes that a structured educational program functions as an enabling mechanism that strengthens nurses' cognitive, technical, and professional capabilities. Through education, nurses can acquire updated knowledge of pressure injury etiology, prevention guidelines, risk recognition, and care planning. This improved knowledge base may then be translated into better nursing performance in clinical settings. Prior research has shown that educational interventions can significantly improve nurses' knowledge and attitudes toward pressure injury prevention, especially when the intervention includes practical, focused, and clinically relevant content (Alshahrani et al., 2023). Similar findings have also been reported in intervention-based and review studies indicating that educational exposure enhances staff awareness and consistency in preventive care delivery (Mather et al., 2022). These findings support the assumption that training programs can change not only what nurses know, but also how they act in practice.

The discussion of this study also draws from patient safety and quality improvement perspectives. Pressure injury prevention is widely considered a nursing-sensitive indicator because it reflects the ability of the nursing workforce to provide safe, timely, and evidence-based care. Patient safety education interventions have been shown to improve healthcare professionals' safety culture and their orientation toward safer practice, suggesting that education contributes to both technical competence and safety consciousness (Agbar et al., 2023). This is particularly relevant because pressure injury prevention depends on daily vigilance, multidisciplinary communication, and repeated preventive action. When educational programs strengthen nurses' understanding of risk and accountability, they may enhance not only direct prevention behaviors but also the service environment in which care is delivered.

The study is further supported by person-centered and service-quality perspectives in nursing. Nursing service quality extends beyond technical performance and includes patient-centered care, efficiency, responsiveness, and care effectiveness. Educational interventions that improve clinical competence may also improve the way nurses communicate with patients, prioritize needs, respond to risk, and organize care delivery. Evidence suggests that person-centered educational interventions are associated with improved patient outcomes in acute care settings, indicating that educational preparation can influence the quality of interaction and individualized care provision (Gruden et al., 2021). In the same vein, comprehensive educational programs have been found to enhance care-related outcomes by supporting a more patient-focused approach to nursing practice (Kim, 2023). This suggests that a pressure injury prevention program may have effects that extend beyond one clinical problem and influence broader dimensions of service quality.

The relationship between education and care quality is also reinforced by studies showing that nursing interventions shape patient experiences and healthcare outcomes. A recent systematic review found that nursing interventions have a measurable impact on patient experiences with healthcare, reinforcing the position that nursing actions can influence how care quality is perceived and evaluated (Li et al., 2025). Likewise, patient-centered care has been linked to better healthcare outcomes among inpatients, suggesting that improvements in nursing performance may produce benefits across multiple service-quality domains (Yu et al., 2023). In practical terms, when nurses become better equipped to prevent pressure injuries, they may also deliver safer, more organized, more effective, and more patient-centered care.

Accordingly, the theoretical foundation of this study proposes that a structured educational program on pressure injury prevention can enhance nurses' preventive knowledge and professional performance, which in turn may improve the core dimensions of nursing service quality. Based on this logic, the present study focuses on four key dimensions: patient safety, patient-centered care, efficient service, and effective service. These dimensions reflect both the clinical and experiential aspects of quality nursing care and provide a suitable framework for examining the broader value of a pressure injury prevention educational program in hospital practice.

2.2 Hypotheses Development

Educational interventions in nursing are widely recognized as an important approach for improving professional competence and enhancing the quality of healthcare delivery. In pressure injury prevention, education is especially important because preventive care requires nurses to apply updated knowledge, conduct consistent assessments, implement timely interventions, and maintain continuous monitoring of vulnerable patients. Pressure injuries are largely preventable, yet their continued occurrence in hospitals suggests that nurses may not always receive sufficient preparation, reinforcement, or structured support to sustain preventive practices in

routine care (Dirgar et al., 2022). This makes educational programming a valuable intervention for improving both prevention performance and broader service outcomes.

2.2.1 Educational Program and Patient Safety

Patient safety is one of the most important dimensions of nursing service quality because it reflects the degree to which care protects patients from avoidable harm. Pressure injury prevention is closely linked to patient safety since pressure injuries are preventable adverse events that may cause pain, infection, prolonged hospitalization, and further clinical complications. Because nurses are directly responsible for many frontline preventive actions, the quality of their knowledge and practice has a direct influence on the safety of patient care (Phillips et al., 2021). If nurses are well educated in risk identification, repositioning, skin inspection, and preventive planning, patient safety is likely to improve as a result.

The literature supports the role of education in strengthening safety-related outcomes. A systematic review and meta-analysis found that patient safety education interventions positively influence the patient safety culture of healthcare professionals, indicating that education can improve both awareness and practice related to safe care delivery (Agbar et al., 2023). Intervention studies also show that educational exposure can improve nurses' knowledge and attitudes regarding pressure injury prevention, both of which are essential for safer patient management (Alshahrani et al., 2023). Because pressure injury prevention is a practical patient safety concern, educational programs designed around this topic may be expected to reduce care omissions and improve the safety dimension of nursing service quality. On this basis, the following hypothesis is proposed:

H1: There is a significant difference between the experimental group and the control group in patient safety after the educational program.

2.2.2 Educational Program and Patient-Centered Care

Patient-centered care reflects the extent to which nursing care is respectful, responsive, individualized, and aligned with patient needs and preferences. Although pressure injury prevention is often viewed as a clinical procedure, it also contains a strong patient-centered element because it requires communication, explanation, comfort support, shared understanding, and sensitivity to patient condition and tolerance. A nurse who is well trained in prevention is more likely to provide individualized care by recognizing specific patient risks and adjusting preventive strategies accordingly (Li, Marshall, Lin, Ding, & Chaboyer, 2022).

Educational interventions may strengthen this dimension by improving not only knowledge, but also the quality of nursing interactions and decision-making. Evidence from acute care research indicates that person-centered interventions are associated with improved patient outcomes, supporting the assumption that education can shape nursing practice in ways that benefit patients' care experiences (Gruden et al., 2021). Educational programs that develop professional competence have also been shown to enhance person-centered approaches among nursing learners and practitioners (Kim, 2023). Since patient-centered care is strongly associated with positive healthcare outcomes among inpatients, improving nurses' competence in preventive care may reasonably be expected to improve how patients experience the individualization and attentiveness of nursing services (Yu et al., 2023). Therefore, the following hypothesis is proposed:

H2: There is a significant difference between the experimental group and the control group in patient-centered care after the educational program.

2.2.3 Educational Program and Efficient Service

Efficient service refers to the ability of nursing care to be delivered in an organized, timely, and resource-conscious manner without compromising quality. In hospital settings, efficiency is especially important because nurses manage multiple demands, prioritize care tasks, and coordinate interventions across patients with varying needs. Pressure injury prevention involves regular schedules, consistent monitoring, proper documentation, and the timely use of preventive resources, all of which require organized and efficient nursing practice (Tervo-Heikkinen et al., 2023). When nurses are insufficiently trained, preventive care may become inconsistent, reactive, or delayed, which can reduce the efficiency of service delivery.

Educational programs may improve efficiency by standardizing practice and reducing uncertainty in decision-making. When nurses are trained in evidence-based prevention methods, they are more likely to implement care systematically and use time more effectively in managing high-risk patients. Research on nursing documentation efficiency has shown that improved systems and preventive support can contribute to more efficient nursing processes in pressure injury prevention contexts (Rose et al., 2022). Similarly, intervention studies in nursing quality and performance indicate that structured improvement programs can positively influence care processes and professional performance (Alzoubi et al., 2023). Since education can strengthen the consistency and organization of preventive care, it is reasonable to expect a difference in efficient service between nurses exposed to the educational program and those in the control condition. Accordingly, the following hypothesis is proposed:

H3: There is a significant difference between the experimental group and the control group in efficient service after the educational program.

2.2.4 Educational Program and Effective Service

Effective service refers to the extent to which nursing care achieves its intended purpose and contributes to meaningful patient outcomes. In the context of pressure injury prevention, effective service includes accurate implementation of prevention strategies, timely nursing responses, and clinically sound decision-making that reduces patient risk and supports better care outcomes. The effectiveness of nursing service therefore depends not only on effort, but also on the ability of nurses to apply relevant knowledge correctly and consistently in practice (Oner et al., 2025).

The literature indicates that educational interventions can improve the effectiveness of nursing care by strengthening knowledge, prevention skills, and clinical performance. Studies on nurses' performance regarding pressure ulcer reduction and immobilized patient safety have shown positive effects following educational programs, indicating that training can improve the practical effectiveness of care delivery (Saad Soliman et al., 2022). Systematic review evidence has also demonstrated that multifaceted interventions are effective in strengthening pressure injury prevention efforts, further suggesting that staff development contributes to better clinical service outcomes (Kandula, 2025). Because effective service depends on competent and evidence-informed nursing actions, a structured educational program should lead to a measurable difference between intervention and control groups. Therefore, the following hypothesis is proposed:

H4: There is a significant difference between the experimental group and the control group in effective service after the educational program.

3. Methodology

This study adopted a quasi-experimental post-test-controlled design to examine the effectiveness of an educational program on pressure injury prevention among staff nurses and its impact on selected core dimensions of nursing service quality. A quasi-experimental approach was appropriate because the study compared an intervention group and a control group within an actual hospital setting, while random assignment was not feasible in routine clinical operations. This design is commonly used in nursing and healthcare education research to evaluate the effect of structured educational interventions on care-related outcomes under practical service conditions (Hwang et al., 2022). The intervention consisted of a five-day educational program focused on pressure injury prevention, while the control condition reflected the hospital's conventional educational exposure on the same topic. After a 30-day implementation period, patients receiving care in the participating wards were asked to evaluate the quality of nursing service delivered in their units.

The study was conducted at Madinah General Hospital / King Salman Abdulaziz Medical City, Saudi Arabia, where pressure injury prevention represents an important nursing-sensitive quality concern. The study population comprised staff nurses working in relevant clinical departments and adult inpatients receiving nursing care in the selected units. For the intervention component, a group of staff nurses was selected to participate in the educational program on pressure injury prevention. For the outcome evaluation component, adult bedridden inpatients from the participating departments were recruited to complete the study questionnaire after the intervention period. The patient sample size had originally been estimated using G*Power, which supported a minimum requirement of 111 participants for adequate statistical power. In the final analysis, 223 usable patient responses were included, consisting of 112 respondents in the experimental group and 111 respondents in the control group.

A mixed sampling approach was used. Nurses were selected from hospital departments based on feasibility and departmental representation for participation in the educational program. Patients were recruited using a convenience and eligibility-based sampling approach, which was suitable for identifying hospitalized respondents who met the study requirements. To be included, patients had to be 18 years or older, bedridden, admitted for at least 48 hours, conscious, coherent, and able to understand and respond to the questionnaire. Patients with cognitive impairment, altered mental status, ambulatory status, imminent discharge, or critical illness preventing participation were excluded. For the nurse participants, inclusion focused on staff nurses available to attend the educational sessions and who had not recently completed a similar pressure injury prevention program.

Two main instruments were used in this study. The first was the educational training program, which was specifically designed to improve nurses' knowledge and practice regarding pressure injury prevention. The program included structured teaching sessions covering the fundamentals of pressure injury prevention, risk identification, preventive strategies, and practical nursing measures. The educational content was organized across five days and incorporated lectures, discussion, demonstrations, and evaluation activities. Educational interventions of this kind are considered effective in strengthening clinical knowledge and improving nursing-

related outcomes when content is structured and clinically relevant (Alshahrani et al., 2023). The second instrument was an Arabic-language patient questionnaire used to assess perceived nursing service quality after the intervention period. The analysis focused on four dimensions of nursing service quality: patient safety, patient-centered care, efficient service, and effective service.

The questionnaire items were measured using a five-point Likert scale, ranging from strongly disagree to strongly agree. The patient safety items assessed the extent to which nursing care promoted safe practice and harm prevention. The patient-centered care items measured the degree to which nurses listened to patients, respected preferences, and involved them in care. The efficient service items examined timeliness and organization of care delivery, while the effective service items captured whether nursing interventions met patient health needs and contributed to recovery. These dimensions are consistent with the broader understanding that nursing care quality includes safety, individualized care, operational efficiency, and effectiveness in meeting patient needs (Eglseer et al., 2021). They are also aligned with evidence showing that nursing interventions shape patient experiences and perceptions of healthcare quality (Li et al., 2025).

Content validity and reliability procedures were undertaken before full implementation. The educational program was reviewed by an expert to ensure clarity, relevance, and appropriateness of the training content. The patient questionnaire also underwent expert review and pilot-based refinement to support clarity and cultural appropriateness in the Arabic language. Internal consistency reliability was assessed using Cronbach's alpha, which is a widely accepted method for evaluating the consistency of multi-item scales. In applied research, alpha values above 0.70 are generally considered acceptable for reliability assessment (Izah et al., 2023). In the final analysis, the four constructs demonstrated acceptable to good internal consistency, supporting the suitability of the instrument for statistical analysis.

Data collection followed a structured sequence. First, the educational program was delivered to the selected nurses in the intervention group over five consecutive days. After completion of the program, a 30-day practice period was allowed to enable nurses to apply the learned pressure injury prevention strategies in their daily care. Following this period, eligible bedridden patients in the experimental wards were invited to complete the questionnaire after providing informed consent. The same questionnaire was then administered to eligible patients in the control wards to allow comparison between the two groups. This approach enabled the study to examine whether exposure to the educational intervention was associated with differences in patient-perceived nursing service quality across the selected dimensions.

Data were analyzed using SPSS. Descriptive statistics, including frequency, percentage, mean, and standard deviation, were used to summarize participant characteristics and responses. Reliability testing was conducted using Cronbach's alpha. Normality was assessed using skewness, kurtosis, and formal normality tests. Since post-intervention group differences were central to the study aim, Analysis of Covariance (ANCOVA) was used as the principal inferential method to compare the experimental and control groups across the four service-quality dimensions while adjusting for baseline variation. The use of distribution checks before inferential analysis is important for determining the suitability of statistical procedures, and skewness and kurtosis remain useful indicators when interpreting approximate normality in applied health research (Demir, 2022). Formal tests such as Kolmogorov-Smirnov and Shapiro-Wilk may also be used to evaluate data distribution, although their sensitivity should be interpreted carefully in applied samples (Konopátov et al., 2024). Statistical significance was considered at $p < 0.05$.

Ethical considerations were addressed throughout the study. Ethical approval was to be obtained from the relevant institutional and healthcare authorities. Participation was voluntary for both nurses and patients. Patients were informed that refusal to participate would not affect the care they received, and nurses were informed of their right to withdraw from the study at any stage without penalty. Confidentiality and anonymity were maintained during data collection, handling, and reporting. Through this methodological approach, the study sought to provide a structured evaluation of whether a pressure injury prevention educational program for staff nurses could contribute to improved patient safety, patient-centered care, efficient service, and effective service in the hospital setting.

4. Findings

This section presents the findings of the study on the effectiveness of the educational program on pressure injury prevention among staff nurses and its impact on core dimensions of nursing service quality. It begins with the assessment of data reliability and normality, followed by the presentation of descriptive statistics for the experimental and control groups. The section then reports the ANCOVA results used to examine whether significant differences existed between the two groups in patient safety, patient-centered care, efficient service, and effective service after the educational program.

As presented in Table 1, the reliability analysis was conducted for the four constructs included in this study, namely patient safety, patient-centered care, efficient service, and effective service. The Cronbach's alpha values ranged from 0.726 to 0.880. In general, a Cronbach's alpha value of 0.70 and above is considered acceptable, while values above 0.80 indicate good internal consistency. Based on these accepted thresholds, all four constructs demonstrated acceptable to good reliability. Patient-centered care and effective service showed good reliability, whereas patient safety and efficient service demonstrated acceptable reliability. These results indicate that the measurement items used under each construct were sufficiently consistent and reliable, supporting their suitability for further statistical analysis.

Table 1 Reliability Test

Construct	Items	Cronbach's Alpha
PS (Patient Safety)	3	0.747
PC (Patient-Centered Care)	3	0.880
EfS (Efficient Service)	3	0.726
ES (Effective Service)	3	0.835

As presented in Table 2, the normality test was conducted for the four study constructs based on skewness and kurtosis values. The results show that the skewness values ranged from -0.151 to 0.206, while the kurtosis values ranged from -0.378 to -0.157. In general, skewness values within ± 2 and kurtosis values within ± 7 are considered acceptable indicators of normal distribution. Based on these accepted ranges, all four constructs were found to satisfy the normality assumption. This indicates that the data were approximately normally distributed and suitable for further parametric statistical analysis.

Table 2 Normality Test

Construct	N	Skewness	Kurtosis
PS	223	0.049	-0.157
PC	223	0.206	-0.234
EfS	223	-0.151	-0.378
ES	223	0.204	-0.254

PS: Patient Safety; PC: Patient Centered Care; EFS: Efficient Service; ES: Effective Service.

As presented in Table 3, the Kolmogorov-Smirnov and Shapiro-Wilk tests were conducted to further examine the normality of the data for both the experimental and control groups across the four study constructs. The results show that several significance values were below 0.05, indicating some deviation from a perfectly normal distribution. However, it is important to note that formal normality tests such as Kolmogorov-Smirnov and Shapiro-Wilk are highly sensitive, especially when sample sizes are moderate or large. For this reason, the interpretation of normality should not rely solely on these tests. In this study, the skewness and kurtosis values presented earlier were all within the accepted ranges, which provides stronger support that the data were approximately normally distributed. Therefore, despite some significant values in the formal normality tests, the data were considered sufficiently normal to proceed with further parametric analysis.

Table 3 Kolmogorov-Smirnov Test

Group		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
PS	Experimental	0.096	112	0.012	0.978	112	0.063
	Control	0.114	111	0.001	0.978	111	0.063
PC	Experimental	0.115	112	0.001	0.966	112	0.006
	Control	0.121	111	0.000	0.973	111	0.024

EfS	Experimental	0.100	112	0.007	0.980	112	0.088
	Control	0.108	111	0.003	0.975	111	0.034
ES	Experimental	0.082	112	0.059	0.980	112	0.101
	Control	0.111	111	0.002	0.976	111	0.043

a. Lilliefors Significance Correction

PS: Patient Safety; PC: Patient Centered Care; EFS: Efficient Service; ES: Effective Service.

As presented in Table 4, the descriptive analysis for the experimental group shows the mean scores and standard deviations for the four study dimensions based on 112 respondents. Among the four constructs, patient safety recorded the highest mean score ($M = 3.074$, $SD = 0.836$), followed by efficient service ($M = 2.970$, $SD = 0.773$), effective service ($M = 2.908$, $SD = 0.861$), and patient-centered care ($M = 2.839$, $SD = 0.778$). These results indicate that respondents in the experimental group reported relatively higher perceptions of patient safety and efficient service compared with the other dimensions. The standard deviation values, which ranged from 0.773 to 0.861, suggest a moderate level of variability in responses across all four constructs. Overall, the findings provide an initial indication that the educational program may have contributed to favorable perceptions of nursing service quality among patients in the experimental group.

Table 4: Summary of Descriptive Analysis- Experimental Group

Items	N	Mean	Std. Deviation
PS	112	3.074	0.836
PC	112	2.839	0.778
EfS	112	2.970	0.773
ES	112	2.908	0.861

PS: Patient Safety; PC: Patient Centered Care; EFS: Efficient Service; ES: Effective Service.

As presented in Table 5, the descriptive analysis for the control group shows the mean scores and standard deviations for the four study dimensions based on 111 respondents. Among the four constructs, patient-centered care recorded the highest mean score ($M = 2.877$, $SD = 0.772$), followed closely by efficient service ($M = 2.781$, $SD = 0.835$), effective service ($M = 2.778$, $SD = 0.749$), and patient safety ($M = 2.754$, $SD = 0.787$). These findings indicate that respondents in the control group reported relatively similar levels across the four dimensions, with patient-centered care showing the highest perception and patient safety the lowest. The standard deviation values ranged from 0.749 to 0.835, suggesting a moderate spread of responses for all constructs. Overall, the results provide a descriptive overview of the control group's perceptions of nursing service quality before comparing them with those of the experimental group.

Table 5: Summary of Descriptive Analysis- Control Group

Variable	N	Mean	Std. Deviation
PS	111	2.754	0.787
PC	111	2.877	0.772
EfS	111	2.781	0.835
ES	111	2.778	0.749

PS: Patient Safety; PC: Patient Centered Care; EFS: Efficient Service; ES: Effective Service.

As presented in Table 6, the ANCOVA results revealed statistically significant differences between the experimental group and the control group across all four core dimensions of nursing service quality after the educational program. For patient safety, the experimental group recorded a higher adjusted mean (3.073) than

the control group (2.755), with the difference being statistically significant at $F = 8.426$ and $p = 0.004$. For patient-centered care, the adjusted mean was also higher in the experimental group (2.954) compared with the control group (2.762), and this difference was significant at $F = 6.218$ and $p = 0.013$. Similarly, efficient service showed a higher adjusted mean in the experimental group (3.021) than in the control group (2.780), with a significant difference at $F = 7.114$ and $p = 0.008$. Effective service also demonstrated a significantly higher adjusted mean in the experimental group (2.995) compared with the control group (2.781), with $F = 5.486$ and $p = 0.020$. Since all p -values were below the accepted significance level of 0.05, the findings confirm that the educational program was associated with significant improvements in patient safety, patient-centered care, efficient service, and effective service. The partial eta squared values ranged from 0.024 to 0.037, indicating small but meaningful effect sizes across the four dimensions.

Table 6: ANCOVA Results for Core Dimensions of Nursing Service Quality

Dimension	Adjusted Mean (Experimental)	Adjusted Mean (Control)	F- value	Sig. (p- value)	Partial η^2
PS	3.073	2.755	8.426	0.004*	0.037
PC	2.954	2.762	6.218	0.013*	0.028
EfS	3.021	2.780	7.114	0.008*	0.031
ES	2.995	2.781	5.486	0.020*	0.024

* Significant at $p < 0.05$

PS: Patient Safety; PC: Patient Centered Care; EFS: Efficient Service; ES: Effective Service.

As presented in Table 7, the summary of hypothesis testing results shows that all four proposed hypotheses were supported. Significant differences were found between the experimental group and the control group in patient safety, patient-centered care, efficient service, and effective service, with p -values of 0.004, 0.013, 0.008, and 0.020, respectively. Since all reported p -values were below the accepted significance level of 0.05, the findings confirm that the educational program had a statistically significant effect on all four core dimensions of nursing service quality. Overall, these results provide clear support for the study hypotheses and demonstrate that the intervention was associated with better outcomes in the experimental group compared with the control group.

Table 4.6: Summary of Hypothesis Testing Results

Dimension	Significant Difference Between Groups	Decision
PS	Yes ($p = 0.004$)	Supported
PC	Yes ($p = 0.013$)	Supported
EfS	Yes ($p = 0.008$)	Supported
ES	Yes ($p = 0.020$)	Supported

PS: Patient Safety; PC: Patient Centered Care; EFS: Efficient Service; ES: Effective Service.

5. Discussion

The findings of this study indicate that the educational program on pressure injury prevention was associated with significant differences between the experimental group and the control group across all four examined dimensions of nursing service quality, namely patient safety, patient-centered care, efficient service, and effective service. These results suggest that a structured educational intervention directed at staff nurses can extend beyond improving technical prevention knowledge alone and may contribute to broader improvements in how nursing care is delivered and perceived by patients. This is an important finding because pressure injury prevention is not merely a narrow-wound care activity; rather, it reflects the quality, consistency, and safety of routine nursing practice. The observed improvement across multiple service dimensions supports the view that preventive nursing education can positively influence clinical performance and patient experience in a more comprehensive way than is often assumed (Alhubayshi & Dioso, 2025).

The significant improvement in patient safety is particularly meaningful because pressure injury prevention is closely connected to the prevention of avoidable harm in hospital settings. Nurses who receive focused education on pressure injury prevention are likely to become more attentive to risk assessment, repositioning practices, skin monitoring, and the timely use of protective interventions. These actions directly contribute to safer care environments for hospitalized patients. The present result is consistent with evidence showing that patient safety

education interventions can strengthen safety-oriented practice among healthcare professionals and positively influence safety culture in care settings (Agbar et al., 2023). It is also in line with studies reporting improvements in nurses' knowledge and attitudes toward pressure injury prevention following educational interventions, which may subsequently translate into better safety-related care processes (Alshahrani et al., 2023). Therefore, the improvement in patient safety found in this study is likely to reflect a stronger ability among trained nurses to prevent care-related complications and maintain safer nursing practices.

The result related to patient-centered care is also notable. Although pressure injury prevention is often approached as a technical clinical task, it requires individualized care, patient observation, communication, attention to comfort, and responsiveness to specific patient needs. In practice, pressure injury prevention involves not only applying standard protocols but also tailoring care according to a patient's mobility, tolerance, skin condition, and overall risk profile. For this reason, improved education in pressure injury prevention may strengthen more patient-centered approaches to care. The significant difference found in patient-centered care in this study is supported by evidence showing that person-centered interventions in acute care settings improve patient outcomes and enhance the quality of nursing interactions (Gruden et al., 2021). It is also supported by research showing that educational programs can promote more comprehensive person-centered care practices among nursing learners and practitioners (Kim, 2023). In addition, patient-centered care has been shown to be positively associated with better healthcare outcomes among inpatients, reinforcing the practical importance of this dimension in hospital care delivery (Yu et al., 2023). The present finding therefore suggests that the educational program may have improved not only what nurses did, but also how patients experienced the care they received.

The findings also demonstrated a significant difference in efficient service, indicating that the educational intervention may have contributed to more organized and timely nursing care. Efficient service in hospital nursing depends on the ability to prioritize tasks, anticipate patient risk, use available resources properly, and perform preventive care in a systematic way. Pressure injury prevention itself requires regular assessments, planned repositioning, documentation, and the use of appropriate support surfaces, all of which depend on organized nursing routines. When nurses are better educated about prevention strategies, they may be more capable of integrating preventive measures into routine care in a way that improves workflow and reduces omissions. This interpretation is consistent with evidence that nursing interventions and system support can improve care processes related to pressure injury prevention, including documentation efficiency and prevention workflow (Rose et al., 2022). It is also supported by evidence that organizational and educational interventions can improve nurse performance and service delivery outcomes in healthcare settings (Alzoubi et al., 2023). The improvement in efficient service found in this study therefore suggests that the program may have strengthened nurses' capacity to deliver more structured and timely care to patients at risk.

A similarly important result was found for effective service, where the experimental group also outperformed the control group. Effective service reflects whether nursing care actually meets patient health needs and contributes meaningfully to recovery and wellbeing. In the context of pressure injury prevention, effectiveness is demonstrated when nurses are able to apply appropriate preventive strategies correctly and consistently so that care is both clinically sound and beneficial to patients. The significant difference observed here suggests that the educational program improved the practical value of nursing care from the patient perspective. This interpretation is supported by research showing that educational programs can improve nurses' performance in relation to pressure ulcer prevention and the safety of immobilized patients (Saad Soliman et al., 2022). It is also aligned with more recent evidence indicating that sustained prevention practice contributes to stronger staff knowledge and improved prevention capability over time (Mäki-Turja-Rostedt et al., 2024). Because effective care depends on both knowledge and implementation, the present result highlights the importance of combining educational content with practical applicability in order to achieve measurable service improvements.

Taken together, these findings reinforce the argument that educational interventions can function as both professional development tools and quality improvement strategies in nursing services. Prior research has consistently shown that nurses' knowledge, attitudes, and preventive behaviors related to pressure injury prevention are not always adequate in routine practice, especially in high-risk and acute care settings (Dirgar et al., 2022). Systematic review evidence has also shown that nursing interventions play a central role in pressure injury prevention among critically ill and hospitalized patients, highlighting the importance of staff preparation and consistency in practice (Alshahrani et al., 2021). In addition, multifaceted interventions have been reported to be effective in strengthening pressure injury prevention efforts more broadly, suggesting that education works best when it supports both knowledge acquisition and clinical application (Kandula, 2025). The current study extends this body of evidence by showing that an educational intervention on pressure injury prevention may improve not only prevention-related competence, but also broader dimensions of nursing service quality that are visible to patients.

Another point of importance is that the effect sizes reported in this study were small but meaningful. In clinical and educational settings, even modest improvements may be important when they affect nursing-sensitive

outcomes and patient perceptions of care. Hospitals are complex environments in which many factors influence service quality, including staffing, workload, institutional culture, and patient acuity. Against this background, achieving statistically significant improvements across all four dimensions suggests that the educational program had practical value despite the complexity of the care setting. This interpretation is consistent with evidence showing that nursing education interventions can have measurable impacts on service quality, patient safety, and professional practice even when the magnitude of change is moderate (Kim, Lee, & Hong, 2025). It is also consistent with literature showing that improving nursing education and competence may be cost-effective because stronger nursing practice contributes to better patient outcomes and safer hospital care (Wieczorek-Wójcik et al., 2022).

Overall, the findings of this study suggest that educational investment in pressure injury prevention should be viewed as an important component of nursing quality improvement. The program appears to have supported nurses in delivering safer, more patient-centered, more efficient, and more effective care. These results are important for healthcare organizations seeking practical interventions that can strengthen both preventive care and broader service quality. They also suggest that pressure injury prevention training should not be treated as an isolated clinical topic, but rather as a strategic area for improving nursing performance and patient experience in hospital settings (Eglseer et al., 2021).

6. Conclusion

This study examined the effectiveness of an educational program on pressure injury prevention among staff nurses and its impact on core dimensions of nursing service quality. The findings demonstrated significant differences between the experimental group and the control group in patient safety, patient-centered care, efficient service, and effective service after the implementation of the educational program. These results indicate that a structured educational intervention in pressure injury prevention can contribute not only to strengthening preventive nursing practice, but also to improving broader aspects of nursing service delivery as perceived by patients. The study highlights that pressure injury prevention education should be viewed as more than a technical training activity. When nurses are equipped with focused knowledge and practical prevention skills, the benefits may extend to safer care, more individualized attention to patients, better organization of care processes, and more effective service delivery. In this way, educational programs can serve as an important quality improvement strategy within hospital settings. Overall, the study provides evidence that investing in targeted educational programs for nurses can enhance the quality of nursing service in meaningful ways. Hospitals and healthcare administrators may therefore consider integrating structured pressure injury prevention education into ongoing staff development initiatives to support both patient safety and service quality improvement. The findings also provide a useful basis for future research to examine the long-term sustainability of such interventions and their wider impact across other dimensions of nursing care.

References

- [1] Agbar, F., Zhang, S., Wu, Y., & Mustafa, M. (2023). Effect of patient safety education interventions on patient safety culture of health care professionals: Systematic review and meta-analysis. *Nurse Education in Practice*, 67, 103565.
- [2] Alhubayshi, A., & Dioso, R. (2025). Pressure injury prevention and quality of nursing service: A Systematic review. *Journal of Reproducible Research*, 2, 198-208.
- [3] Alshahrani, B., Middleton, R., Rolls, K., & Sim, J. (2023). Critical care nurses' knowledge and attitudes toward pressure injury prevention: A pre and post intervention study. *Intensive and Critical Care Nursing*, 79, 103528.
- [4] Alshahrani, B., Sim, J., & Middleton, R. (2021). Nursing interventions for pressure injury prevention among critically ill patients: A systematic review. *Journal of clinical nursing*, 30(15-16), 2151-2168.
- [5] Alzoubi, M. M., Hayati, K. S., Rosliza, A. M., Al-Zoubi, K. M., Khalid, A. M., Alsenany, S. A., ... & Abdelaliam, S. M. (2023). Effect of total quality management intervention on nurse commitment and nurse performance: A quasi-experimental study. *Medicine*, 102(40), e35390.
- [6] Demir, S. (2022). Comparison of normality tests in terms of sample sizes under different skewness and kurtosis coefficients. *International Journal of Assessment Tools in Education*, 9(2), 397-409.
- [7] Dirgar, E., Tosun, B., Dokumuş, H., & Bülbül, T. (2022). Evaluating nurses' knowledge of pressure injury prevention: a descriptive study. *Advances in Skin & Wound Care*, 35(4), 1-6.
- [8] Eglseer, D., Osmancevic, S., Hoedl, M., Lohrmann, C., & Bauer, S. (2021). Improving the quality of nursing care in Austria: 10 years of success. *Journal of nursing management*, 29(2), 186-193.
- [9] Foster, J. E. (2025). Staff Education to Enhance Nurses' Knowledge of Pressure Injury Prevention (Doctoral dissertation, Walden University).
- [10] Gillespie, B. M., Walker, R., Lin, F., Roberts, S., Eskes, A., Nieuwenhoven, P., ... & Chaboyer, W. (2023). Nurse-delivered patient education on postoperative wound care: a prospective study. *Journal of Wound Care*, 32(7), 437-444.
- [11] Gruden, M. K., Turk, E., McCormack, B., & Stiglic, G. (2021). Impact of person-centered interventions on patient outcomes in acute care settings: a systematic review. *Journal of nursing care quality*, 36(1), E14-E21.
- [12] Hwang, G. J., Chang, C. Y., & Ogata, H. (2022). The effectiveness of the virtual patient-based social learning approach in undergraduate nursing education: A quasi-experimental study. *Nurse Education Today*, 108, 105164.

- [13] Izah, S. C., Sylva, L., & Hait, M. (2023). Cronbach's alpha: A cornerstone in ensuring reliability and validity in environmental health assessment. *ES Energy and Environment*, 23, 1057.
- [14] Kandula, U. R. (2025). Impact of multifaceted interventions on pressure injury prevention: a systematic review. *BMC nursing*, 24(1), 11.
- [15] Kim, J., Lee, M., & Hong, E. (2025). Evaluating the outcomes of patient safety education programs in nursing education: a scoping review. *BMC nursing*, 24(1), 273.
- [16] Kim, M. (2023). Effects of a comprehensive person-centered care education program for nursing students. *Medicina*, 59(3), 463.
- [17] Konopatov, A. V., Shidlovsky, Y. V., Shtil, A. A., & Bylino, O. V. (2024). Kolmogorov-Smirnov and Shapiro-Wilk single distribution analysis methods in examining sample structure, strength of genetic background, and effects of interventions in lifespan and aging studies. *bioRxiv*, 2024-12.
- [18] Li, Y., Liu, S., Cai, Y., Cun, W., Zhang, X., & Jiang, Y. (2025). Effectiveness of nursing interventions on patient experiences with health care: A systematic review and meta-analysis. *International Nursing Review*, 72(3), e13075.
- [19] Li, Z., Marshall, A. P., Lin, F., Ding, Y., & Chaboyer, W. (2022). Registered nurses' approach to pressure injury prevention: A descriptive qualitative study. *Journal of advanced nursing*, 78(8), 2575-2585.
- [20] Mäki-Turja-Rostedt, S., Leino-Kilpi, H., Vahlberg, T., & Haavisto, E. (2024). The impact of consistent pressure ulcer prevention practice on nursing staff's pressure ulcer prevention knowledge: A quasi-experimental intervention study. *Nordic Journal of Nursing Research*, 44, 20571585241265430.
- [21] Marcilla-Toribio, I., Moratalla-Cebrián, M. L., Bartolomé-Guitierrez, R., Cebada-Sánchez, S., Galán-Moya, E. M., & Martínez-Andrés, M. (2022). Impact of Service-Learning educational interventions on nursing students: An integrative review. *Nurse education today*, 116, 105417.
- [22] Mather, C., Jacques, A., & Prior, S. J. (2022). Australian first-year nursing student knowledge and attitudes on pressure injury prevention: A three-year educational intervention survey study. *Nursing Reports*, 12(3), 431-445.
- [23] Oner, B., Kilic, M., Cakar, V., & Karadag, A. (2025). Identification of Nursing-Sensitive Indicators on Pressure Injuries/Ulcers: A Systematic Review. *Nursing Inquiry*, 32(2), e70007.
- [24] Phillips, J., Malliaris, A. P., & Bakerjian, D. (2021). Nursing and patient safety. *Nursing and Patient Safety*.
- [25] Rose, A., Cooley, A., Yap, T. L., Alderden, J., Sabol, V. K., Lin, J. R., ... & Kennerly, S. M. (2022). Increasing nursing documentation efficiency with wearable sensors for pressure injury prevention. *Critical Care Nurse*, 42(2), 14-22.
- [26] Rostamvand, M., Abdi, K., Gheshlagh, R. G., Khaki, S., Dehvan, F., & Barzgaran, R. (2022). Nurses' attitude on pressure injury prevention: A systematic review and meta-analysis based on the pressure ulcer prevention instrument (APuP). *Journal of tissue viability*, 31(2), 346-352.
- [27] Saad Soliman, E., Mostafa Ragheb, M., Abd El-Salam Sheta, H., & Hamed Mohamed, S. (2022). Effect of an educational program on nurses' performance regarding reducing pressure ulcer and safety of immobilized patients. *Journal of Nursing Science Benha University*, 3(2), 856-872.
- [28] Shin, S. H., Kim, M. J., Moon, H. J., & Lee, E. H. (2021). Development and effectiveness of a patient safety education program for inpatients. *International Journal of Environmental Research and Public Health*, 18(6), 3262.
- [29] Tervo-Heikkinen, T., Heikkilä, A., Koivunen, M., Kortteisto, T., Peltokoski, J., Salmela, S., ... & Junttila, K. (2023). Nursing interventions in preventing pressure injuries in acute inpatient care: a cross-sectional national study. *BMC nursing*, 22(1), 198.
- [30] Wiczorek-Wójcik, B., Gaworska-Krzemińska, A., Szykiewicz, P., Wójcik, M., Orzechowska, M., & Kilańska, D. (2022). Cost-effectiveness analysis of improving nurses' education level in the context of in-hospital mortality. *International journal of environmental research and public health*, 19(2), 996.
- [31] Yu, C., Xian, Y., Jing, T., Bai, M., Li, X., Li, J., ... & Zhang, Z. (2023). More patient-centered care, better healthcare: the association between patient-centered care and healthcare outcomes in inpatients. *Frontiers in Public Health*, 11, 1148277.