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Impact of In-Service Education on Nurses' Attitude Regarding Pressure Ulcer Risk-Assessment and Hospital-Acquired Pressure Ulcers Prevention: A Quasi-Experimental Study

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Abstract

Background and Aim: Despite increasing advancement in healthcare, incidence of Hospital-Acquired Pressure Ulcer among at risk hospitalized patients remains high with increasing morbidity and mortality. Improved nurses' attitude to pressure ulcers risk assessment and hospital-acquired pressure ulcers prevention strategies among at risk hospitalized patients cannot be overemphasized. This study investigates impacts of in-service education on nurses' attitude regarding pressure ulcer risk assessment and hospital-acquired pressure ulcers prevention at University College Hospital, Ibadan, Nigeria.

Methods and Materials: A quantitative one group pretest-posttest quasi-experimental design using a pretested self-administered questionnaire. Sample size was 207 clinical nurses recruited through convenient sampling technique. Data were analyzed using descriptive and Chi-square statistics. Level of significance was set at $p \leq 0.05$.

Results: Mean age of participants was 45±8.01. Findings revealed that proportion of participants with positive attitude regarding pressure ulcer risk assessment increased from 30.9% at pretest to 59.9% at posttest. Similarly, proportion of participants with positive attitude towards hospital-acquired pressure ulcers prevention increased from 28.5% at pretest to 57.5% at posttest. There was no significant association between participants' knowledge and attitude regarding hospital-acquired pressure ulcers prevention before ($\chi^2 = 2.950$, $p = 0.229$) and after intervention ($\chi^2 = 1.342$, $p = 0.624$).

Conclusion: In-service education was impactful in improving attitude of nurses regarding pressure ulcer risk assessment and hospital-acquired pressure ulcers prevention. Formulation of policies to influence nursing practice through integration of routine pressure ulcer risk assessment in hospitalized patients is crucial for promoting patient's skin integrity. Thereby preventing avoidable harm to "at risk" hospitalized patients.

Keywords: In-Service Education; Nurses' Attitude; Pressure Ulcer Risk Assessment; Hospital-Acquired Pressure Ulcers

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1. Introduction

Pressure injuries pose a significant healthcare challenge globally, with high prevalence and incidence rates (Tervo-Heikkinen et al., 2022). Hospital-Acquired Pressure Ulcer (HAPU) is a localized wound on the skin and underlying soft tissues including epithelial, dermal and subcutaneous tissues (such as fat and/or muscles) over bony prominence(s) of the body which patient develops during hospitalization due to intense unrelieved pressure in combination with shear and/ other conditions (Baykara et al., 2023). These injuries are not mere wounds but localized damage to the skin caused by prolonged pressure over bony prominences and sometimes due to medical devices. Risk factors for developing pressure injuries include immobility, reduced perfusion, malnutrition, and sensory loss (Mondragon & Zito, 2022). Unrelieved pressure for long period shuts down the blood capillaries and hampers blood circulation, same consequently prevents oxygen and essential nutrients reaching the affected skin areas and underlying tissues. This consequently leads to tissue ischemia, necrosis and painful ulceration prone to infection (National Health System [NHS], 2020). Development of HAPUs in patients is associated with significant clinical and economic burdens, detrimental to their physical, psychosocial, and quality-of-life, as well as economic burdens to healthcare systems (Graves, Phillips & Hardin, 2022).

Despite increasing advancement in healthcare such as availability of international recommendations and practice guidelines for HAPU prevention, it continues to be a healthcare burden within the hospital settings (Källman et al., 2022). Pressure injuries are commonly observed in the hospital setting and are estimated to be the third most costly condition, after cancer and cardiovascular disease (Kitamura et al., 2023). Worldwide, prevalence of HAPU is high ranging from 1.1% to 43.2% among adult hospitalized patients in various healthcare settings (Baykara et al., 2023; Rapetti et al., 2023), in which every 11.3 persons per 100,000 populations suffers from HAPUs globally (Xianghong, et al, 2021). More than 2.5 million patients in the United States develop HAPIs yearly, with increasing healthcare costs and hospital stays (Fischbein, 2023). Critically ill patients are particularly more vulnerable (Cox et al., 2022), with very high avoidable morbidity and mortality (Baykara et al., 2023; Rapetti et al., 2023). In other words, when adequate prevention strategies are not carried out, HAPU may occur in patients who are prone to it (NHS, 2020; Cochrane Library, 2019).

Nevertheless, HAPU is a preventable harm to patient, and has been regarded globally as an avoidable event that should never develop on hospitalized patients, when it occurs in patients it is seen as an avoidable harm to them (Fernando-Canavan et al., 2021). Thus, its negatives consequences highlight need for its risk assessment and prevention strategies to promote hospitalized patients' skin integrity (Tervo-Heikkinen et al., 2022). However, inadequate nurses' knowledge of pressure ulcer risk assessment (PURA) and evidence-based hospital-acquired pressure ulcer prevention strategies in critically ill patients has been identified as a major contributing factor to development of HAPUs among "at risk" hospitalized patients (Mukantwari et al., 2025). Inadequate knowledge of PURA and HAPUs prevention strategies among nurses has also been identified in a study (Gbadamosi, et al., 2023). Thus, pressure injury prevention through evidence-based strategies is crucial across medical facilities and caregiving settings (Chao, 2025).

Pressure ulcer risk assessment (PURA) is an evidence-based structured evaluation of patients to predict their likelihood of developing PU based on their individual health conditions and circumstances using a standardized risk assessment tool. It is regarded as an essential component of evidence-based preventive strategies in individual patients "at risk" of developing PU (Oliveira, et al., 2025). Different standardized pressure ulcers risk assessment tools exist, which include Braden Scale, Water low Scale, Norton Scale etc (Cochrane Library, 2019). One commonly utilized tool for assessing the risk of pressure injuries in patients is the Braden Scale. The Braden scale is more accurate in assessing pressure injury risk, simple to utilize and is more widely used in clinical applications. The Braden scale comprises six subscales: sensory perception, moisture, activity, mobility, nutrition, and friction and shear. Each subscale, except for friction and shear, is assessed using a 4-point scale. A rating of '1' signifies the least favorable, while '4' denotes the most favorable (indicating the least risk). Friction and shear are rated on a 3-point scale, where '1' represents the least favorable and '3' indicates the most favorable (least risk) (Cochrane Library, 2019). The score ranges from 6 to 23. The categories and interpretations of PURA score are as follows: ≤ 9 = Very high risk; 10-12 = High risk; 13-14 = Moderate risk; 15-18 = Mild risk; and ≥ 19 = No risk of developing pressure ulcer. It is worthy to note that the lower the PURA score in a patient, the higher the risk of such patient to developing HAPU. Any score below 15 indicates an increased pressure injury risk. The Braden scale allows nurses to systematically evaluate a patient's risk for developing pressure ulcers during each shift. Based on the assessment, the nurse can determine the appropriate course of action, including involving the wound care team, notifying the provider, or initiating specific preventive interventions tailored to the patient's needs (Jansen, Silva, & Moura, 2020). Detailed documentation and assessment tools such as the Braden Scale are crucial in ensuring comprehensive pressure ulcer prevention and management (Givens, 2025).

A descriptive study by Gbadamosi et al., (2023) documented adequate knowledge of pressure ulcer risk assessment among 50% of the participants. However, a pilot study in Nigeria revealed significant increase in nurses' knowledge of

pressure ulcer risk assessment following an educational program (Gbadamosi et al., 2023). Although, the study was limited in scope due to small size (n = 16), a single study setting and a pilot study. In addition, another study reported inadequate knowledge of pressure ulcer risk assessment scales among majority of the nurses, which will obviously affect their knowledge of pressure ulcer risk assessment (Tomas & Mandume, 2024). Furthermore, findings in another study reported significant increase in knowledge regarding pressure ulcer risk assessment among participants after intervention as compared to before intervention (Noor & Hassan, 2021). In addition, in an education intervention study by Woldemariam et al., (2025) in Addis Ababa, Ethiopia, there was significant increase in knowledge of nurses after intervention regarding pressure ulcer risk assessment using the Braden Scale. However, majority of available studies were descriptive and pilot studies which limited the scope in generalization of their findings. They also lack ability to provide comprehensive findings on effects of educational training on nurses' knowledge of pressure ulcer risk assessment. Thus, there is still a dearth in literatures regarding comprehensive information on effectiveness of in-service training on the knowledge of pressure ulcer risk assessment among nurses. Therefore, there is need for comprehensive educational intervention studies to explore effectiveness of educational intervention on nurses' knowledge of pressure ulcer risk assessment.

A descriptive study revealed inadequate nurses' knowledge of hospital-acquired pressure ulcer prevention in critically ill in Rwanda (Mukantwari et al., 2025). This study did not assess impact of an intervention on participants' knowledge of prevention strategies', thus the study was unable to provide an in-depth knowledge of the participants' knowledge of its prevention. This limitation could be addressed through a comprehensive interventional study evaluating impact of in-service education on nurses' knowledge of HAPUs prevention. Furthermore, previous studies have reported improved nurses' knowledge of pressure ulcer prevention after an educational intervention (Gbadamosi et al., 2023; Noor & Hassan, 2021).

Nurses who harbor positive attitude towards HAPUs prevention tend to demonstrate heighten efforts and dedication to implementing proactive measures, thus ultimately reducing the incidence of HAPUs (Chao, 2025; Li et al., 2023). A higher level of knowledge has been associated with more positive attitudes among nurses toward pressure injury prevention (Hu, Sae-Sia, & Kitrungrote, 2021). An education interventional study in public hospitals, Addis Ababa, Ethiopia reported more positive attitude among nurses towards pressure ulcer risk assessment utilizing the Braden Scale post intervention (Woldemariam et al., 2025). Furthermore, previous descriptive studies have documented positive attitude among respondents regarding HAPUs prevention (ALFadhalah, et al., 2025; Zencir et al., 2025). A similar study showed negative attitude of nurses towards pressure ulcers prevention (Sari et al., 2025). Also, nurses' attitude towards pressure ulcer prevention was average in a survey in Turkey (Şahan & Güler, 2024). Nevertheless, findings in some interventional studies showed no statistically significant difference in the nurses' attitudes before and after the intervention (Reineke, Tallier, & Choonoo, 2024; Khalili et al., 2024). However, a pilot interventional study among student nurses in Turkey indicated that the education had a significant positive effect on improving their attitudes regarding pressure ulcers prevention (İşeri & Ursavaş 2024). This finding cannot be generalized over all nurses because of its small sample size. The finding underscores the need for comprehensive education interventional studies to extensively explore influence of in-service education on nurses' attitude towards PURA and HAPUs prevention among hospitalized patients.

Nevertheless, literatures on impacts of in-service education on nurses' attitude regarding PURA and HAPUs prevention are very scarce in Nigeria and specifically at UCH, Ibadan. Therefore, this study aims to investigate impact of in-service education on nurses' knowledge and attitude towards PURA and HAPUs in hospitalized at risk patients at UCH, Ibadan, Nigeria. This study focused on nurse clinicians across all cadres working in different units within department of Clinical Nursing, University College Hospital, Ibadan. The variables of interest include nurses' knowledge of pressure ulcer risk assessment, knowledge of hospital-acquired pressure ulcer prevention strategies, knowledge of predisposing factors to hospital-acquired pressure ulcers in at risk hospitalized patients, their attitude towards pressure ulcer risk assessment and their attitude towards prevention of hospital-acquired pressure ulcers pre and post intervention.

Findings from this study reveals evidence-based information on impact of in-service training on nurses' knowledge and attitude using Braden scale use in hospital-acquired pressure ulcers prevention at University College Hospital (UCH), Ibadan. The findings may influence policy formulation in the study setting towards integration of regular PURA in hospitalized patients in the facility. It will also add to body of knowledge on the subject matter and serve as reference material for future researchers. The participants were selected from nurses who attended year 2025 In-Service Training in the Department of Clinical Nursing, University College Hospital, Ibadan, Nigeria

2. Methods

2.1. Study Design

A quantitative one group pretest-posttest quasi-experimental design was used to evaluate impact of in-service education on nurses' knowledge and attitude towards PURA and HAPUs prevention

2.2. Study Setting

The study was conducted in the Department of Clinical Nursing, University College Hospital (UCH), Ibadan. The first teaching and tertiary hospital in Nigeria and West-Africa Sub-region, established by an Act of Parliament on November, 1952 in response to the need for the training of medical personnel and other healthcare professionals for the country and the West-African Sub-Region (The Guardian Nigeria Newspaper, 2017).

2.3. Study Population

All clinical nurses who attended year 2025 annual in-service training programme in the Continuing Education Unit, Department of Clinical Nursing, University College Hospital, Ibadan. Those who consented to participate were recruited into the study. Nurses who did not attend in-service and those who declined participation in the study were excluded.

2.4. Sample Size Calculation

For Categorical Outcome

$$n = \frac{(Z_{\alpha} + Z_{\beta})^2 \times [P_1(1 - P_1) + P_2(1 - P_2)]}{(P_1 - P_2)^2}$$

Z_{α} = the standard normal variate at 95% confidence interval in a 2-tailed distribution, at a significant level of 0.05 = 1.96

Z_{β} = Normal standard deviate at a power of test at 90% = 1.24

P1 = prevalence of positive attitude in the previous study = 48.8% (Ehighibe et al., 2025)

P2 = expected prevalence of positive attitude after intervention in the present study = 65.0%

$$n = \frac{(1.96 + 1.24)^2 \times [0.488(0.512) + 0.650(0.350)]}{(-0.162)^2} \quad n = 186.2569$$

To account for 10% attrition, minimum sample size was approximated to 207 participants

Sampling Technique

Convenient sampling technique was used to recruit participants.

2.5. Instrument for Data Collection

A self-administered questionnaire was used for data collection. Section A captured information on participants' socio-demographic data. Section B focused on participants' knowledge of pressure ulcer risk assessment. Section C was based on participants' knowledge of hospital-acquired pressure ulcer prevention. Section D captured information on participants' knowledge of predisposing factors to hospital-acquired pressure ulcers. Furthermore, section E focused on participants' attitude towards pressure ulcer risk assessment. While section F captured data on participants' attitude towards HAPUs prevention. The questionnaire was prepared in English language only since all participants understand the language. Time required to fill each questionnaire was about 10 minutes. The instrument was reviewed by expert analyst and some senior nursing officers, the corrections were effected accordingly. Reliability test was carried out before commencement of study, Cronbach Alpha was 0.89 which was considered appropriate.

2.6. Procedure for Data Collection

Before the training and administration of the study instrument, the participants at the training program were approached to explain objectives of the study to them. Their participation and cooperation were sought for. Thereafter,

the pretest questionnaires were administered on eligible participants, after which interventional training consisting of lectures on pressure ulcer risk assessment using Braden scale and hospital-acquired pressure ulcer prevention strategies was implemented. Lastly after the training, posttest questionnaire was administered on the participants to evaluate effectiveness of the training on the participants.

Table 1 Socio-Demographic Characteristics of the Participants

Socio-Demographic Characteristics	**Frequency**	**Percent**
Age		
21 - 30 years	7	3.4
31 - 40 years	48	23.2
41 - 50 years	95	45.9
51 years and above	57	27.5
Sex		
Male	7	3.4
Female	200	96.6
Marital Status		
Single	9	4.3
Married	190	91.8
Widowed	7	3.4
Divorced	1	.5
Highest Level of Education		
PGDN	12	5.8
BN.Sc.	182	87.9
MN.Sc.	9	4.3
Diploma	4	1.9
Designation		
NO I	12	5.8
SNO	50	24.2
ACNO	33	15.9
CNO	38	18.4
AND	74	35.7
Work Experience (Years)		
1 – 10	43	20.8
11 – 20	84	40.6
21 – 30	70	33.8
31 and above	10	4.8
Participated in any formal Training on PURA & HAPU before		
Yes	36	17.4
No	171	82.6

*Mean age = 45±8.01;*Age range = 21 to 60 years

Table 2 Association between Knowledge of PURA and Knowledge of HAPUs Prevention Pre- and Post-Intervention among the Participants

Knowledge of PURA Assessment	Knowledge of HAPU Prevention			Chi-Square	p-value
	Good	Moderate	Poor		
Pre				0.703f	1.000
Good	1 (25.0)	3 (75.0)	0 (0.0)		
Moderate	13 (25.0)	30 (57.7)	9 (17.3)		
Poor	36 (23.8)	87 (57.6)	28 (18.5)		
Post				10.926f	0.015*
Good	128 (92.8)	10 (7.2)	0 (0.0)		
Moderate	49 (87.5)	7 (12.5)	0 (0.0)		
Poor	9 (69.2)	3 (23.1)	1 (7.7)		

f = Fisher Exact, * = Significant

Table 3 Association between Knowledge of HAPU Prevention and Attitude towards HAPUs Prevention Pre-and Post-Intervention among the Participants

Knowledge of HAPU Prevention	Attitude towards HAPUs Prevention		Chi-Square	p-value
	Positive	Negative		
Pre			2.950	0.229
Good	19 (38.0)	31 (62.0)		
Moderate	31 (25.8)	89 (74.2)		
Poor	9 (24.3)	28 (75.7)		
Post			1.342f	0.624
Good	107 (57.5)	79 (42.5)		
Moderate	12 (60.0)	8 (40.0)		
Poor	0 (0.0)	1 (100.0)		

f = Fisher Exact

Table 4 Overall Effect of Intervention on Knowledge of PURA, HAPU Prevention, Attitude towards PURA and HAPUs Prevention

	Pre	Post	|t|	p-value
	Mean ± SD	Mean ± SD		
Knowledge of PURA	2.12 ± 0.74	3.68 ± 0.73	23.519	<0.001*
Knowledge of HAPU Prevention	3.62 ± 1.18	5.39 ± 0.74	22.184	<0.001*
Attitude towards PURA	29.59 ± 4.30	32.35 ± 3.66	9.133	<0.001*
Attitude towards HAPUs Prevention	26.79 ± 3.41	28.74 ± 3.33	7.647	<0.001*

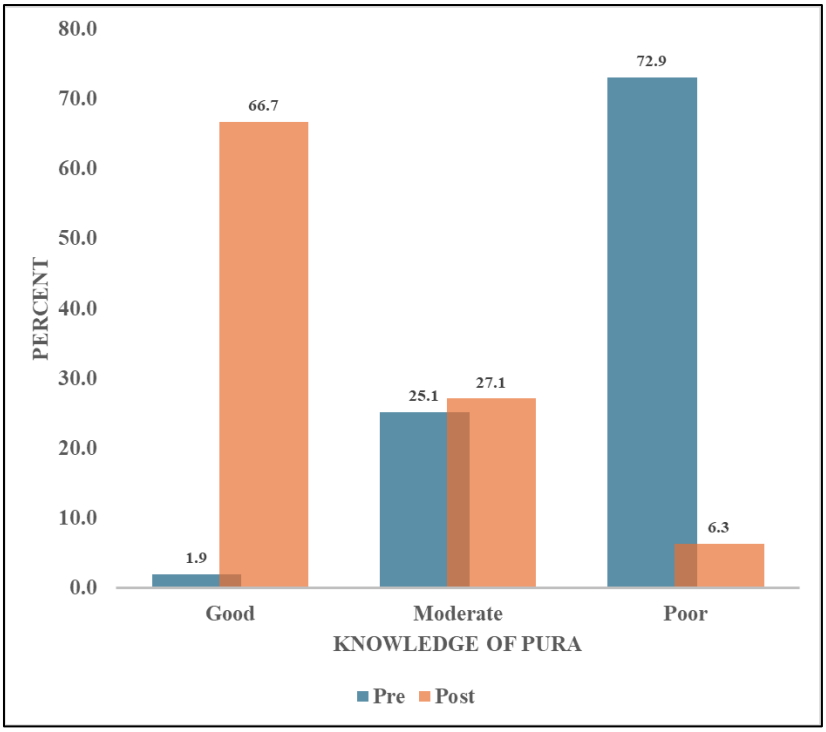

Figure 1 Participants' Overall Knowledge of PURA

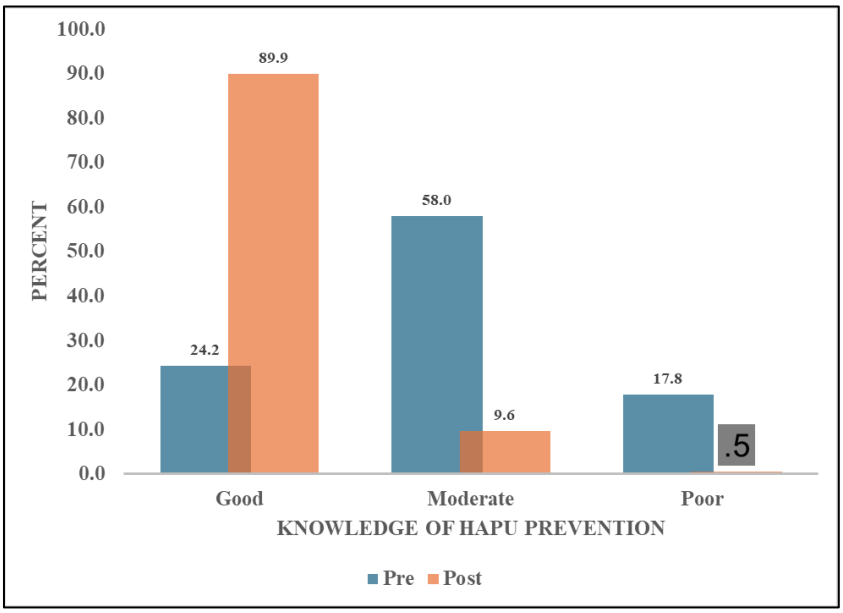

Figure 2 Participants' Overall Knowledge of HAPUs Prevention

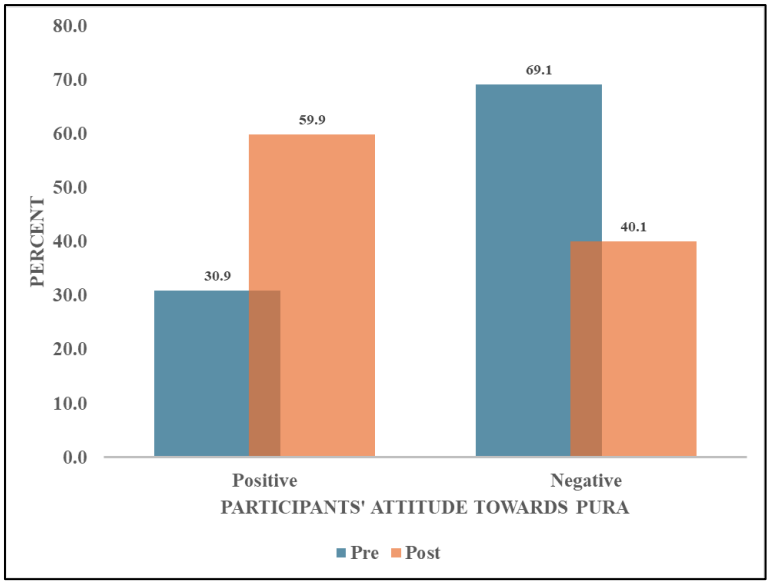

Figure 3 Overall Participants' Attitude towards PURA

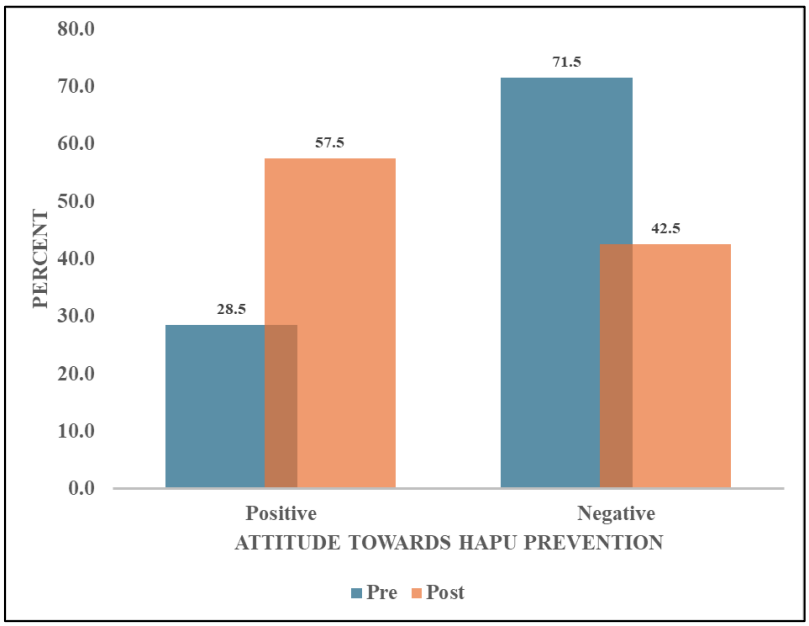

Figure 4 Participants' Overall Attitude regarding HAPU Prevention

2.7. Ethical Considerations

Ethical principles guiding the use of human participants in research was followed in the conduct of this study. Ethical approval was sought from University of Ibadan and University College hospital Joint Ethical Review Committee (UI/EC/25/0293). Written permission was obtained from Chief Medical Director, University College Hospital, Ibadan. Permission was also sought from Head of Department of Clinical Nursing. Informed consent was taken from each participant before data collection. Participation in the study was voluntary, participants were free to withdraw from the study anytime. Privacy and absolute confidentiality of participants' information was ensured by coding the questionnaire. No identifier such as, participants' names was written on the instrument. There was no harm to the participants during the course of this study.

2.8. Method of Data Analysis

After collection, data was cleaned, coded and entered into the system. Analysis was done using statistical package for social science (SPPS) software, version 25. Data were analyzed using descriptive and inferential statistics to determine

difference between pretest and posttest mean scores. The results were presented in descriptive tables and charts. Hypotheses were tested and analyzed using paired t-test (for one group pretest-posttest) to determine the mean scores before and after intervention. Level of significance was $p \leq 0.05$.

3. Results

A total of 207 participants were recruited into the study with 100% response rate. Overall, majority 66.7% of participants demonstrated good knowledge of PURA after educational intervention, as compared to only 1.9% who had good knowledge before intervention (figure 1). Findings revealed also that almost all 89.9% of participants had good knowledge of HAPUs prevention post-intervention, while only 24.2% of participants had good knowledge pre-intervention (figure 2). Furthermore, findings revealed that before intervention, 30.9% of the participants had positive attitude towards PURA, and this was increased to 59.9% after intervention (Figure 3). In addition, findings showed that above average 57.5% of participants demonstrated positive attitude towards HAPUs prevention after intervention, unlike before intervention when just a quarter 28.5% of participants had positive attitude towards HAPUs prevention (figure 4). Moreover, Chi-square analysis revealed a statistically significant association between participants' knowledge of PURA and their knowledge of HAPU prevention ($\chi^2 = 10.926$, $p = 0.015$) after the intervention. However, there was no significant association between participants' knowledge of PURA and their knowledge of HAPU prevention ($\chi^2 = 0.703$, $p = 1.000$) before intervention (table 2). Additionally, Chi-square analysis showed that there was no significant association between participants' knowledge and attitude ($\chi^2 = 1.342$, $p = 0.624$) towards HAPUs before and after intervention (table 3). Regarding overall effect of intervention on participants' knowledge of PURA, HAPU prevention, attitude towards PURA and HAPUs prevention, paired t-test analysis shows significant positive differences between pre-test and post-test mean scores in all domains tested (table 4).

4. Discussion

Mean age of participants was 45±8.01 years, with age range between 21 and 60 years. Majority of participants were females, which justifies the female dominance in the profession. Almost all participants had minimum of first degree with few already having postgraduate degree in nursing which is commendable. This will promote delivery of quality nursing care to patients by nurse clinicians and help to prepare them to function successfully as leaders in healthcare settings. Almost all participants had not participated in any formal Training on PURA and HAPU before the current intervention. This justifies the scarcity of training on PURA and HAPUs prevention in the study setting and the need for continuous in-service education on the subject matter.

Regarding participants' knowledge of PURA, findings revealed a significant improvement in participants' knowledge of PURA following intervention. This finding corroborates outcome of similar previous studies in which remarkable improvement in the knowledge of PURA among participants post intervention was documented (Woldemariam et al., 2025; Gbadamosi, et al., 2023; Noor & Hassan, 2021). Also, the intervention in the current study was impactful regarding the knowledge of hospital-acquired pressure ulcer among the participants post intervention as adequate knowledge was revealed among most of the participants. This indicates the intervention was effective in significantly improving knowledge of HAPU prevention among the participants. This finding is in tandem with previous studies which documented adequate knowledge of HAPUs after the intervention (Noor et al., 2021; Mohame & Weheida, 2015).

Furthermore, the present study also indicated increase in the proportion of participants with positive attitude to PURA following the intervention. This is in line with Woldemariam et al., (2025) who also documented positive attitude among majority of the participants after intervention in their study. In addition, there was a remarkable increase in positive attitude towards HAPUs prevention among majority of participants after the intervention. The finding is consistent with similar studies which reported positive attitude among majority of participants following intervention (İşeri & Ursavaş 2024; Şahan & Güler, 2024; Reineke, Tallier, & Choonoo, 2024). In overall, the results indicate that in-service training positively influenced participants' knowledge and attitudes, fostering stronger commitment and optimism toward pressure ulcer risk assessment and hospital-acquired pressure ulcer prevention in "at risk" hospitalized patients.

Additionally, findings depicted a statistically significant association ($p=0.015$) between participants' knowledge of PURA and their knowledge of HAPU prevention after the intervention. However, there was no significant association ($p =1.000$) between participants' knowledge of PURA and their knowledge of HAPU prevention before intervention**.** This implies that the association was not by chance but as a result of the intervention. Therefore, participants' knowledge of PURA tend to influence their knowledge of HAPUs prevention. In other words, an increase in participants' knowledge of PURA can consequently improve their knowledge of HAPUs prevention and vice versa. Moreover, there was no significant association ($p = 0.624$) between participants' knowledge and attitude towards HAPUs before and after intervention.

This suggests that although both knowledge and attitudes improved after the intervention, the increase in knowledge did not directly translate into a statistically significant change in attitude toward HAPU prevention. The nurses might be knowledge about HAPUs prevention but, at the same time have poor or negative attitude towards it prevention. Findings further revealed significant positive differences between pre-test and post-test knowledge and attitude means scores in all domains tested (participants'' knowledge of PURA, knowledge of HAPUs prevention, attitude towards PURA and attitude towards HAPUs prevention). Overall, the in-service training had significant positive effect on participants' knowledge of pressure ulcer risk assessment using Braden scale and their attitudes regarding hospital-acquired pressure ulcers prevention at University College Hospital, Ibadan, Nigeria.

5. Conclusion

The in-service education had positive impacts on nurses' knowledge and attitude towards PURA and HAPUs prevention at University College Hospital, Ibadan. This underscore the need for regular in-service training to influence nurses' practice. The study also suggests policy formulation towards regular availability of Braden scale and other logistical supports from the management and nurse leaders for better integration PURA into clinical practice in the management of "at risk" hospitalized patients. This will promote skin integrity and safety of this category of patients at University College Hospital, Ibadan, Nigeria.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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