



(RESEARCH ARTICLE)



Effect of Intervention Training on Nurses' Knowledge of Pressure Ulcer Risk Assessment and Prevention at a Tertiary Hospital, Nigeria

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Abstract

Background: Despite advances in healthcare, inadequate knowledge of pressure ulcer risk assessment (PURA) and prevention strategies among nurses as a major contributory factor to development of pressure ulcers among “at risk” patients has been identified by previous studies.

Aim: This study evaluated effect of intervention training on nurses' knowledge of pressure ulcer risk assessment and prevention strategies at University College Hospital, (UCH) Nigeria.

Methods: A randomized controlled trials research design. Sample size was 268 (134 participants each in intervention and control groups) nurses selected through simple random and systematic sampling techniques. A structured pre-tested questionnaire was used for data collection. Data were analyzed using descriptive and inferential statistics. Level of significance set at p-value <0.05.

Results: Mean ages of participants were 42.45±8.89 and 38.81±10.56 years for intervention and control groups respectively. Almost all participants in intervention group during pre-test had adequate knowledge of pressure ulcer risk assessment, and pressure ulcers prevention strategies compared to during pre-test in which poor knowledge of those areas was recorded among majority of them. Also, adequate knowledge of pressure ulcers prevention strategies was observed among intervention group after the training as compared to control group in which poor knowledge was recorded. Furthermore, intervention training was highly statistically significant with all studied domains at p<0.001.

Conclusion: The intervention training on nurses' knowledge regarding PURA and prevention strategies was positive at a high rate. Regular training programs on the subject matter for all nurse clinicians to promote quality nursing care according to international best practices is crucial.

Keywords: Effect; Intervention Training; Knowledge; Pressure Ulcer Risk Assessment; Prevention Strategies

1. Introduction

Pressure ulcers otherwise known as bed sores/pressure sores/pressure injuries or decubitus ulcers are localized wounds/injuries to the skin and underlying tissues over bony prominences of the body such as occiput, ears, shoulders, elbows, hips, buttocks, knees, ankles and heels; primarily caused by prolonged pressure in combination with moisture and friction between bony structures and the skin which reduces blood circulation, oxygen supply, essential nutrients, which can result to tissue ischemia and necrosis around the area(s), it can also lead to serious complications including death^{1, 2, 3}. Pressure ulcer (PU) in healthcare remains a global concern due to their health consequences, significant economic burdens and challenge to healthcare providers, as it directly reflects the quality of healthcare a patient receives in the hospital^{4, 5}. Development of PUs is regarded as a “never event” that should never happen in a healthcare

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setting, it is considered evidence of serious harm to the patient when it happens, because PUs are preventable⁶. Prevalence of PUs remains unacceptably high worldwide, ranging from 1.1%-35.8%, with its development ranging from four to thirty-three days, and eight days on the average^{7,8,9}. In United States of America, it was estimated that over 2.5 million people develop PU each year¹⁰, an annual cost of treatment of about \$26.8 billion to the US government¹¹, the additional cost of \$43,000 per related hospital stay⁹, among whom (60,000) die due to its complications such as osteomyelitis and sepsis¹². In Europe, cost of PU prevention is more cost-effective than that of its treatment¹³. In Asia, prevalence of PUs in China was 1.67%¹⁴ and 3.3% in Turkey¹⁵. In Africa, PUs prevalence was 19.3% in Tunisia¹⁶.

In Nigerian, there is a paucity of current literatures on the prevalence of PUs. However, one of the available publications; a study on the prevalence of PUs in a descriptive study among SCI patients while on admission in a tertiary health facility (UCH) in Ibadan documented that the prevalence of pressure ulcers was 47.7%¹⁷. Another study on PUs prevalence among hospitalized adults in six University Hospitals in South-West Nigeria revealed that the prevalence of PUs in these Hospitals ranged from 0% to 6.9%, thus giving an overall prevalence of 3.22%¹⁸.

An essential component of preventive strategies is the Pressure Ulcer Risk Assessment (PURA) using a standardized risk assessment scale in individual patients at risk of PUs in addition with prompt implementation of necessary strategies to curb it¹⁹. Knowledge provides the foundation for informed decision-making, promotes high-quality nursing care delivery competency, and evidence-based practices leading to the quality and safety of nursing care to patients^{20,21,22}. Professional nurses are primarily responsible for the patient's skincare and PUs preventive measures²³. Therefore, the need for them to have the necessary skills to identify early patients at risk of PUs through PURA; implement promptly and adequately, evidence-based best practices PUs prevention strategies/measures. This study evaluated effect of intervention training on nurses' knowledge of Pressure Ulcer Risk Assessment and prevention strategies at University College Hospital, Ibadan, Nigeria.

Despite advances in healthcare technology, inadequate knowledge of pressure ulcers risk assessment and prevention strategies among nurses has been identified by previous studies as major contributing factor to the development of PUs among "at risk" patients^{20,24,25,26,27,4,28}. Development of PUs consequently results in significant physical, financial and emotional burdens on the affected patients and their relatives including healthcare providers^{29,8,30,31}. Therefore, all nurse clinicians need to have necessary skills through a planned educational program on Pressure Ulcer Risk Assessment and preventive strategies³². Studies on PURA and prevention strategies among nurses are scanty in Nigeria, particularly at UCH, Ibadan. Findings from the study will shed light on the knowledge of PURA and prevention strategies among nurses which will inform appropriate policies and interventions at the facility. It will also add to the existing body of knowledge, and contribute to the scanty literatures on the subject matter in the country. Furthermore, this study will serve as a valuable resource for future researchers on the subject matter.

A quasi-experimental research design on the effect of implementing standardized preventive guidelines for pressure ulcer on nurses' performance in Egypt among 99 nurses through accidental sampling technique using a knowledge questionnaire, attitude scale, and observational checklist for data collection displayed that there was a highly statistically significant difference ($p < 0.001$) between nurses' knowledge of Braden Scale as a predictive risk assessment of pressure ulcer between pre (1.03 ± 1.59) and post (7.29 ± 1.44) implementation of standardized PUs preventive guidelines³³. A quasi-experimental design study among 75 samples selected in a non-probability purposive sampling technique on the effectiveness of a planned teaching program regarding use of the Braden Scale for pressure sore on knowledge and practices among staff nurses working in selected Hospitals International using a questionnaire and an observational checklist revealed significant difference between scores knowledge of respondents in pressure sore risk assessment pre (7.813) and post (12.51) test of the teaching program³⁵. Furthermore, a pre-experimental research design study on the effect of pressure ulcer preventive nursing interventions on knowledge, attitudes and practices of nurses among hospitalized geriatric patients in Alexandria, Egypt among 40 nurses purposively selected using questionnaire, observational checklist, and nurses' attitude scale for data collection revealed that the majority of the nurses had low level of knowledge of PUs prevention before (10.68 ± 4.05) and a significantly high level of knowledge of PUs prevention (26.92 ± 1.40) after application of interventions at $p < 0.001$ ²⁶.

Another quasi-experimental study on the effectiveness of an interventional program on nursing staff' knowledge concerning the prevention of pressure ulcer at the intensive care unit (ICU) in Al-Diwaniyah Teaching Hospital, India among 27 participants selected through a non-probability purposive sampling using a questionnaire documented that the application of the interventional program has the beneficial effects on intensive care unit nursing staff in which participants' knowledge domains in prevention of PU increased in post-test (1.92 ± 0.125) as compared to their pre-test (1.20 ± 0.141); and the interventional program was highly significantly ($p < 0.0001$) associated with the participants' knowledge of PUs risk assessment and prevention³⁶. Another comparison group pretest-posttest study on effects of pressure ulcer prevention training among nurses in long-term care hospitals in Korea by³⁷, using convenient sampling

technique reported that both groups exhibited significant increases in scores for pressure ulcer prevention knowledge after the intervention. However, there were no significant differences in the pre-post difference scores for any of the variables between the two groups. A randomized control study on effect of educational intervention on the knowledge and attitude of intensive care nurses in the prevention of pressure ulcers in Iran, among 67 nurses randomly assigned to the intervention and control groups using questionnaire for data collection revealed that knowledge in intervention group improved significantly ($p=0.000$) compared to control group³⁸. In addition, a quasi-experimental study to assess an interactive educational intervention on nurses' knowledge of pressure ulcer prevention in Nigeria among 193 nurses purposefully selected and randomized to intervention (IG, $n = 127$ from 2 hospitals) and control (CG, $n = 66$ from 1 hospital) groups, using questionnaire for data collection showed differences in the pre-test knowledge scores of pressure ulcers prevention between intervention group and control groups (32.5 ± 4.2) and (30.8 ± 5.0) respectively³⁹

2. Material and methods

2.1. Study Design and Population

A randomized controlled trial (RCT) research design to determine cause-effect relationship between an intervention training and outcome was used to conduct this study. Study population consisted of all nurses in the Department of Clinical Nursing of the facility.

2.2. Sample Size Determination and Sampling Technique

Sample was 268 nurses (intervention group 134 + control group 134). Formula for sample size calculation for comparison between two groups when endpoint is quantitative data was used as follows:

$$\text{Formula, Sample size (n)} = 2 \text{ SD}^2 \times (Z_{\alpha/2} + Z_{\beta})^2 / d^2$$

Where, Standard Deviation [(sigma (σ)] = a value of S.D from previous study

$Z_{\alpha/2} = Z_{0.05/2} = Z_{0.025} = 1.96$ (standard normal Z value from Z table) @ level of significance of 0.05 (type 1 error of 5%)

$Z_{\beta} = Z_{0.20} = 0.9$ (standard normal Z value from Z table) @ 90% statistical power of study

d = effect sized = difference between mean values (considered by the researcher as statistically significant in the current study).

When, $SD = 27.3$ ³⁴

$Z_{\alpha/2} = 1.96$, $Z_{\beta} = 0.9$, and $d = 10$

Sample size (n) = $2 (27.3)^2 \times (1.96 + 0.9)^2 / (10)^2 = 122$

Considering 10% attrition rate, $10/100 \times 122 \approx 12$ nurses

Therefore, total sample size (n) in each group was = 134 (122 + 12) nurses

2.2.1. Sampling Technique

Simple random and systematic sampling techniques were used to select participants from selected units (Intensive Care, Medical, surgical, Neurosurgery and Nephrology units) within the Department of Clinical Nursing of the facility.

2.2.2. Method of Data Collection

The study was conducted in three phases: Pre-intervention phase, Intervention phase, and Post intervention phase after gaining their consents. Data were obtained from participants through pre-test and post-post using aforementioned structured self-administered questionnaire. During pre-intervention, questionnaires were distributed to participants in both intervention and control groups. The training containing the concept of the study was delivered in English language by the researcher to intervention group only. The training was also supplemented with colored pamphlets containing summary of the contents of the training in simple English Language with beautiful pictures for illustrations. The training sessions were conducted in groups at the convenience of the participants over 8 weeks. Each of them also received a copy of pamphlet containing the summary of the training to serve as reminder. Post-test was conducted for

intervention group only after intervention training using same contents of the questionnaire earlier used for pre-test, to evaluate impact of the intervention training on the participants knowledge of the areas examined by the study. The pre-test and post-test were analysis.

2.3. Data Analysis

Data were analyzed using Statistical Packaging for Social Sciences (SPSS) version 25 and descriptive statistics. Hypotheses were tested using t-test. Results were presented in descriptive statistics and charts in line with objectives of study. Level of significance set at p-value <0.05.

3. Results

3.1. Socio-Demographic Characteristics of Participants

A total of 268 participants (each group comprised of 134 nurses) were recruited into the study with 100% response rate.

Table 1 Socio-Demographic Characteristics of Participants

| Socio-Demographic Characteristics | Participants' Groups | |
|-----------------------------------|--------------------------|---------------------|
| | Intervention (%) n = 134 | Control (%) n = 134 |
| Age Groups | | |
| 20 – 29 years | 10 (7.5) | 30 (22.4) |
| 30 - 39 years | 49 (36.6) | 43 (32.1) |
| 40 – 49 years | 45 (33.6) | 28 (20.9) |
| 50 years & above | 30 (22.4) | 33 (24.6) |
| Mean Age ± SD | 42.45 ± 8.89 | 38.81 ± 10.56 |
| Gender | | |
| Male | 1 (0.7) | 9 (6.7) |
| Female | 133 (99.3) | 125 (93.3) |
| Designation | | |
| Nursing Officer 1 | 21 (15.7) | 29 (21.6) |
| Senior Nursing Officer | 45 (33.6) | 57 (42.5) |
| Assistant Chief Nursing Officer | 9 (6.7) | 6 (4.5) |
| Chief Nursing Officer | 21 (15.7) | 14 (10.4) |
| Assistant Director of Nursing | 35 (26.1) | 22 (16.4) |
| Deputy Director of Nursing | 3 (2.2) | 6 (4.5) |
| Educational Status | | |
| ND/HND in Nursing | 35 (26.1) | 27 (20.1) |
| Bachelor of Nursing | 90 (67.2) | 99 (73.9) |
| Postgraduate Diploma in Nursing | 6 (4.5) | 5 (4.5) |
| Postgraduate Degree in Nursing | 3 (2.2) | 3 (2.2) |

3.2. Participants' Knowledge of Braden Scale Pre and Post Intervention Training

In overall, almost all 94.0% of participants had adequate knowledge of Braden Scale post-intervention training, while 3.0% had adequate knowledge of Braden Scale at pre-intervention training (Figure 1).

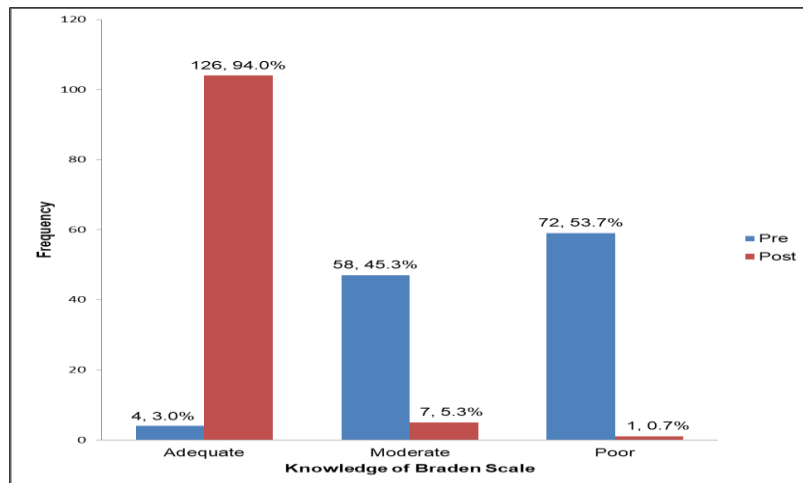


Figure 1 Participants’ Knowledge of Braden Scale Pre and Post Intervention Training

Table 2 Participants’ Knowledge of Pressure Ulcers Risk Assessment Pre and Post Intervention Training

| Participants’ Knowledge of Pressure Ulcers Risk Assessment | Correct Responses (%) | | Wrong Responses (%) | |
|---|-----------------------|------------|---------------------|-----------|
| | Pre-Test | Post-Test | Pre-Test | Post-Test |
| Ability to risk factors for development of pressure ulcers such as immobility, incontinence, impaired nutrition & altered consciousness | 132 (98.5) | 128 (95.5) | 2 (1.5) | 6 (4.5) |
| Knowing that PURA should be carried out on all new patients within 8 hours of admission into the ward | 115 (85.8) | 126 (94.0) | 19 (14.2) | 8 (6.0) |
| Knowing that PURA should be carried out daily on patients “at risk” of developing pressure ulcer | 84 (62.7) | 117 (87.3) | 50 (37.3) | 17 (12.7) |
| Knowing that it is necessary to do PURA for patient when his/her condition deteriorates | 108 (80.6) | 133 (99.3) | 26 (19.4) | 1 (0.7) |
| Knowing that the Professional nurses are the health personnel most accountable for PURA in patients | 71 (53.0) | 100 (74.6) | 63 (47.0) | 34 (25.4) |
| Knowing that nurses should always report patients’ skin condition every shift | 94 (70.1) | 102 (76.1) | 40 (29.9) | 32 (23.9) |
| Knowing that a PURA score above 18 is associated with increased pressure ulcer risk | 20 (14.9) | 100 (74.6) | 114 (85.1) | 34 (25.4) |
| Knowing that a low-humidity environment may predispose a patient to pressure ulcers development | 54 (40.3) | 65 (48.5) | 80 (57.7) | 69 (51.5) |

3.3. Participants’ Knowledge of Pressure Ulcers Risk Assessment

In overall, findings pointed out that more than three-quarter 81.3% of participants had adequate knowledge of pressure ulcers risk assessment at post-test, while just average 50.0% of them had adequate knowledge of pressure ulcer risk assessment at pre-test (Figure 2).

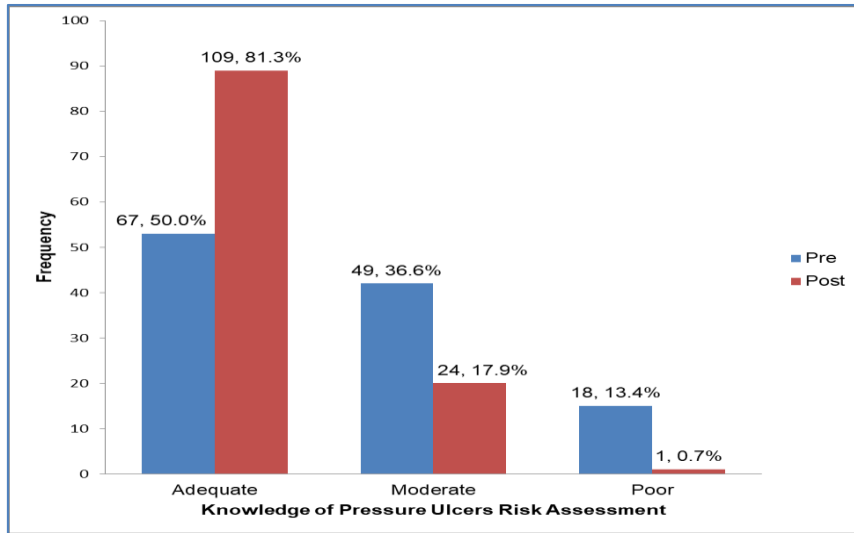


Figure 2 Participants' Knowledge of Pressure Ulcers Risk Assessment Pre and Post Intervention Training

3.4. Participants' Knowledge of Pressure Ulcers Prevention Strategies Pre and Post Intervention Training

In overall, almost all 97.0% participants had adequate knowledge of pressure ulcers prevention strategies at post-test, as compared to a little above average 64.9% participants who had adequate knowledge during pre-test phase (Figure 3).

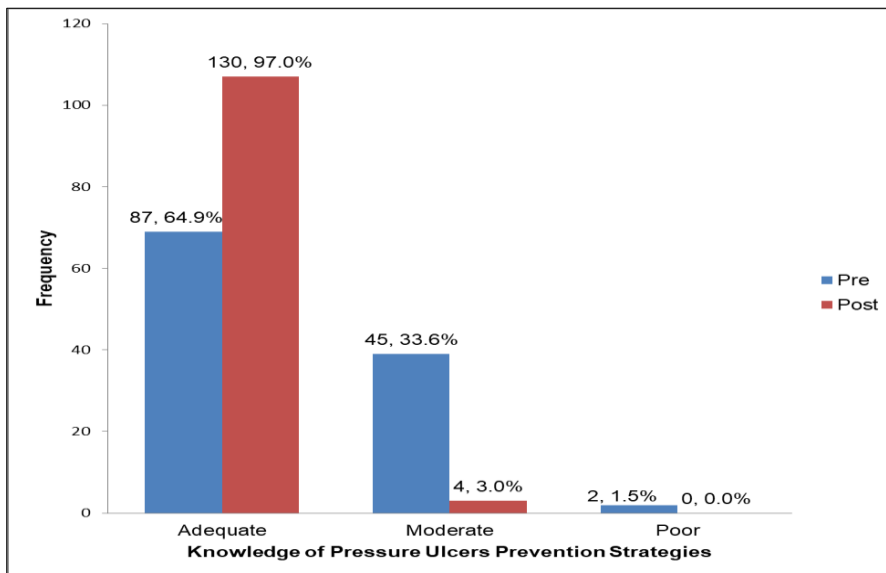


Figure 3 Participants' Knowledge of Pressure Ulcer Prevention Strategies Pre and Post Intervention Training

3.5. Knowledge of Pressure Ulcers Prevention Strategies among Intervention and Control Groups Pre versus Post Intervention Training

In overall, findings depicted that almost all 97.0% participants among intervention group displayed improved knowledge in the knowledge areas of pressure ulcers prevention strategies at post-test, while less than three-quarter 70.2% in the control group had adequate knowledge of pressure ulcers prevention strategies (Figure 4).

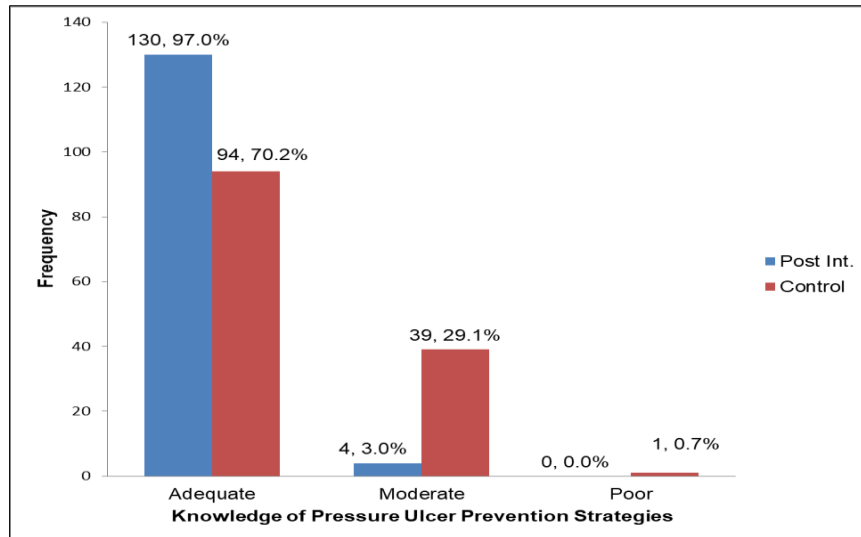


Figure 4 Knowledge of Pressure Ulcers Prevention Strategies among Intervention and Control Groups Pre versus Post Intervention Training

3.6. Hypotheses

T-test analysis revealed significant differences between pre-test and post-test knowledge mean scores of participant and the intervention training was highly statistically significant ($p < 0.001$) with all studied domains (Table 3).

Table 3 Significance of Intervention Training to the Knowledge of Participants

| Participants' Knowledge | Mean \pm SD | Mean Difference | T | p-value |
|---|-------------------|-----------------|--------|---------|
| Knowledge of Braden Scale among Intervention Group | | | | |
| Pre-Test | 5.96 \pm 2.451 | -5.582 | 24.614 | <0.001* |
| Post-Test | 11.54 \pm 1.391 | | | |
| Knowledge of Pressure Ulcer Risk Assessment among Intervention Group | | | | |
| Pre-Test | 5.06 \pm 1.397 | -1.440 | 10.060 | <0.001* |
| Post-Test | 6.50 \pm 1.181 | | | |
| Knowledge of Prevention Strategies towards Pressure Ulcer among Intervention Group | | | | |
| Pre-Test | 11.81 \pm 1.916 | -2.157 | 12.000 | <0.001* |
| Post-Test | 13.97 \pm 0.892 | | | |
| Knowledge of Prevention Strategies towards Pressure Ulcer between Two Groups | | | | |
| After Intervention Group | 13.97 \pm 0.892 | 2.067 | 12.371 | <0.001* |
| Control Group | 11.90 \pm 1.716 | | | |

4. Discussion

The mean ages of participants were 42.45 ± 8.89 years and 38.81 ± 10.56 years for intervention and control groups respectively which falls within the service years and implies also implies that majority of them were young nurses. Almost all participants were females. This might be due to the observed ratio of less male to female nurses in the nursing profession which is in tandem with the assertion that nursing is a female dominated profession. Educational distribution indicated that majority of them in both groups were university graduates of nursing science with few already had postgraduate degree in nursing. This will promote quality nursing practice, prepare the nurses to be able to meet

patients' needs, function as leaders, engage in advanced science and be at-par with other sister healthcare professionals in Nigeria and beyond.

As regards nurses' knowledge of Braden scale, the current study revealed that at pre-test majority of the nurses had not attended any previous training course on Braden Scale. This might be due to lack of hospital management's vision to see the need for the training, lack of financial resources for training, shortage of nursing staff to be released for the training, and work overload for nurses to leave the work and attend training course. At post-test after implementation of intervention training, almost all of them had adequate knowledge of Braden Scale compared to their pre-test where the majority of them had poor knowledge of it. From the researcher's point of view, these results were related to the effectiveness of the interventional training as there was increase in the post-test score. This finding corroborates the finding of previous researchers who reported adequate knowledge of nurses about Braden Scale after a designed educational programme^{33,34}.

Concerning nurses' knowledge of pressure ulcers risk assessment (PURA), this study found that majority of participants had adequate knowledge of PURA post-intervention training, than before the intervention training when less than average participants had adequate knowledge of pressure ulcer risk assessment. This result might be due to the fact that majority of studied nurses had not attended any previous training programs on pressure ulcer risk assessment and prevention, lack of hospital policies for utilizing the pressure ulcers risk assessment tool, lack of availability of pressure ulcer risk assessment tool, or poor attitude of the nurses to pressure ulcers risk assessment which might hinder them from practicing the risk assessment on their patients "at risk". The researcher opines that the improvement in participants' knowledge at post-test could not have been by chance but, with the aid of the intervention training. The current study is supported by the findings of previous studies^{35,33}, as documented that educational programmes improved nurses' knowledge of pressure ulcers risk assessment in comparative to before the teaching program.

Regarding nurses' knowledge of pressure ulcers prevention strategies, the current study documented that almost all participants had adequate knowledge of pressure ulcers prevention strategies post intervention training, compared to before the intervention. This result indicated that the training was impactful among the participants which were evident greatly in their post-test. Finding in this study is in accordance with similar studies in which majority of the participants had low level of knowledge of PUs prevention before and a significantly high level of knowledge of PUs prevention after application of interventional training^{36,26,34,38,33}. However, this finding is in contrary with another study by³⁷ which documented that there was no significant difference in the participants' pre-post scores in pressure ulcers prevention strategies.

Concerning knowledge of pressure ulcers prevention strategies among intervention and control groups, findings in this study depicted that almost all participants among intervention group had adequate knowledge of pressure ulcers prevention strategies at post-test, compared to lesser score recorded in the control group. This improvement in participants' knowledge at post-test might be due to the knowledge impacted on them during the intervention. The study corroborates the findings in previous studies which reported increase in number of nurses with improved knowledge of pressure ulcers prevention strategies at post-test among intervention group than in control group^{38,39}. However, finding in the current study is not consistent with a similar study which documented that both intervention and control groups exhibited significant increases in scores for pressure ulcer prevention knowledge after the intervention, but there were no significant differences in the pre-post difference scores for any of the groups³⁷. Furthermore, findings revealed significant differences between pre-test and post-test knowledge mean scores and the intervention training was highly statistically significant ($p < 0.001$) with all knowledge domains examined by this study after the implementation of the intervention training. The relationship was not by chance but as a result of the intervention training implemented on the intervention group. The training had a positive impact/effect on the intervention group's knowledge of Braden Scale, knowledge of pressure ulcers risk assessment, and their knowledge of pressure ulcers prevention strategies. This showed that the intervention training was effective as it added to the knowledge of the nurses in the intervention group in this study.

5. Conclusion

After the implementation of the training, significant improvement in knowledge among majority of the participants in all knowledge domains examined by this study was observed. The intervention training had positive effect on nurses' knowledge of PURA and prevention strategies at UCH, Ibadan, Nigeria. It also reflects the fact that nurses need regular training to improve their knowledge in PURA and prevention of pressure ulcers among at risk patients. There is a need for formulation of necessary policies towards practice of PURA by the nurses in all "at risk" patients and regular training programs for all nurse clinicians in the facility to acquire required knowledge and skills to bridge previously identified

gap in knowledge, prevent avoidable harms to the patients, and enhance quality nursing care according to international best practices.

Limitation of the study

- **Problem of Generalization**

Since the study was carried out among nurses at a health facility, its results may not be generalized to the whole population of nurses in the country. Had the number of the health facilities from which the participants were selected been increased, the results would have been much wider and easier to generalize.

Compliance with ethical standards

Acknowledgments

We express our profound gratitude to the management and all nurses in the facility who participated in this study for their cooperation during data collection. We also appreciate all authors whose works were used as reference materials for the study.

Disclosure of conflict of interest

Authors declared no conflict of interest

Statement of Ethical Approval

Ethical Approval was obtained from University of Ibadan and UCH Joint Ethics Review Committee with registration number UI/EC/22/0052. Permission was also granted by management of the study setting. Study was conducted in accordance with ethical standards laid down by 1964 Declaration of Helsinki.

Statement of informed consent

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

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