

Impact of educational intervention on nurses' knowledge of pressure ulcer risk assessment and prevention: A pilot study

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World Journal of Advanced Research and Reviews, 2023, 19(03), 230–239

Publication history: Received on 05 July 2023; revised on 20 August 2023; accepted on 22 August 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.19.3.1642>

Abstract

Background: Professional nurses are saddled with a unique role in patient's skincare among hospitalized patients. Inadequate nurses' knowledge of pressure ulcer risk assessment (PURA) and prevention as a major contributory factor to development of pressure ulcer among "at risk" patients has been identified by previous studies.

Aim: To evaluate the impact of an educational intervention on nurses' knowledge of pressure ulcer risk assessment and prevention at a tertiary hospital, Ibadan, Nigeria.

Methods: A pilot study with sample size of 26 nurses selected through simple random sampling technique from selected nursing units of the facility. Data collection was done through a structured questionnaire. Hypotheses were tested with inferential statistics using t-test. Results were presented in descriptive statistics and charts. Level of significance was p-value <0.05.

Results: Almost all participants' knowledge mean score of PURA increased from 4.92 ± 1.26 at pre-test to 14.00 ± 0.71 at post-test ($p < 0.001$). Also, knowledge mean score of pressure ulcer prevention improved among intervention group (14.00 ± 0.707) post educational intervention as compared to their counterparts in control group (11.85 ± 1.41). Educational intervention was statistically significant with participants' knowledge of PURA and prevention ($p < 0.001$).

Conclusion: The results of this study confirmed that educational intervention was impactful positively on nurses' knowledge regarding PURA and prevention strategies at UCH, Ibadan, Nigeria. Thus, a structured educational program on the subject matter is needed to promote quality nursing care delivery according to international best practices among Nigerian nurses.

Keywords: Impact; Educational Intervention; Knowledge; Pressure Ulcer Risk Assessment; Pressure Ulcer Prevention

1. Introduction

Pressure ulcer otherwise known as bed sore/pressure sore/pressure injury or decubitus ulcer is a localized wound/injury to the skin and underlying tissues over bony prominences of the body such as occiput, ears, shoulders, elbows, hips, buttocks, knees, ankles and heels. It is 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 (PUs) in healthcare remains a global concern due to their health consequences,

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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 PU is regarded as a “never event” that should not happen in a healthcare setting, it is considered evidence of serious harm to the patient when it happens, because PU is preventable [6]. Prevalence of PU 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].

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 PU in addition with prompt implementation of necessary strategies to curb it [10]. 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 [11, 12]. Professional nurses are primarily responsible for the patient's skincare and PU preventive measures among hospitalized patients [13]. Therefore, the need for them to have necessary skills to identify early patients at risk of PU through PURA; implement promptly and adequately, evidence-based best practices PU prevention strategies/measures. This pilot study aims to evaluate impact of an educational program on nurses' knowledge of pressure ulcer risk assessment and prevention strategies at a Tertiary Hospital in Ibadan, Nigeria. It also aims to test the reliability of the proposed pressure ulcer risk assessment and prevention questionnaire among 26 nurse clinician in the facility.

Despite advances in healthcare technology, inadequate knowledge of pressure ulcer risk assessment and prevention strategies among nurses has been identified by previous studies as major contributing factor to the development of PU among “at risk” patients [11, 14, 15, 16, 17, 4, 18]. Development of PU consequently results in significant physical, financial and emotional burdens on the affected patients and their relatives including healthcare providers [19, 8, 20, 21]. Therefore, all nurse clinicians need to have necessary skills through a planned educational program on Pressure Ulcer Risk Assessment and preventive strategies [22]. Studies on PURA and prevention strategies among nurses are scanty in Nigeria, particularly at the study facility. Findings from the study will inform the investigators the likelihood of the success of further study on the focus of the subject matters. 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.

Previous researches relating to the subject matter were reviewed. 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 PU preventive guidelines [23]. 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 program [24]. 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 PU 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 $p < 0.001$ [16].

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 PU risk assessment and prevention [25]. A randomized control study on effect of educational intervention on the knowledge and attitude of intensive care nurses in the prevention of pressure ulcer 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 group [26]. In conclusion from the previous literatures, majority of nurses are not competent in PURA and preventive measures of PU and it has been regarded to be a leading causative factor to occurrence of PU in patients who are prone to it. This gap in practice might be majorly due to poor integration of PURA in nursing education and lack of training and retraining of nurse clinicians

through well-designed educational programs. However, the reviewed literatures documented improvement in the knowledge of nurses after implementation of intervention training in line with the subject matter.

2. Material and methods

2.1. Study Design and Population

A randomized controlled trial pilot study, study population consisted of all nurses in the Department of Clinical Nursing of the facility.

2.2. Sample Size Determination

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 $[(\sigma)] =$ a value of S.D from previous study

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

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

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

When, $\text{SD} = 27.3$ [27]

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

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

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

Hence, the total sample size (n) for the main study = 134 (122 + 12) nurses

Therefore, approximately 13 participants were recruited into each of the two groups (intervention and control) for the Pilot study.

2.3. Sampling Technique

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

2.4. Method of Data Collection

After necessary ethical approval and permission sought from the facility, the researchers approached the participants to participate in the pilot study of which they demonstrated their consent by signing the consent form. During pre-intervention phase, all consented participants in both intervention and control groups were administered a pre-intervention questionnaire to fill for baseline data. Thereafter, intervention training on PURA and PU prevention was delivered to the intervention group only in English Language. While, those that fall under control group did not receive any training. Immediately after the intervention training during post-test, all participants in the intervention group were again administered post-intervention questionnaire. The post-intervention questionnaire contained same contents of the questionnaire earlier used for pre-test, to evaluate the impact of the educational intervention on the participants' knowledge of the domains examined.

2.5. Data Analysis

Data was managed using Statistical Package for Social Sciences (SPSS) version 25 software. Hypotheses were tested inferential statistics 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 and Discussion

The score of the intervention and control group, and post intervention during pilot study were recorded and used for the analysis below. Socio-demographic characteristics of the two groups were compared. Pre and post intervention scores were also tested for significant differences as well as differences between post intervention score and control group scores.

3.1. Socio-Demographic Characteristics of the Respondents

In table 1, it was observed that the mean age of intervention group was 41.77 ± 7.907 years while that of control group was 45.46 ± 10.461 years. There were more male in control group (15.4%) when compare with intervention group (7.7%). There was no significant difference between the socio-demographic characteristics of the two groups ($p > 0.05$).

Table 1 Comparison of Socio-Demographic Characteristics of the Respondents

Socio-Demographics Characteristics Respondents	Groups		Total	Chi-Square	df	p-value
	Intervention	Control				
Age Group				4.378 ^f	3	0.244
20 – 29	1 (7.7)	2 (15.4)	3 (11.5)			
30 – 39	6 (46.2)	2 (15.4)	8 (30.8)			
40 – 49	4 (30.8)	3 (23.1)	7 (26.9)			
50 year & above	2 (15.4)	6 (46.2)	8 (30.8)			
Mean Age \pm SD	41.77 \pm 7.907	45.46 \pm 10.461	t = 1.015, p-value = 0.321			
Gender				0.377 ^f	1	1.000
Male	1 (7.7)	2 (15.4)	3 (11.5)			
Female	12 (92.3)	11 (84.6)	23 (88.5)			
Designation				3.933 ^f	5	0.651
NO1	3 (23.1)	3 (23.1)	6 (23.1)			
SNO	4 (30.8)	1 (7.7)	5 (19.2)			
ACNO	1 (7.7)	1 (7.7)	2 (7.7)			
CNO	2 (15.4)	3 (23.1)	5 (19.2)			
ADN	3 (23.1)	3 (23.1)	6 (23.1)			
DDN	0 (0.0)	2 (15.4)	2 (7.7)			
Educational Status				1.063 ^f	2	1.000
ND/HND in Nursing	4 (30.8)	4 (30.8)	8 (30.8)			
Bachelor of Nursing	8 (61.5)	9 (69.2)	17 (65.4)			
Postgraduate Degree in Nursing	1 (7.7)	0 (0.0)	1 (3.8)			

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

In overall at post intervention, majority 92.3% of the nurses had adequate knowledge of Braden Scale while no one (0.0%) had adequate knowledge at pre intervention training (Figure 1).

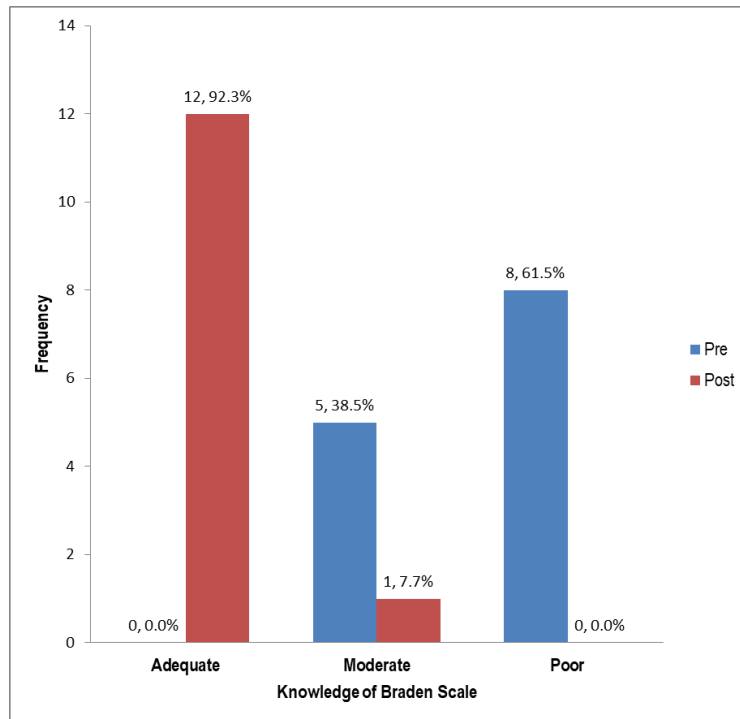


Figure 1 Nurses' Knowledge of Braden Scale Pre and Post Intervention Training

3.3. Nurses' Knowledge of Knowledge of Pressure Ulcer Risk Assessment Pre and Post Intervention Training

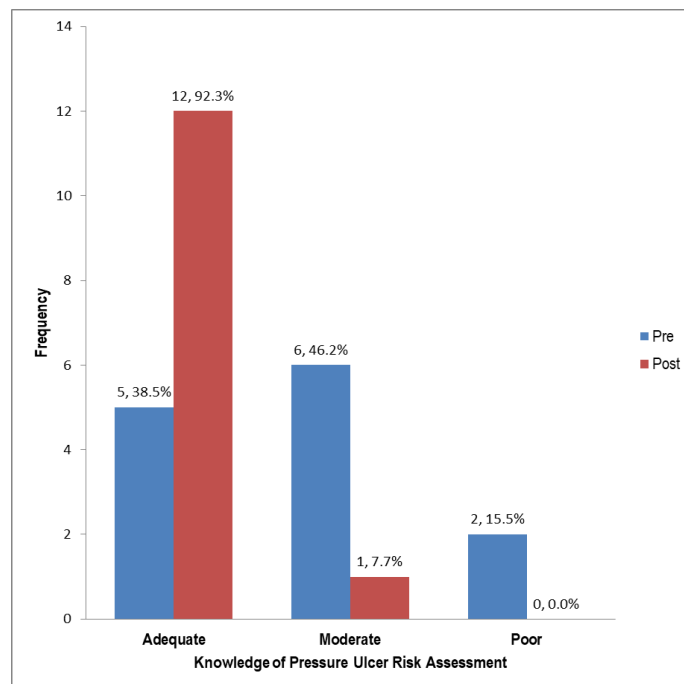


Figure 2 Nurses' Knowledge of Knowledge of Pressure Ulcer Risk Assessment Pre and Post Intervention Training

In overall, the result showed that 92.3% had adequate knowledge of pressure ulcer at post intervention training while 38.5% had adequate knowledge of pressure ulcer pre intervention training (Figure 2).

3.4. Nurses' Knowledge of Pressure Ulcer Prevention Strategies Pre and Post Intervention Training

In overall, Figure 3 showed that all the nurses 100.0% had adequate knowledge of pressure ulcers prevention strategies at post intervention training while 69.2% had adequate knowledge at pre intervention training.

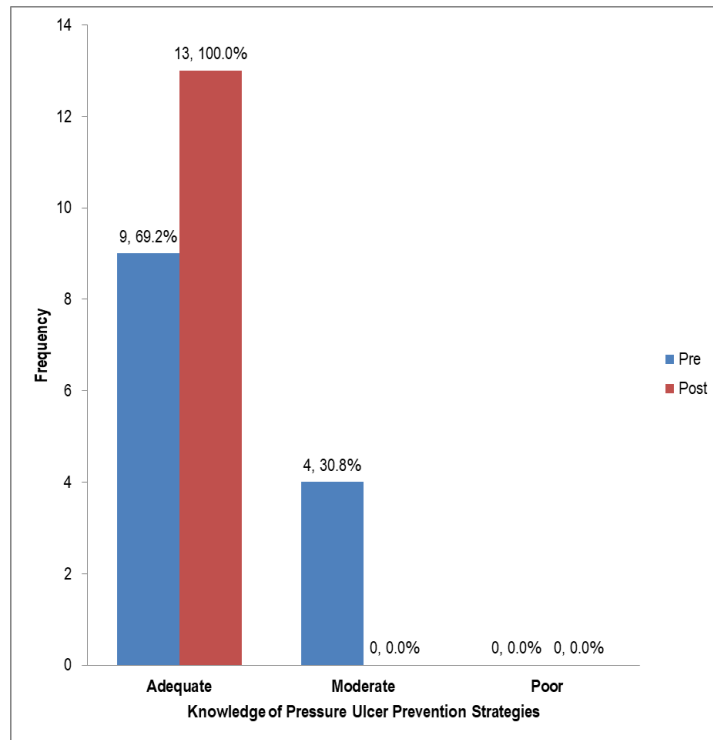


Figure 3 Nurses' Knowledge of Pressure Ulcer Prevention Strategies Pre and Post Intervention Training

3.5. Knowledge of Pressure Ulcer Prevention Strategies among Nurses in the Post Intervention Group and Control Group

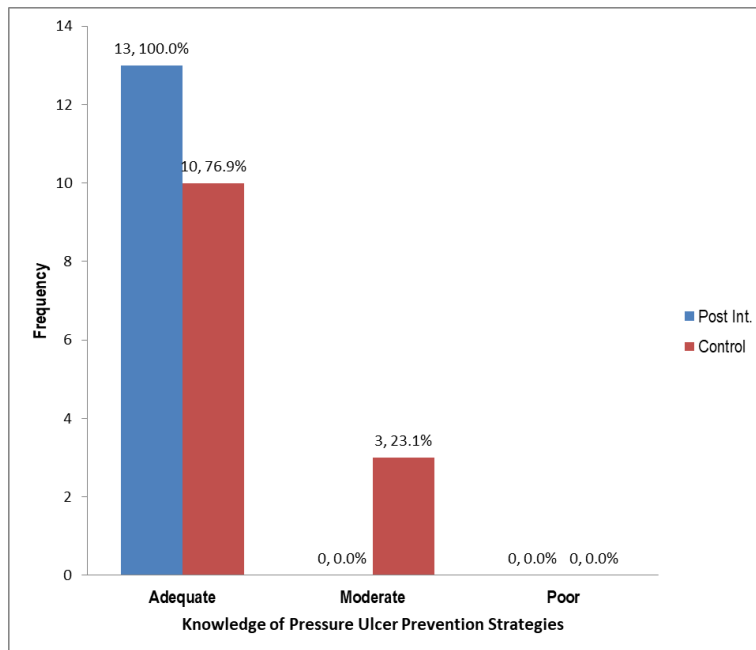


Figure 4 Knowledge of Pressure Ulcer Prevention Strategies among Nurses in the Post Intervention Group and Control Group

In overall, all the respondents 100.0% in the intervention group had adequate knowledge of pressure ulcer prevention strategies while 76.9% of the nurses in control group had adequate knowledge (figure 4).

3.6. Hypotheses

T-test analysis revealed significant differences between pre-test and post-test knowledge mean scores of participant, the intervention training was highly statistically significant ($p < 0.001$) with all studied domains. The difference was not by chance but as a result of the intervention training. It had significant effect on the knowledge of the nurses.

Table 2 Difference between Pre and Post Intervention Training Knowledge Level of Braden Scale

Respondents' Knowledge	Mean \pm SD	Mean Difference	t	p-value
Braden Scale Pre and Post				
Pre-test	5.54 \pm 2.402	-5.846	9.965	<0.001*
Post-test	11.38 \pm 1.261			
Pressure Ulcer Risk Assessment				
Pre-test	4.92 \pm 1.256	-1.923	6.218	<0.001*
Post-test	6.85 \pm 1.281			
Prevention Strategies				
Pre-test	12.08 \pm 1.605	-1.923	4.186	0.001*
Post-test	14.00 \pm 0.707			
Prevention Strategies between Intervention and Control Groups				
Control Group	11.85 \pm 1.405	2.154	4.937	<0.001*
Intervention Group	14.00 \pm 0.707			

4. Discussion

The mean age of intervention group was 41.77 ± 7.907 years while that of control group was 45.46 ± 10.461 years, same fall within the service years and implies also implies that majority of them were young nurses. There were more male in control group (15.4%) when compare with intervention group (7.7%). There was no significant difference between the socio-demographic characteristics of the two groups ($p > 0.05$). 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-pal 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 [23, 27].

Concerning nurses' knowledge of pressure ulcer 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 ulcer risk assessment tool, lack of availability of pressure ulcer risk assessment tool, or poor attitude of the nurses to pressure ulcer 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 [23, 24], as documented that educational programmes improved nurses’ knowledge of pressure ulcer risk assessment in comparative to before the teaching program.

The current study documented that almost all participants had adequate knowledge of pressure ulcer 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 PU prevention before and a significantly high level of knowledge of PU prevention after application of interventional training [25, 16, 23, 26]. However, this finding is in contrary with another study which documented that there was no significant difference in the participants’ pre-post scores in pressure ulcer prevention strategies [28].

This study depicted that almost all participants among intervention group had adequate knowledge of pressure ulcer 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 ulcer prevention strategies at post-test among intervention group than in control group [26, 29]. 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 groups [28]. 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 ulcer risk assessment, and their knowledge of pressure ulcer 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

A knowledge deficit in pressure ulcer risk assessment and prevention strategies exists prior educational intervention, and there was a significant improvement after the educational intervention among the majority of the participants in all knowledge domains examined during this pilot study at the facility. This reflects a gap in the knowledge of current evidence-based international best practices among nurse clinicians regarding pressure ulcer risk assessment and prevention. There is a need for urgent, structured educational programs to improve nurses’ knowledge in PURA and prevention of pressure ulcer among at risk patients to bridge previously identified gap in knowledge. Thereby, promoting the delivery of evidence-based international best practices among nurse clinicians in Nigeria.

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

There are no conflicts of interest in connection with this paper

Statement of ethical approval

Ethical Approval was obtained from University of Ibadan and University College Hospital 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.

References

- [1] Akiseku AK, Sule-Odu AO, Adefuye PO, Jagun OE, Shorunmu TO. (2020). Review of Current Concept in the Management. *Nigerian Medical Practitioner*; 78(1-2):24-32.
- [2] Headlam J, Illsley A. Pressure ulcers: an overview. (2020). *British Journal of Hospital Medicine*; 81(12):1-9. doi:10.12968/hmed.2020; 0074
- [3] National Health Service. (2020). Overview of pressure ulcers. <https://www.nhs.uk/about-us/Niraj>
- [4] Jiang L, Li L, Lommel L. (2020). Nurses' knowledge, attitudes, and behaviours related to pressure injury prevention: A large-scale cross-sectional survey in mainland China. *Journal of Clinical Nursing*; 29 (17-18): 3311-24. <https://doi.org/10.1111/jocn.15358>
- [5] Fletcher J, Hall J. (2018). New guidance on how to define and measure pressure ulcers. *Nursing Times*;114 (10):41-4.
- [6] Delmore B, Deppisch M, Sylvia C, Luna-Anderson C, Nie AM. (2019). Pressure injuries in the pediatric population: a national pressure ulcer advisory panel white paper. *Advances in Skin & Wound Care*; 32 (9): 394-408. <https://doi.org/10.1097/01.ASW.0000577124.58253.66>
- [7] Jansen RC, Silva KB, Moura ME. (2020). Braden Scale in pressure ulcer risk assessment. *Revista brasileira de enfermagem*;73. Doi: <http://dx.doi.org/10.1590/0034-7167-2019-0413>
- [8] Li Z, Lin F, Thalib L, Chaboyer W. (2020). Global prevalence and incidence of pressure injuries in hospitalized adult patients: A systematic review and meta-analysis. *International journal of nursing studies*;105:103546.
- [9] Gould LJ, Bohn G, Bryant R, Paine T, Couch K, Cowan L, McFarland F, Simman R. (2019). Pressure ulcer summit 2018: An interdisciplinary approach to improve our understanding of the risk of pressure-induced tissue damage. *Wound Repair and Regeneration*; 27(5):497-508. <https://doi.org/10.1111/wrr.12730>
- [10] Huang C, Ma Y, Wang C, Jiang M, Yuet Foon L, Lv L, Han L. (2021). Predictive validity of the braden scale for pressure injury risk assessment in adults: A systematic review and meta-analysis. *Nursing Open*; 8(5):2194-207.
- [11] Halász GB, Bérešová A, Tkáčová L, Magurová D, Lizáková L. (2021). Nurses' knowledge and attitudes towards prevention of pressure ulcers. *International Journal of Environmental Research and Public Health*; 18(4):1705. <https://doi.org/10.3390/ijerph18041705>
- [12] Yilmazer T, Tüzer H, Erciyas A. (2019). Knowledge and Attitudes Towards Prevention of Pressure Ulcer: Intensive Care Units Sample in Turkey. *Turkiye Klinikleri Journal of Nursing Sciences*; 11(2).
- [13] Sardari M, Esmaili R, Ravesh NN, Nasiri M. (2019). The impact of pressure ulcer training program on nurses' performance. *Journal of Advanced Pharmacy Education*;3.
- [14] Saranasinghe SA, Seneviratne SM. (2021). Knowledge, attitudes, and perceived barriers for prevention of pressure ulcers among nurses in the National Hospital of Sri Lanka. *Proceedings of the Research Conference in Health Sciences 2021-FAHS, USJ*. Pp107-194
- [15] Sen S. (2020). Nurses' knowledge and practices toward pressure ulcer prevention in Medical Hospital, Kolkata. *Journal Homepage*; 8(04). <http://ijmr.net.in>,
- [16] Awad WH, Hewi SA. (2020). Effect of pressure ulcer preventive nursing interventions on knowledge, attitudes and practices of nurses among hospitalized geriatric patients in Alexandria, Egypt. *J Nurs Health Sci.*; 9(2):1-2. (IOSR-JNHS) e-ISSN: 2320–1959.p- ISSN: 2320–1940
- [17] Sengul T, Karadag A. (2020). Determination of nurses' level of knowledge on the prevention of pressure ulcers: The case of Turkey. *Journal of tissue viability*; 29(4):337-41.
- [18] Ebi WE, Hirko GF, Mijena DA. (2019). Nurses' knowledge to pressure ulcer prevention in public hospitals in Wollega: a cross-sectional study design. *BMC nursing*; 18(1):1-2.
- [19] Dlungwane TP. (2020). Nurses' knowledge, attitudes and practices regarding pressure ulcer prevention in the Umgungundlovu District, South Africa. *Africa Journal of Nursing and Midwifery*; 22(2):17-pages.
- [20] Aloweni F, Ang SY, Fook-Chong S, Agus N, Yong P, Goh MM, Tucker-Kellogg L, Soh RC. (2019). A prediction tool for hospital-acquired pressure ulcers among surgical patients: Surgical pressure ulcer risk score. *International wound journal*; 16(1):164-75.<https://doi.org/10.1111/iwj.13007>

- [21] Jackson D, Sarki AM, Betteridge R, Brooke J. (2019). Medical device-related pressure ulcers: a systematic review and meta-analysis. *International journal of nursing studies*; 92:109-20.
- [22] Campoi AL, Engel RH, Stacciarini TS, Cordeiro AL, Melo AF, Rezende MP. (2019). Permanent education for good practices in the prevention of pressure injury: almost-experiment. *Revista brasileira de enfermagem*; 72:1646-52.
- [23] Ibrahim NM, Qalawa SA. (2020). Effect of implementing standardized preventive guidelines for pressure ulcer on nurses' performance. *American Journal of Nursing*; 8(2):163-9. <http://pubs.sciepub.com/ajnr/8/2/5>.
- [24] Pandhare SP, Dhudum B. (2018). Effectiveness of PtP Regarding Use of Braden Scale for Pressure Sore on Knowledge and Practices among Staff Nurses Working in selected Hospitals. *Amarjeet Kaur Sandhu*; 10(4):139.
- [25] Noor AM, Hassan HS. (2021). Effectiveness of an Interventional Program on Nursing Staff Knowledge Concerning Prevention of Pressure Ulcer at the Intensive Care Unit in Al-Diwaniyah Teaching Hospital. *Indian Journal of Forensic Medicine & Toxicology*; 15(3):5081.
- [26] Karimian M, Khalighi E, Salimi E, Borji M, Tarjoman A, Mahmoudi Y. (2020). The effect of educational intervention on the knowledge and attitude of intensive care nurses in the prevention of pressure ulcers. *International Journal of Risk & Safety in Medicine*; 31(2):89-95.
- [27] Qalawa SA, El-Ata AB. (2016). Effectiveness of designed educational programme for nurse's regarding using the braden scale to predict pressure ulcer risk. *Ame Jour of Nurs Sci*; 5(1):1-7. Doi: 10.11648/j.ajns.20160501.11
- [28] Seo Y, Roh YS. (2020). Effects of pressure ulcer prevention training among nurses in long-term care hospitals. *Nurse Education Today*; 84: 104225. <https://doi.org/10.1016/j.nedt.2019.104225>
- [29] Ilesanmi RE, Oluwatosin OM. (2016). A quasi-experimental study to assess an interactive educational intervention on nurses' knowledge of pressure ulcer prevention in Nigeria. *Ostomy/wound management*; 62(4):30-40.