



# **Utilization of an Instructional Package on Patient Safety Culture to Enhance Knowledge of Nursing Students in Two Selected Universities in South-West, Nigeria**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. Author EOC designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors ACCC and ORO managed the analyses of the study. Authors EO and AAQ managed the literature searches. All authors read and approved the final manuscript.*

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## **ABSTRACT**

**Aims:** The culture of keeping patients safe is a global issue which should be emphasized within the nursing profession. Despite exposure of nursing students to patient safety teachings, its knowledge among nursing students has been low. Re-emphasizing a positive culture of patient safety in classroom is essential in the training of nurses that will provide high quality care. This study was developed to assess the outcome of an instructional package on the knowledge of baccalaureate nursing trainees concerning patient safety culture in two chosen Universities in Southwest, Nigeria.

**Study Design:** The researchers adopted a two groups nonequivalent pre-test, and post-test quasi-experimental design.

**Place and Duration of Study:** Babcock University, Ogun State and Afe Babalola University, Ekiti State between March and April 2018.

**Methodology:** The study participants comprised 143 nursing students from Babcock University (experimental group) and Afe Babalola University (control group). A self-developed questionnaire was employed to obtain data on the knowledge of patient safety culture pre-intervention and two weeks post intervention. Data was examined using Statistical package for the social science (SPSS) and t-test was done at a significance level of  $P < 0.05$ .

**Results:** Findings revealed experimental mean knowledge gain of 2.425, while control group mean knowledge gain was 0.110. Significant differences were found in the participants knowledge of patient safety culture between the experimental group and control group ( $P < 0.001$ ) and between knowledge of error reporting in the experimental group ( $P < 0.001$ ).

**Conclusion:** Teaching sessions on patient safety culture can improve nursing students' knowledge about patient safety. The findings of the study recommends that patient safety education should be reinforced in the curriculum of nursing schools, and that supplementary boosting sessions be executed periodically to ensure the retention of learned materials.

**Keywords:** Medical errors; instructional package; patient safety culture; nursing students.

## 1. INTRODUCTION

Nurses are globally identified as being closely linked to patient safety as they are always monitoring patients to recognize, interrupt, and alleviate medical errors and lessen the preventable mistakes of healthcare. Nurses are key healthcare personnel involved in safety, hence it is essential for nurses to be knowledgeable about patient safety culture while in training, in order to maintain optimum healthcare delivery. Patient safety means absence of avoidable injury to a patient while care continues. This entails a combination of coordinated efforts to reduce harm that may result from healthcare management [1]. This suggests that errors can occur despite the best of intentions. A condition that allows organizational, professionals and patients efforts to prevent errors by learning from outcomes of errors is based on patient safety culture [2]. The culture of keeping patient safe has been defined as the summation of both personal and organized norms, belief systems, feelings, understanding, skills and habits which determine individual responsibility and the ways organizations regard the safety of everyone [2].

When patient safety is compromised, patient safety events or errors occur. Medical error is described as the inability to perform earlier planned actions or the means of achieving a purpose by using a wrong plan [3]. Medical error includes all forms of mistakes that occur while patients are receiving care. It includes medication errors, poor communication during

taking/handling over, improper patient identification, pressure injury, falls, healthcare acquired infections (HAIs) [3].

Studies such as those of [4,5,6,7] confirmed that the most occurring medical errors in the health facilities include pressure injury, nosocomial infections, falls, medication administration errors, poor communication, and management errors, that could have been prevented by healthcare professionals especially nurses. In a study conducted by Agu, et al. [8] it was revealed that the incidence rate of medical errors was 40.5 per 100 persons per year. A study by Ilo, et al. [9] revealed that prevalence of medical errors was 42.8%. In 2016, annual deaths of 251,454 were said to have resulted from medical errors in the United States of America [3]. These medical errors are said to be due to the low knowledge of patient safety culture among nurses and nursing students as espoused by Fathi, et al. [10] that nurses were responsible for 17% of medical errors in their study. A study conducted to ascertain the frequency, types and causes of medical errors made by final year nursing students revealed that drug calculation and constitution were the commonest and low knowledge of the culture of patient safety was attributed as the cause [11].

Patient safety education has been accepted as an essential need, and various programs have been instituted by many regulatory bodies for healthcare students. However, these are often sporadic programmes, aimed at enhancing the awareness of baccalaureate nursing student on

patient safety culture [12]. These irregular teachings may be responsible for the low level of knowledge of patient safety culture among nursing students and may suggest a fundamental problem. Interestingly, foreign studies [13,14,15,16] have revealed that an instructional session on patient safety culture was used to improve the previously low knowledge level of nursing students. Sadly, no literature has exposed the effects of such educational intervention among nursing students in Nigeria. Also, the researchers while supervising nursing students in the clinical area observed safety incidents among nursing students, but sadly there were no established methods or plan for reporting such adverse events in the hospital. This may be attributed to the fact that there was inadequate knowledge of the culture of patient safety owing to little or no established curriculum on patient safety ethics for nursing students in Nigeria. Hence, the researchers evaluated the outcome of an educational intervention on culture of patient safety within nursing students who are in their formative years, and would be expected to provide high quality and safe care in the future. The study was aimed at assessing the impact of an educational package on the knowledge of nursing students concerning the culture of patient safety in two selected private universities in Southwest, Nigeria.

### **1.1 Research Questions**

1. What is the nursing students' pre-intervention knowledge on patient safety culture in experimental and control group?
2. What is the nursing students' post intervention knowledge on patient safety culture in experimental and control group?

### **1.2 Hypotheses**

- H<sub>1</sub>: There is a remarkable difference in the pre-intervention and post-intervention knowledge on patient safety culture among nursing students in experimental and control group.
- H<sub>2</sub>: There is a remarkable difference in the pre-intervention and post-intervention knowledge of error reporting among nursing students in the experimental control group.

Students of Nursing schools would benefit from this study, as the knowledge learnt from the instructional session would help their clinical decisions during nursing practise. The resulting

reduction in medical errors would improve patient safety, reduce length of hospitalization, and decrease morbidity and mortality from these errors globally. It would also improve the quality of life of patients, by the prevention and early detection of medical errors. It would also be beneficial to nursing administrators as it can be a basis for the creation of policies, interventions and teaching curriculum whose implementation would enhance patient safety by nurses.

## **2. METHODS**

### **2.1 Study Design**

This study adopted a two-group, pre-test post-test quasi-experimental design to evaluate the impact of an instructional package on the knowledge of nursing students concerning patient safety culture in two selected private universities in Ogun State and Ekiti State between the period of March and April 2018.

### **2.2 Population**

The populations for the study were all baccalaureate nursing students in 400 level in Babcock University, and Afe Babalola University. They were 105 baccalaureate nursing students in 400 level at Babcock University, Ilisan-Remo, Ogun State which became the experimental group and 38 nursing students from Afe Babalola University, Ado Ekiti, Ekiti State that formed the control group.

#### **2.2.1 Inclusion criteria**

400 level student nurses who were willing to participate throughout the period of teaching and data collection. They must also be registered as students for second semester 2017/2018 school session when clinical rotations usually begin.

#### **2.2.2 Exclusion criteria**

All other nursing students who were not in 400 level, and were not scheduled for clinical rotations were excluded. Also, direct entry students who were already fully registered nurses were excluded.

### **2.3 Sample Size and Sampling Technique**

Two private universities were randomly selected for the study through balloting. Although calculated sample size using Epi-Info gave a total sample size of 106, the researchers

adopted total enumeration for this study because of the small sample size in one of the randomly selected schools. All 400-level nursing students enrolled in the 2 selected universities constituted the sampling frame. The total number of the students sampled for the study was 143. However, 25 participants from the experimental group, and 5 participants from the control group failed to partake in the post experimental data collection, and were excluded from the final analysis. Therefore a total of 80 students from Babcock University formed the experimental group, while 33 students from Afe Babalola University formed the control group, making a total of 113 participants.

## 2.4 Instrumentation

The instrument employed for the collection of data, was a self-developed questionnaire consisting of 18 items which was structured around patient safety culture and was divided into the following sections:

**Section A:** Which contained demographic information of the study participants, has 3 questions.

**Section B:** Contains 8 questions used to obtain information on the knowledge of nursing students' regarding the culture of patient safety and was assessed using a set of multiple choice questions generated from vignettes. A score of 7-8 was categorized as high knowledge of patient safety culture, score of 4-6 was categorized as fair knowledge of patient safety culture, and a score of  $\leq 3$  was categorized as low knowledge.

**Section C:** contained 7 items used to obtain information on nursing students' knowledge of error reporting and non-punitive response to error. Each question comprised of both positively and negatively worded questions on a 5-point likert scale with answers graded between 1 to 5 with strongly disagree 1 and strongly agree 5.

The researcher developed an instructional module based on patient safety culture. It was developed based on literatures reviewed and modified based on feedback obtained from the score of pre-intervention knowledge. The instructional module was delivered to participants in experimental group, using power-point lecture slides, and verbal discussion methods. The learning modules comprised of the concept of patient safety culture, elements and significance

of patient safety culture, causes and factors that influence the occurrence of medical errors, and nurses role in patient safety. The instruction modules were two and each module was completed within an hour once a week for two weeks. The research apparatus was reviewed by the research supervisor and a panel of experts in the field of study who decided the content and validity of the apparatus. A pilot-testing was done to ascertain the reliability of the questionnaire among 19 400 level students of nursing of the Ladoko Akintola University of Technology, Osogbo, Osun State, Nigeria. The correlational coefficient of internal consistency test was calculated, and Cronbach Alpha value was seen to be 0.700. The instructional modules were also pre-tested, and its suitability for the study was ensured.

## 2.5 Data Collection Procedure

The process for the collection of data was done in three phases:

### Phase 1: Pre-intervention

This phase involved the meeting of the participants in groups, and on separate days, and information about the purpose of study, the course curriculum and the potential benefits of the study was clearly explained to them. Afterwards, consent was taken from the participants in both of the groups, after which they were asked to complete a questionnaire. The use of Internet access, peer interaction and materials of reference were not permitted during data collection to avoid any forms of external assistance in filling the questionnaire. The researcher remained with the participants throughout the period of data collection. Completed questionnaires were scanned properly to ensure it was filled correctly. Data collected was kept confidential.

### Phase 2: Intervention

In this phase, the researchers met the participants in the experimental group and control group. The participants in the control group received a teaching session on occupational health, which was organized by the institution during the month of March 2018. The instructional module was delivered to participants in experimental group, using power-point lecture slides, and verbal discussion methods. The learning modules comprised of the concept of patient safety culture, elements and significance

of patient safety culture, causes and factors that influence the occurrence of medical errors, and nurses role in patient safety. A total of 2 instructional modules were used, and each module was completed within one hour, once a week for two weeks in a classroom before participants regular lecture period in the first two weeks of March 2018. Week one covered module 1, while week two covered module 2.

### Phase 3:

A post-intervention test was administered to the experimental and control groups, two weeks post-intervention and the same instrument used during the pre-test was utilized. 80 and 33 participants from experimental and control groups returned completed post-test questionnaire.

T-test was used to analyse the data gathered from the participants after it was processed using the Statistical package for the social science (SPSS), version 23. Participants' information was expressed with the aids of frequency tables, and descriptive statistics utilized to address the research questions after calculations of group means and standard deviations. Both Hypotheses were tested using t-test at  $P < 0.05$  level of significance.

## 3. RESULTS

Table 1 describes the demographic data of the participants. The results show that females were predominant in the study, and majority of the participants, that is 62 (77.5%) out of 80 participants in experimental group, and 30

(90.90%) out of 33 participants in the control group were between the ages of 20-24 years.

Table 2 illustrates participants' pre-intervention knowledge category of patient safety culture. Results reveal that in the experimental group, majority 65 (81.25%) had moderate pre-intervention knowledge of patient safety culture and the pre-intervention knowledge mean score for experimental group was 5.1625. While, In the control group, majority, 30 (90.91%) had moderate pre-intervention knowledge of patient safety culture and the pre-intervention knowledge mean score for control group was 5.0606. The mean difference was 0.1019.

Table 3 illustrates participants' post-intervention knowledge category of patient safety culture. The results indicate that most participants 77 (96.2%) had high post-intervention knowledge of patient safety culture and the post intervention knowledge mean score was 7.587. In the control group, the highest number of participants 29 (3.8%) had moderate post intervention knowledge culture of patient safety, and the post-intervention mean score was 5.2727. The mean difference was 2.3148.

Table 4 shows the t-test relationship between the participants pre-intervention and post-intervention knowledge of patient safety culture. The results indicate no significant contrast in the knowledge of safety culture between participants in both the experimental and the control groups pre-intervention. (MD=0.1019;  $t=0.417$ ;  $P=0.666$ ). Post-intervention, results in Table 4 indicate a significant difference (MD=2.3148;  $t=13.889$ ;  $P<0.001$ ).

**Table 1. Demographic data of participants**

S/N	Variable	Experimental (n =80)		Control (n=33)	
1	Age	Frequency	Percent (%)	Frequency	Percent (%)
	15-19 years	15	18.75	3	9.10
	20-24 years	62	77.50	30	90.90
	25-29 years	2	2.50	0	0.00
	≥ 30 years	1	1.25	0	0.00
	Total	80	100.00	33	100.00
2	Gender				
	Male	1	1.25	3	9.10
	Female	79	98.75	30	90.90
	Total	80	100.00	33	100.00
3	School				
	Babcock University	80	100.00		
	Afe BabalolaUniversity			33	100.00

**Table 2. Participants' pre-intervention knowledge on patient safety culture**

Knowledge category of participants	Category of score	Experimental group		Control group	
		Frequency	Percent (%)	Frequency	Percent (%)
High	7-8	6	7.5	1	3.03
Moderate	4-6	65	81.25	30	90.91
Low	≤3	9	11.25	2	6.06
Total		80	100	33	100
Mean		5.1625		5.0606	
Mean difference	0.1019				
Maximum	7			7	
Minimum	2			3	

**Table 3. Participants' post-intervention knowledge on patient safety culture**

Knowledge category of participants	Category of score	Experimental group		Control group	
		Frequency	Percent (%)	Frequency	Percent (%)
High	7-8	77	96.2	3	9.10
Moderate	6-4	3	3.8	29	87.87
Low	≤3	-	-	1	3.03
Total		80	100	33	100
Mean		7.5875		5.2727	
Mean difference	2.3148				
Maximum	8			8	
Minimum	5			3	

**Table 4. Independent t-test showing the difference between pre and post intervention knowledge of patient safety culture**

Knowledge	Group	n	mean	sd	Md	df	T-value	P	Decision
Pre-intervention	Experimental	80	5.1625	1.237	0.1019	.111	.417	.666	Not significant
	Control	33	5.0606	1.028					
Post-intervention	Experimental	80	7.5875	0.60991	2.3148	.111	13.889	<.001	Significant
	Control	33	5.2727	1.15306					

**Table 5. Independent T-test showing the difference in pre and post intervention knowledge of error reporting**

Knowledge of error reporting	Group	n	mean	sd	Md	df	T-value	P	Decision
Pre-intervention	Experimental	80	9.136	1.973		78			
Post-intervention	Experimental	80	10.887	2.019	1.750	78	5.545	<.001	Significant

Table 5 shows the t-test relationship between the participants pre-intervention and post-intervention knowledge of patient safety culture. Results in Table 5 indicate a significant difference in the knowledge of error reporting among the students (MD=1.750;  $t = 5.545$ ;  $P < .001$ ).

#### 4. DISCUSSION OF FINDINGS

This study revealed some substantial information about patient safety culture and its education in

Nigeria. The noteworthy findings of the study were: there was some level of knowledge of patient safety culture among participants pre-intervention, there was a significant contrast in the knowledge of patient safety culture between the experimental and control groups post-intervention. Also there was a significant difference in the pre-intervention and post-intervention knowledge of error reporting in participants in the experimental group, and there is a dire need for regular patient safety culture education in nursing curriculum in Nigeria.

Pre-intervention, the majority of the participants in experimental and control group had moderate knowledge of patient safety culture. This is because their mean score is higher than the set minimum score of 3 (37.5%) but below set maximum score of 7-8 (87.5-100%) respectively. This implies that the participants of this study to a degree have knowledge on patient safety culture which may be as a result of the orientation and education embedded in their curriculum. This finding was in line with the work of [12,13,16,17,18], which reported that students already recognized the importance of patient safety, causes of error and knowledge concerning patient safety culture before intervention were administered.

The results also revealed that the post-experiment knowledge of participants' in the experimental group improved from moderate to high, unlike participants in control group who maintained moderate knowledge. This implies that the educational intervention administered to participants in the experimental group was valid enough to improve their understanding of patient safety culture. Furthermore, the t-test was used to show that a significant difference is seen in the utilization of an instructional package on knowledge concerning patient safety culture in the experimental and control group ( $p < 0.001$ ). This finding was in line with studies of [13,16,19]. The finding of this study also suggests that the use of a short instructional session can improve nursing students knowledge of patient safety culture and is in line with Leung study [16] who used a two one-hour interactive sessions to increase knowledge of patient safety culture among medical students. However, the finding of this study was inconsistent with studies like [11,16,19] which reported low knowledge of patient safety culture among nursing students, despite their interest to learn and educational interventions. This may be due to inadequate curricular and irregular teaching programme on patient safety culture and differences in individual learning ability because retention of an idea requires continuous reinforcement.

Results also show that in the experimental group, the knowledge of error reporting among nursing students improved by an instructional session as observed in the increase in post-intervention knowledge mean score when compared with the pre-intervention knowledge mean score. T-test also shows that there is a marked difference in the pre and post-interventional knowledge of error reporting in the

experimental group. This finding suggests that the use of a brief instructional session can enhance knowledge of error reporting among nursing students and this is in line with studies of [11,16,19,20] who found positive changes in knowledge of error reporting including the reporting of near miss events. However, this finding is inconsistent with the findings of [12] who reported that majority of the students had low understanding of error reporting and they regarded reporting of near misses as unimportant. This represents a basic misconception about the relationship between the nature, system and medical errors causes.

## 5. CONCLUSION

To promote and improve patient safety culture among nursing students, extensive literature on patient safety culture [13,14,15,16,19,20] supports the use of educational interventions. The outcome of such educational intervention on patient safety culture among nursing students in two universities in Ogun State and Ekiti State was the focus of this study. Two research questions; What is the pre-intervention knowledge on patient safety culture among nursing students' in experimental and control group? and What is the post intervention knowledge on patient safety culture among nursing students' in were answered and two hypotheses; There is a significant difference in knowledge on patient safety culture among nursing students in experimental and control groups and there is a significant difference in knowledge of error reporting among nursing students in the experimental group were tested at 0.05 level of significance.

Based on the outcome of this study, we deduce that there was little difference in pre-intervention knowledge regarding patient safety culture within nursing students in the experimental and control group. Instructional sessions on patient safety culture improved knowledge of participants as this study achieved a difference in mean post-intervention knowledge score with regards to the culture of patient safety among the experimental and control group. Hence, instructional package on patient safety culture has significantly enhanced the knowledge of nursing students.

## 6. RECOMMENDATION

The researcher's recommendations are based on the findings of this study, and include:

Educational subjects with regards to Patient safety should be reinforced in the curriculum of nursing students, and periodically, complementary sessions should be implemented to ensure retention of previous materials learned.

In schools, where they do not exist already, nursing curriculum should be revised and should include contents highlighting patient safety and patient safety culture that is necessary to improve patient outcomes measurable by Quality of life.

There should be a collaboration between faculty members and health leaders aimed formulating guidelines aimed at enhancing patient safety culture among students in clinical and classroom settings.

Hospitals hierarchy should provide and constantly review their protocols and policies for nursing students on how to report medical errors and patient safety incidents in line with global best practices.

The governing boards of Nursing associations should carefully monitor school programmes and ensure that it is focused at improving the knowledge of patient safety culture among nursing students.

## 7. LIMITATIONS OF THE STUDY

The study was limited by an inability to evaluate the experimental group, one month after the implementation of the teaching package. Selection bias was also considered a limitation in this study because of the significant imbalance in number of participants in the experimental group and the control group.

## CONSENT

Consent was obtained voluntarily from the participants, while the research team ensured that all the data obtained from the participants remained confidential. No participants suffered any harm during the research study.

## ETHICAL APPROVAL

The ethical clearance was obtained from the Babcock University Health Research Ethics Committee (BUHREC) with clearance number BUHREC 462/17. Likewise, letters of introduction to the two universities and permission to conduct the study was obtained from the Heads of the

Department of Nursing, of the schools in both groups.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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