

Impact of a Pressure Ulcers Instructional Program on Nurses' Performance and Patient Outcomes

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ABSTRACT

Background: Pressure ulcers (PU) are still a big problem in intensive care units. Nurses play a crucial role in its prevention and management. The goal of this study was to assess impact of a pressure ulcer instructional program on nurses' performance and patient outcomes. **Methods:** A quasi-experimental design was used. The research was carried out at a Hospital in Damietta city. **Subjects:** The study included 51 nurses and 80 patients assigned to the Intensive Care Unit (ICU) unit. **Instrument:** There was structured interview sheet for nurses. It consisted of two parts: general characteristics, their understanding of pressure ulcers, observational checklist, patients' profile records, patients' outcomes, and the Braden Scale. **Results:** The study revealed that nurses' knowledge and practices significantly improved towards pressure ulcers post program implementation when compared to preprogram (with P value less than 0.05). Moreover, there was a significant improvement in pressure ulcer healing (outcome) among study group compared with control group who received routine care before the program (with P value less than 0.05). **Conclusion:** From the study it was concluded that the educational programme is very helpful in enhancing knowledge and practice for nurses in intensive care units, as well as patient outcomes. **Recommendation:** More study should be done to evaluate the routine use and regular updating of pressure ulcer risk assessment sheets, as well as ongoing nurse education on PUs prevention.

Keywords: *Instructional Program; Nursing Performance; Pressure Ulcer; Patient's Outcomes*

INTRODUCTION

Pressure Ulcers (PUs) are recognized as one of the most physical, psychological, social and financial burden nationally and globally, affecting people of all ages in both hospital and community settings (Awali, Nagshabandi, & Elgmail, 2018). PUs is defined as a localized lesion to the skin or tissue produced by long-term suppression of soft tissue between projecting bone and the outside surface. Commonly they are painful, take a long time to heal, and are frequently a prelude to life-threatening problems such skin and bone infections. Patients who lose bladder or bowel control, are immobile, elderly, Dehydrate, poor nutrition, and those with impaired sensory perception are all risk factors for developing Pus. It occurs when blood flow slows or stops, that affect the skin as it is deprived of oxygen and nutrients, the symptoms may not appear for days or even weeks. Management of PUs begin with

detecting vulnerable patients, skin assessment, changing posture, proper nutritional support mobility (Mervis & Phillips, 2019; De Meyer *et al.*, 2019).

PUs is an index of nursing quality of care; the literature evokes that nurses play a crucial role in preventing Pus. Nurses place low priority on this, due to their lack of understanding about the catastrophic consequences of its complications. Nurses' lack of knowledge and abilities in the prevention contributes considerably to its formation which can lead to greater consequences. As a result, nurses should get frequent training and education in this area of practice. Furthermore, nurses with a thorough understanding of pressure ulcer prevention can increase the quality of nursing care while also reducing the length of time patients spend in the hospital and the number of patients who suffer from this painful issue (Berihu *et al.*, 2020).

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Study Significance

About 2.5 million individuals acquire PUs each year and worldwide 60,000 fatalities occur each year as a result of PUs complications, the high frequency of PUs is a reflection of the nursing care provided. As a result, a variety of measures have been employed to reduce PUs rates and enhance patient quality of care, including health care member education, the availability of PUs guidelines, and the use of technology. So, nurses play an important role in patients' assessment, education and care which means that nurses need continuous training on methods to prevent and care of PUs (Mäkinen *et al.*, 2020). At present there are no studies based on determined setting that examine impact of a pressure ulcer instructional program on nurses' performance and patient outcomes. Therefore, the present study was conducted.

Research Hypotheses

H1: Nurses performance after program will be better than before the program.

H2: Patients out come after the program will be better than before the program.

METHODOLOGY

Research Design: A quasi-experimental research was conducted for this study.

Study Setting: The study was conducted at ICU of university hospital.

Participants

Nurses: All nurses working in the ICU at the time of the study agreed to take part in the current study (51).

Patients: A convenient sample of 80 critically ill patients who were admitted to the ICU. They were divided into two equal group. The first group consists of 40 patients who received routine hospital care only prior to the programme application (control group). The Second group of 40 patients received the nursing care post program application.

Inclusion criteria are adult male and female, patients, not experienced at any stage of PUs within last 24 hours, and agreed to participate in the current study.

C) The sample size was calculated using the equation below (Charan & Biswas, 2013).

$n =$ sample size $Z \alpha/2 =$ the value for a type I error of 5%. $Z \beta =$ the value for a type II error of 20%. $P1 =$ proportion

of patients who received proper nursing PI care and developed PI = 32%. $P2 =$ Prevalence of patients who didn't receive proper nursing PI care and developed PI = 46%. $P1 - P2 =$ effect size.

The calculated sample size is 40 patients in each group

$$\text{Sample size (n)} = \frac{P(1-P)}{D^2} Z^2$$

Tools of Data Collection:

Tool (I) Evaluation of patient profile: used to assess he patient's socio-demographic and clinical information as (age, sex, Current illness history, previous medical disorders, reasons for admission, medical diagnosis, and risk factors of PUs).

Tool (II): Glasgow Coma Scale (GCS) established by Green, (2011) was used to examine the neurological status on the scale consists of three tests: Eye reaction (E) vocal answer (V) & motor response (M) System of scoring: Extremely severe, with GCS less than 8, Middle, GCS 9–12.

Tool (III): Braden Scale for Predicting Pressure Injury Risk was developed by Barbara Braden and Nancy Bergstrom in 1987 for assessing patient's risk of developing a pressure injury by looking at six different factors: sensory perception, moisture, activity, mobility, nutrition, and friction and shear. The scale has a maximum score of 23 points, with a lower score indicating a higher risk of developing a pressure injury and vice versa. The Braden Scale has five levels of risk: extremely high risk (total score 9 or fewer), high risk (total score 10-12), moderate risk (total score 13-14), mild risk (total score 15-18), and no risk (total score 19-23) Correlation the aggregate score coefficients on the Braden scale were 0.80.

Patient's Outcomes: It is used to examine the patient's outcomes in order to determine the healing of a PUs. The National PUs Advisory Panel created it (2019). It is divided into two sections. Part I is a skin examination of the pressure location, depth, skin color, skin temperature, wetness, texture, ulcer stage, and signs and symptoms of dehydration. A score ranging from 0 to 24 might be obtained. Part II: Pressure Ulcer Healing (PUH), which comprised three criteria to assess changes in pressure ulcer status over time (length, width, exudate amount, and tissue type), with a total pain range of 0-13. The patients' pressure injury wound healing results were

estimated by adding the two. Total scores might range from 0.0 to 37, with a lower value indicating a better result. The Cronbach's Alpha was 0.8.

Considerations for Ethical Behavior: The ethical commission of the Faculty of Nursing at Port-Said University gave permission on 5-12-2017. The research was given official permission by the hospital's management. The present study's goal was conveyed to each nurse and patient. Patients were also assured that their anonymity and privacy is respected. They can leave the study at any moment without incurring any penalties.

To guarantee the impartiality and clarity of the tools and to estimate the time necessary for data collection tools, along with to assess the feasibility of the study, a pilot study was conducted on 8 patients and five nurses (10%) who met the inclusion criteria. The necessary correction was made available to the tools' final version. They were removed from the main study population, and the results of the pilot study proved that the study was feasible.

Fieldwork: Collection of data was completed over the duration of 13 months, "from December 2017 to the end of 2019". Data collected was done at morning, 5 days/ including all patient who had the previous inclusion criteria through using study tools by the researcher.

Pre-program phase (1): the researchers started the interviewing process among three-five nurses daily, for about 20-25 minutes for each nurse, the interviewing sheet was utilized. The demographic features of nurses, as well as their knowledge, were evaluated. Furthermore, the researchers used an observational checklist to examine the nurses' performance in the management of PUs during actual clinical care practices. The researcher reviewed every point in sheet to be sure that no points are missed.

For patients, the demographic and medical features of all 80 patients were assessed during the initial assessment. The Braden scale was used to determine which patients were at risk of developing PUs as they were followed until discharge through a period 6 weeks using patients' outcomes assessment. The total phase took about six months to complete.

The Implementation Phase: The educational program was developed upon nurse's assessment during the pre-program phase along with the European Pressure Ulcer Advisory Panel guidance (EPUP). It

contains (anatomy and physiology of skin, definition, risk factors, causes, signs, symptoms, most common locations, phases, diagnostic measures, complications, management, and nurses' practices addressing pressure ulcers). Each session consists of one group of five nurses who had been studied for 6 sessions both in theoretical and practical aspects (2 meetings per week for 90 minutes).

Evaluation Phase: In this phase, nurses' knowledge and skills were examined immediately after the program was delivered, then again after 8 weeks, the nurses' observational checklist was utilized. In addition, all the patients in the specified units were assessed. Patients on the Braden scale were tracked until they were discharged, and those who developed PUs were enrolled in the trial and tracked for 6 weeks using the patients' outcomes tool. Similarly, the post-program patients were matched with the pre-program patients based on demographics, medical profiles, and physical therapy outcomes.

Statistical Interpretation

The information gathered was arranged, reviewed, tallied, and analyzed. SPSS 20.0 is a statistical software for social science. The suitable statistical tests were used to determine whether there was a significant statistical difference between study variables or not.

For qualitative variables, descriptive statistics in the form of frequencies and percentages were used, as well as means and standard deviations for quantitative variables. In the event of comparisons between two groups, quantitative continuous data was compared using the Student *t*-test.

RESULTS

Part (1) applies to nursing-related factors such as nursing demographic characteristics, as well as a comparison of mean knowledge and practice scores of nurses before and after nursing intervention. Part (2) applies to nursing-related factors such as nursing demographic characteristics, as well as a comparison of mean knowledge and practice scores of nurses before and after nursing intervention. Throughout the study period, Part 2 is concerned with patient-related variables such as demographics, medical variables, and outcomes mean scores between patients care for after program implementation (study group) and before program implementation (control group).

Table 1: Frequency Distribution among the Studied Sample According to their General Characteristics (N=51)

General Characteristics	Frequency	Percentage (%)
Age (years)		
≤20	2	3.9
21-25	8	15.6
26-30 or more	41	78.5
Mean ± SD	28.8 ± 4.8	
Gender		
Female	40	78.5
Male	11	23.5
Educational Level		
Diploma Nurse	40	78.5
Technical Nurse	6	11.8
Bachelor Nurse	4	7.9
Years of Experience		
>1 Year	5	9.8
2-5 Year	3	5.9
>6 Years	43	84.3

Training course about PU		
No	44	88.2
Yes (1-3)	6	11.8
Place of Residence		
Rural	29	56.9
Urban	22	43.1

Table 1 shows that, 87.5% of the studied nurses had age ranged between 26 to more than 30 years, 78.5 % were female with diploma of Nursing, with 84.3% of them had 6 years' experience.

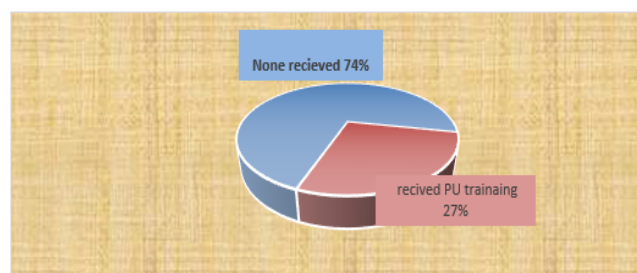


Figure 1: Nurses Attendance of PUs Training Courses (N=51)

Table 2: Comparison of the mean Knowledge Scores of Nurses before, After, and During Program Implementation (N = 51)

Parameters	Pre-program Mean score	Post-program Mean score	Statistic test Pre and Post		Reliability Statistics Pre and post Cronbach's Alpha test	Follow up-mean score	Reliability Statistics Pre and follow-up Cronbach's Alpha test	Statistic test Pre and follow up	
			t	P				t	P
Total scoring	45.57±21.26	66.2±5.298	22.734	0.000*	0.725*	65.6±10.203	0.584	12.-916	0.000*

Result is significant at p-value ≤ 0.05, **Result is highly significant at p-value ≤ 0.001

Table 2 reveals that there were highly statistically significant differences in nurses' knowledge before and after program implementation (t -test = 22.734, p -value ≤ 0.001.), as well as pre and post program follow-up (t -test = 12.916, p -value ≤ 0.00.).

Table 3: Nurses' Mean Practice Scores Program of the Pressure Ulcer Before, After, and Follow-Up

Parameters	Pre-program Mean score	Post-program Mean score	Statistic test Pre and Post		Follow up	Statistic test Pre and follow up		Statistic test Post and follow up	
			t	P		t	P	t	P
Total scoring	67.1 ± 15.2	108.6 ± 12.9	22.734	0.000*	96.1 ± 16.9	8.903	0.000**	8.292	0.000*

Table 3 demonstrates that there were highly statistically significant changes in nurses' mean practice

scores pre-program, post-program, follow-up, and finally, between post-program and follow-up assessment (*p*-value less than 0.05).

Table 4: The Frequency Distribution of the Study and Control Groups' (n=80)

Variables	Study Group (n= 40)		Control Group (n= 40)		Significance
	No	%	No	%	
Age in (years)					
<20	15	37.5	14	35.0	X ² = 1.892 P= 0.60
20-40	9	22.5	6	15.0	
41-60	8	20.0	7	17.5	
More than 60	8	20.0	13	32.5	
Mean (SD)	51.73±6.56		48.85±6.99		t= 0.742 P= 0.46
Sex					
Male	34	85.0	33	82.5	X ² = 2.051 P= 0.23
Female	6	15.0	7	17.5	

Table 4 clears that the mean age in the study group and the control group was 51.73±6.56 and 48.85±6.99 respectively. About 15.0% of the samples in the study

group vs. 17.5% in the control group were female. There was homogeneity between the two group regarding general qualities (*P* more than 0.050).

Table 5: Comparison between the Study and Control Group in Relation to Presence of Risk Factors

Variables	Study group n=40		Control group n=40		χ ²	P
	No.	%	No.	%		
Unconsciousness	7	17.5	9	22.5	χ ² =4.652	0.471
Decreased perfusion	4	10	3	7.5	χ ² = 0.774	= 0.714
Obesity	14	35	16	40	χ ² =3.688	0.158
Diabetic ketoacidosis	8	20	6	17.5	χ ² =0.227	0.893
Hypertension	6	17.5	8	20	χ ² =0.227	0.883
Stroke	8	20	6	17.5	χ ² =0.227	0.893
Post road traffic accident (RTA) spinal injury	3	7.5	4	10	χ ² = 0.774	= 0.714
Immobility	35	87	34	86	χ ² =3.688	0.158

not mutually equal. *P* >0.05 non-significant (RTA=road traffic accident)

Table (5) compares the study and control groups in terms of risk variables, with immobility accounting for

87.0% of cases in the study group against 86.0% in the control group, with no significant difference (*P* >0.05).

Table 6: Comparison between Both Study and Control Groups as Regard to Neurological Examination Using Glasgow Coma Scale (GCS)(N=80)

Variables	Study group (n=40)		Control group (n=40)		χ ²	p-value
	No.	%	No.	%		
Level of consciousness					0.532	0.641
Fully conscious	10	25	9	22.5		
Semi conscious	23	57.5	22	55		
Unconscious	7	17.5	9	22.5		

p-value is significant at ≤ 0.05.

Table 6 demonstrates that 17.7% of those in the study group and 22.5 % of those in the control group were unconscious,

Table 7: Comparison Between Study and Control Group in Relation to Braden Scale Assessment(N=80)

	Study group (n=40)		Control group (n=40)		χ^2	p-value
	No.	%	No.	%		
1st. day on admission)					0.213	0.832
Severe risk is less than 9		62.0		60.0		
High risk from 10-12		9.0		10.0		
Moderate risk from 13-14		20.0		22.0		
Mild risk from 15-18		9		8		
Mean±SD	11.20±0.66		11.73±2.33			

Table (7) shows comparison between study and control group in relation to Braden scale assessment. The mean score and SD were (11.20±0.66 vs 11.73±2.33) in study and control group respectively on day of admission, with no significant difference first day ($P>0.05$).

Table 8: Mean Scores for Patients with PUs in the Study and Control Group Throughout the Study Period (N= 80)

Study Periods	Mean ± SD		t-test	p-value
	Study Group (n=40)	Control Group (n=40)		
1st week	11.20±0.66	11.73±2.33	0.610	0.504
2nd week	15.61 ± 1.91	21.42 ± 3.21	11.476	0.000**
3rd week	13.48 ± 1.63	28.27 ± 2.82	14.629	0.000**
4th week	11.20 ± 1.55	27.48 ± 2.97	26.466	0.000**
5th week	10.43 ± 1.22	28.94 ± 2.91	30.962	0.000**
6th week	9.42 ± 1.22	28.93 ± 3.21	37.962	0.000**

Table (8) reveals that there were very statistically significant differences between the study and control groups in all 6 weeks of evaluation, with p -value= 0.000.

DISCUSSION

One of several nursing cares goals is pressure injury prevention, which is very crucial and a major indicator of nursing care quality. Concerning nurses' knowledge, regarding nurses related variables, the current study found that in the pre-program, studied nurses had mean knowledge scores that were poor, but these scores improved quickly and to a high level of knowledge after intervention. Sengul, & Karadag, published a study that supports these findings at (2020). In Turkey, they reported that the level of knowledge of nurses about the

prevention of pressure ulcers was determined. As nurses' understanding on how to avoid pressure ulcers (PUs) was lacking at two foundation hospitals. The lack of awareness about Pus leads to lower the quality of patient care and raise the risk of PUs formation. Also, Coyer *et al.*, (2019) & Kim & Lee (2019) investigated ICU nurses' knowledge, attitude, and performance toward PUs prevention among nurses in Korean long-term care institutions, concluding that they are often poor in PUs preventive knowledge.

Regarding education effect it is clear from the finding of our result and congruent with Ursavaş & Eri (2020) who investigated the effects of PUs prevention education on nursing students' knowledge, attitudes. It was found that the intervention group had a significantly higher mean score post education for knowledge about pressure

ulcer prevention than the control group with high significance. Nurses knowledge and attitudes about PUs prevention improved as a result of the education they received.

This is confirmed that method of presenting information had a significant influence on the understanding of nurses.

Meanwhile, current study's findings contradict finding of Kim, Park, & Kim (2020) regarding the impact of pressure injury training on nurses. They found that individuals' posteducation knowledge levels dropped or vanished over time, with the subjects returning to their pre-education baseline. Regular educational sessions, ongoing feedback following education, and follow-up are therefore required.

In terms of nurses' level of practice, the current study found that mean nurse practice scores were low in the pre-program, indicating that the studied nurses had low levels of practice in the pre-program, which could be due to insufficient training as most of them had not attended any PU training course, but there were highly statistically significant differences post-intervention, indicating that the educational program was effective. These findings are similar to those of Kwong *et al.*, (2020), who conducted cluster randomized controlled trials to determine the effectiveness of a pressure injury prevention program for nursing assistants in private for-profit nursing homes. Khojastehfar, Ghezalje, & Haghani, (2020) investigated the effectiveness of a pressure injury prevention program for nursing assistants in private for-profit nursing homes. They came to the conclusion that an evidence-based pressure injury prevention program increased the nursing assistants' skill and performance.

In addition, Kim, Park, & Kim (2020) indicated that pressure injury training programs can increase nurses' competency. According to the findings of this study, these programs can help nurses improve their knowledge, visual discrimination ability, and clinical judgment, and they can be categorized as continuing education programs. Large scale research, on the other hand, is needed to back up this conclusion. In contrast to Mwebaza (2014), who evaluated nurses' practices in the care of patients with PUs in a Ugandan Teaching Hospital, also, Cogan *et al.*, (2017) who emphasized nurses' poor performance and stated that, there is no evidence of the effectiveness of behavioral or educational interventions in preventing the occurrence of pressure ulcers in adults with spinal cord injury.

In contrast to Nakata, & Suzuki's (2019) findings that "regarding practices, the result of the pretest indicates that the level of practices significantly increases." However, this conclusion differed from prior findings as reported in Hoxmeier & Lenk's (2020) study, which indicated that seminars and workshops were the most common sources of information, but practices is still poor.

Concerning patients' related variables, study group and the control group had similar mean ages of 51.73 ± 6.56 and 48.85 ± 6.99 , respectively. In terms of gender, it was discovered that about 15.0% of the samples in the study group were female, compared to 17.5% in the control group. In terms of general data there was no difference between the control and study groups. During the six weeks of PUs wound healing assessment, significant improvements was reported in wound healing process in patients cared post-program implementation (study group) compared to care pre-program (control group), indicating the effectiveness of the educational program provided to the nurses and its positive patient outcomes.

In the line of our finding, Gaballah & El-Deen (2021) investigated the effects of a PI care program and observed that after five weeks of therapy, patients' PI wound healing improved significantly. On the other hand, Stern *et al.*, (2014) conducted a pragmatic cluster randomized stepped wedge trial by multidisciplinary team versus usual care for the treatment. Nurses who visited and educated nursing staff weekly at bedside and in group sessions, found no statistically significant differences in PUs wound healing between the control and in the intervention groups.

CONCLUSION

This study concluded that the educational program is extremely successful in enhancing nurses' knowledge and performance in intensive care units which consequently reflected on patients PUs healing outcomes. The findings of the research supported the proposed research hypotheses.

Recommendation

It is recommended that further research must be conducted to consider the routine use and regular revision of pressure ulcer risk assessment sheets is necessary. The obstacles in the implementation of pressure ulcer preventive measures must be identified and addressed in order to achieve a change in practice. An in-service training program must be conducted for nursing staff in order to continuously advance patient care in this area.

Conflict of Interests

The authors declare that they have no conflict of interests.

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