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EFFECT OF EDUCATIONAL PROGRAM ON NURSES' PERFORMANCE FOR PATIENTS WITH SPINAL CORD INJURY

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Abstract

Background Spinal cord injury (SCI) is the damage to the spinal cord that results in loss of function such as mobility or feeling. Aim of the study: evaluate the effect of educational program on nurses' performance for patients with spinal cord injury. Design: A quasi-experimental design was utilized to achieve the aim of the current study. Setting of the study was carried out in General intensive care unit at El demrdash Hospital. The sample of the study. A convenient sample of 35 nurses. Tools for Data collection. Tool (I) Self-administered Questionnaire: First part: it is concerned with the characteristics of nurses under study such as age, gender, educational level, and years of experience. Second part: it is concerned with the assessment of nurses' level of knowledge regarding to care of patient with spinal cord injury. Tool (II) Nurses' practice observational Checklist. It is concerned with the assessment of the nurses' practice regarding care of patient with spinal cord injury. Tool (Ⅲ) Nurse's attitude Likert scale toward care of patient with spinal cord injury: It is concerned with assessment of the nurse's attitude toward caring of patient with spinal cord injury. Results: it revealed that 28.6% the studied nurses had total satisfactory knowledge level regarding spinal cord injury care at pre-program phase compared to 85.7% at post-program phase, and 68.6% at the follow up phase with high statistically significant difference between pre/post phases, and pre/follow-up phases. While, the total satisfactory level of practice of the studied nurses regarding care of patient with spinal cord injury was 17.10 % at the pre-program assessment compared to 74.30% at post-program assessment, and 60 % at the follow up with high statistically significant difference between pre/post (x^2=23.026, P<0.001), and pre/follow phases (x^2=13.566, P<0.001). Conclusion: educational program had positive effect on the performance of the studied nurses caring of patient with spinal cord injury with statistically significance improvement in the total satisfactory level of knowledge, attitude and practice throughout program phases. Recommendations: it should develop a system to evaluate nurses' performance periodically to determine strategies for upgrading and enhancing their performance continuously with strict follow up plan during patient care.

Index terms: Nurses performance, spinal cord injury (SCI), program

INTRODUCTION

Spinal cord injury (SCI) is the damage to the spinal cord that results in a loss of function such as mobility or feeling. The effects of SCI depend on the type and level of the injury.

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Before World War II, most people who sustained SCI died within weeks of their injury due to respiratory problems. According to the National Spinal Cord Injury Statistical Center, there are 12,500 new cases of SCI each year in North America. Etiologically, more than 90% of SCI cases are traumatic and caused by incidences such as traffic accidents and falls [1] [2]. Spinal cord injury types including complete or incomplete injury based upon functional outcome. The functional outcome of SCI depends upon the neurological level and severity of the damage to the spinal cord. Neurologic level refers to the lowest level at which sensory and motor functions are appropriate [3].

Nursing assessment of patient with spinal cord injury is an integral part of nursing care. The provision of adequate prompt nursing care could prevent or alleviate further injury. Nurses need to have an experience and knowledge around the range of acute interventions [4]. Health care professionals need to update their skills regularly. Continuing education for nurses not only keeps nurses up to date on the latest advances in providing patients care, but it affords nurses an opportunity to explore other areas of nursing care. Training nurses should actively develop their independence, critical thinking, and open-mindedness. Nurses play an important role in improving health standards. Hence, they need to be updated about theoretical and practical knowledge in this field [7]. Educational program improves nurses' performance as a result of improving level of knowledge and skills. Integration of knowledge, attitudes, and skills is an important component of the educational curriculum for healthcare professionals. Nurses must be able to demonstrate critical thinking as they assess patients' individual needs for skillful intervention in healthcare settings [5][6]. Education process is achieved when changes in knowledge, attitudes, and skills occur. Staff education involve the relationship between the learner and the educator, so that the learner's information needs could be met through the process of education. Staff education is the process of influencing the behavior of nurses by producing changes in their knowledge, attitudes, and skills to help them improve their competencies to deliver high quality care [6].

Nurses are an integral part of the spinal cord injury management team. The nurse should perform primary and secondary assessments of patients, while simultaneously performing interventions to stabilize the airway, breathing, and circulation. All patients with significant mechanisms of injury must be suspected of having a spinal injury and should be completely immobilized. Spinal protection involves manual immobilization of the patient's head, until a rigid cervical collar and a backboard are applied [2][8]. The role of nursing care, which is established and performed, based on evidence-based performance principles and standard guidelines are very effective in managing patient with spinal cord injury and even preventing further problems for patients. Evaluating the effect of implementing these interventions, which could improve maximum neurological recovery, independence, and prevention of complications [9].

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SIGNIFICANCE OF THE STUDY

Spinal cord injuries (SCIs) are increasingly recognized as a global health priority. Worldwide, SCIs have a considerable impact in terms of mortality and morbidity, and represent a relevant burden for healthcare systems due to the expensive and complex medical support required for patients with SCI, in addition to economic consequences deriving from loss in productivity. This condition is a leading cause of disability especially among younger people, with a high impact on years lived with disability [10].

There is no doubt that spinal cord injury is a major catastrophic event. Effective nursing care is the hidden key for patient recovery. Nurse is likely to be the first one to detect problems of such group of patients. An injury of this type is significant for the individual and their family and can be challenging for nurses delivering care for patients with life changing injuries. In addition, there is a lack of research in the acute setting. Level of knowledge and skills influences directly by the quality of nursing care provided, that why the researcher conduct this study [11].

AIM OF THE STUDY

This study aims to evaluate effect of educational program on nurse's performance for patient with spinal cord injury. It will be achieved though the following:

- Assessment of nurses' level of knowledge regarding care for patients with spinal cord injury.
- Assessment of nurses' level of practice regarding care for patients with spinal cord injury
- assessment of nurses' level of attitude regarding care for patients with spinal cord injury.
- Development and implementation of educational program for nurses based on their needs.
- Evaluation of the effect of the developed educational program on nurses' performance for patients with spinal cord injury.

Research hypothesis:

The current study hypothesized that: educational program will improve nurses' performance regarding care of patient with spinal cord injury.

SUBJECTS AND METHODS

The study was portrayed under the four main designs as follows:

I. Technical design.
II. Operational design.
III. Administrative design.

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IV. Statistical design.

I. Technical design:

The technical design includes research design, setting, subjects and tools for data collection.

Research Design: A quasi-experimental design was utilized for the conduction of this study. A quasi-experimental design is a one-group (pretest-posttest). A quasi-experimental design is used frequently because; it is practical, less costly, and feasible with potentially generalizable findings. This design is more adaptable to the real-world practice setting than the controlled experimental design. This design may be the only way to evaluate the effect of the independent variable for some research hypotheses **[12].**

Setting of the Study:

This study was conducted at the General Intensive Care Unit (ICU) at El-dermdash Ain Shams University Hospitals. The ICU located at the 1st floor in the hospital building. It was distributed into three units, first unit contains 12 beds, second unit contains 12 beds, and the third unit contains 8 beds. There is an isolation room contains 8 beds with total number of 40 beds, receiving different types of patients including (intracerebral hemorrhage, polytrauma, spinal cord injury, traumatic brain injury and respiratory failure) that's why the researcher select this setting to conduct the current study.

Subject: Convenient sample of all available nurses (No=35 nurses), who are working in the previous mentioned setting and accepted to participate in the study from both gender with different qualifications, age, training courses and years of experiences.

Tools of data collection:

Three tools were used for data collection

1) Self-administered Questionnaire:

The researcher developed it in Arabic language to assess nurses' level of knowledge regarding care of patient with spinal cord injury after reviewing the recent related literature. It included two parts:

First part: it was concerned with the characteristics of nurses under study such as age, gender, educational level, years of experience and attending previous training courses related to care of patient with spinal cord injury.

Second part: It was developed by the researcher guided by Paul et al., (2016); Burns and Delgado, (2019); Chulay et al., (2019); Urden, et al., (2019); Urden et al., (2021) [13,14,15,16]. It was concerned with the assessment of nurses' level of knowledge regarding to the care of patient with spinal cord injury. It included 56 questions in the form of multiple-choice and true/false questions. It was categorized into three sections as follows; section (1): it is concerned with the assessment of nurses' knowledge regarding the anatomical structure and function of spinal cord. It included six items; section (II): It is concerned with the assessment of nurses' knowledge regarding spinal cord injury

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including its definition, types, risk factors, causes, signs and symptoms, complications, diagnosis and management. It included 25 items. Section (III): It is concerned with the assessment of nurse's knowledge regarding nursing care of patient with spinal cord injury. It included 25 items.

Scoring system: each correct answer was given one grade, while the incorrect answer was given zero, with total score 56 grades. It was summed and percentage was developed. The level of knowledge is considered satisfactory if the percentage was ≥ 85%. The level of knowledge is considered unsatisfactory if the percentage < 85%.

2) Nurses' observational Checklist:

It was concerned with the assessment of the nurses' practice regarding care of patient with spinal cord injury. It was adapted and modified by the researcher from **Perry et al., (2019); Stein and Hollen, (2020); Lister et al., (2021); Perry et al., (2021). [17,18,19,20]**. It consists of nursing assessment, nursing interventions and nursing measures to avoid complications for patient with spinal cord injury. It includes checklist namely; primary and secondary survey assessment (39 steps), vital signs monitoring (5 steps), neurological assessment (orientation, GSC, sensory, motor assessment and deep tendon reflexes 24 steps), cardiac monitoring (9 steps), oxygen therapy (14 steps), endotracheal suction and care (29 steps), nasogastric feeding and care (29 steps), mobilization and skin care (5 steps) and nursing measures to avoid complications (15 steps).

The step observed to be done correctly was scored by one grade and the step not done or incorrectly done was scored zero, with total score 169 grades. The level of practice was considered satisfactory if the percentage was ≥ 90%. The level of practice was considered unsatisfactory, if the percentage was < 90% considered unsatisfactory. As all parts of the procedures, consider as life threatening for such group of patients.

3) Nurses' attitude Likert scale toward caring for patient with spinal cord injury:

It was concerned with assessment of the nurses' attitude toward caring of patient with spinal cord injury. It was developed in Arabic language to assess nurses' attitude toward caring of patient with spinal cord injury after reviewing the recent related literature **(Abdoh et al., 2017; Al-Othman et al., 2018) [21,22].** It consists of 16 statements that is reflect nurses feeling and reactions toward caring of patient with spinal cord injury and nurses' responses is grading according to Likert scale (agree, neutral and disagree). The scale is consisted of 16 statements including 14 statements reflect positive attitude and two statements reflect negative attitude, the 3-point Likert scale responses was ranged as 2 for (agree), 1for (neutral), and 0 for (disagree). The score of statements were summed up and given a total score for nurses' attitude and categorized into two categories as the following; if the percentage ≥ 60 % reflect positive attitude. If the percentage < 60 % reflect negative attitude.

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II. Operational design:

The operational design includes the preparatory phase, validity and reliability, pilot study, ethical consideration and field of work.

Preparatory phase:

It included reviewing of the current and more recent relevant national and international literature reviews and theoretical knowledge of the various related aspects using books, articles, periodicals, magazines and internet in order to develop the data collection tools.

Validity and reliability

The validity of the developed tools was tested using (face and content validity). Face validity aimed to inspect the items to determine whether the tools measure what it supposed to measure, while content validity was done to determine whether the tool achieve the study aim. Validity was tested through a jury of seven experts from Ain shams university (7 professors of critical care nursing and medical surgical nursing). The experts reviewed the tools for clarity, relevance, comprehensiveness, and simplicity, minor modification was done, and to estimate time need to fill in the study tools. Validity for the study tools were for Self-administered Questionnaire (90% to 100%) and for Nurses' observational Checklist tool was (100%), and for Nurses' attitudes Likert scale toward caring for patient with spinal cord injury was (90 % to 100 %). The reliability of study tools was tested statistically using Cronbach's Alpha /coefficient the reliability test score. They were for the study tool including Self-administered Questionnaire, Nurses' observational Checklist, and Nurses' attitudes Likert scale toward caring for patient with spinal cord injury were (0.87, 0.96, and 0.88 respectively).

The ethical research considerations:

The ethical consideration in the current study includes the following: The research approval was obtained from scientific research ethical committee in faculty of nursing Ain Shams University before stating the study. The researcher clarified the aim, objectives of the study to the nurse's included in the study prior to data collection. Maintaining anonymity and confidentiality had been guaranteed. Nurses were informed that they allowed choosing to participate or not in the study and that, they had the right to withdraw from the study at any time. Ethics, values, culture, and beliefs were respected during study period.

III. Administrative design

Approval was obtained from Dean of faculty of nursing Ain Shams University, then written official letter sent to the director of ELdermdash Ain Shams university hospitals, include the aim of the study and steps of application the program, to the get permission to conduct the study.

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Pilot study

It was carried out on (10%) of total the sample of the studied nurses to test applicability, clarity and efficiency of the tools. According to the results obtained from analysis with minimal modification were done, so the nurses' who included in the pilot study were included in the study sample.

Fieldwork:

An approval was obtained from hospital directors and nursing directors. The aim of the study was explained to the nurses who agreed to participate in the study prior to data collection. The actual work of this study took about 7 months, started from the beginning of November 2021 to the end of June 2022. The data were collected by the researcher through 3 days /week (Monday, Wednesday and Thursday) during morning and afternoon shift in the previously mentioned setting. Timing of educational program sessions in morning shift, the sessions started from 11.00 am or from 12.00 pm, shift the sessions started from 4.00 pm or from 5.00pm to the nurse in afternoon shift. The researcher observed the performance of each nurse during care of patient with spinal cord injury by indirect observation to ensure the maximal realistic observations of nurses' practice and minimize the possibility of bias, then self-administered questionnaire and attitude Likert scale completed, and it took about 30 minutes to be fulfilled by each nurse. The study tools were assessed three times as follow at pre-program, post-program implementation, and 3 months follow-up later. The educational program was implemented for the studied nurses in general ICU in term of sessions integration with the relevant latest theory into practice regarding the care of patient with spinal cord injury.

The fieldwork included four phases: assessment phase, planning phase, implementation phase and the evaluation phase.

Phase (I): Assessment phase

The first phase was concerned with assessment of nurses' performance (practice, knowledge and attitude) regarding spinal cord injury care by using the three previously mentioned tools (Observational checklist, Self-administered questionnaire and Nurses' attitude Likert scale) to identify nurses' educational needs. Based on nurses' needs and reviewing the recent related literatures, illustrated Arabic-language booklet was developed covering knowledge and practice regarding spinal cord injury care, this phase took about two months to be accomplished guided by Lynn, (2018); Shier et al., (2018); Chulay and Suzanne, (2020); Salmon, (2020) [23,24,25,26].

Phase (II): Planning phase

Development of the educational program in Arabic language was based on the nurses' needs, which identified from the pretest results of nurses' practices knowledge and attitude (pre-program implementation) and reviewing the most recent related literature, and then an illustrated booklet was developed.

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Phase (III): Implementation phase

Educational program implementation was carried out through 5 sessions including 2 sessions for the theoretical part and 3 sessions for the practical part. Each session expands 30 minutes, two sessions per day. The theoretical sessions include knowledge regarding structure and function of the spinal cord, definition of spinal cord injury, risk factors, causes, signs and symptoms, complications, diagnosis, management of patient with spinal cord injury. The theoretical sessions applied through a small group discussion. While, the practical sessions including demonstration and redemonstration of (primary and secondary survey assessment, vital signs assessment, and neurological assessment, oxygen administration, endotracheal suction and care, nasogastric tube feeding and care, mobilization and skin care and nursing measures to avoid complications), applied through demonstration and re-demonstration regarding procedures related to nursing care for patient with spinal cord injury. The total numbers of nurses under study were thirty-five divided into two group of nurses included in each shift. Each session includes 3 to 5 nurses. The educational session was done at the nursing office in coordination with the Chief Nursing office. The educational program was implemented for the studied nurses during the official working hours. Educational booklet, images, videos, smart phone applications were used. Motivation and reinforcement techniques as praise and recognition during program sessions were used.

Phase (Ⅳ): Evaluation phase:

This phase was conducted to evaluate the effect of educational program on nurses' performance (practice, knowledge and attitude) immediately post program implementation and after 3 months follow up period later using study tools. Evaluating the effect of the educational program on nurses' performance caring for patients with spinal cord injury done by comparing the results of the data collected pre, after and follow up period after implementation of the educational program.

RESULTS

Table (1) showed that, 51.4% of the studied nurses were between the age group 20 to less than 30 years old with mean age 29.2 ±7.2 years old, and 54.3% of them were females. Meanwhile, 60% of the studied nurses were technical institute nurses, 42.9 % of them had previous experience less than 5 years with mean years of experience 8.5±3.8. Moreover, 20% of the studied nurses attended previous training courses regarding spinal cord injury care, and reported that no availability of manual /booklet regarding care of patient with spinal cord injury. Figure (1) illustrated that, 28.6% the studied nurses had total satisfactory knowledge level regarding spinal cord injury care pre-program compared to 85.7% post-program, and 86.6% at the follow up phases with high statistically significant difference between pre/post program phases, and pre/follow-up phases (x^2=23.333, P <0.001) and (x^2=11.209, P <0.001 respectively).

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Figure (2) revealed that 94.3% of the studied nurses had negative attitude toward care of patient with spinal cord injury preprogram, while 80 % and 74.3% had positive attitude post program and at the follow up phase respectively, with statistically significant difference between pre/post phases (x^2=39.433, P<0.001) and pre/follow-up phases (x^2=34.285, P<0.001). Figure (3) illustrated that, the total satisfactory level of practice of the studied nurses regarding care of patient with spinal cord injury was 17.10% at the pre-program assessment compared to 74.30% at the post-program assessment, and 60 % at the follow up with high statistically significant difference between pre/post phases (x^2=23.026, P<0.001), and pre/follow phases (x^2=13.566, P<0.001).

Table (2) showed that there was no statistically correlation between the studied nurse's level of knowledge and level of practice and attitude regarding care of patient with spinal cord injury pre-program (r=0.066, P>0.707), (r=0.155, P<0.373), and (r=0.332, P<0.051) respectively. Meanwhile, there was positive correlation between the studied nurse's level of knowledge, practice and attitude post program implementation (r=0.358, P<0.035), (r=0.481, P=0.043) & (r=0.363, P<0.031) respectively. In addition, there was positive correlation between the studied nurses' level of knowledge, practice and attitude at the follow up phase (r=0.395, P<0.017), (r=0.438, P<0.008) and (r=0.387, P<0.026) respectively.

Table (1): Percentage distribution of the studied nurses according to their demographic characteristics (N= 35)

Demographic data	N	%
Age (years)		
20 - < 30	18	51.4
30 - < 40	13	37.1
≥ 40	4	11.4
Range (Years) (Minimum – Maximum)	20 – 46	
Mean ±SD	29.2 ±7.2 years	
Gender		
Male	16	45.7
Female	19	54.3
Educational Level		
Diploma	7	20.0
Technical	21	60.0
Bachelor	7	20.0
Experience (Years)		
1- < 5	14	40.0
5 - < 10	11	31.4
≥ 10	10	28.6
Range (Years) (Minimum – Maximum)	1 – 23	
Mean ±SD	8.5 ±3.8 years	
Attending previous training courses regarding spinal cord injury care		
Yes	7	20.0
No	28	80.0
Availability of manual/booklet regarding care of patient with spinal cord injury		
Yes	0	00.0
No	35	100

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Figure (1): Percentage distribution of studied nurses according to their satisfactory level of knowledge regarding spinal cord injury care at pre-program, post-program and follow up phases (No= 35)

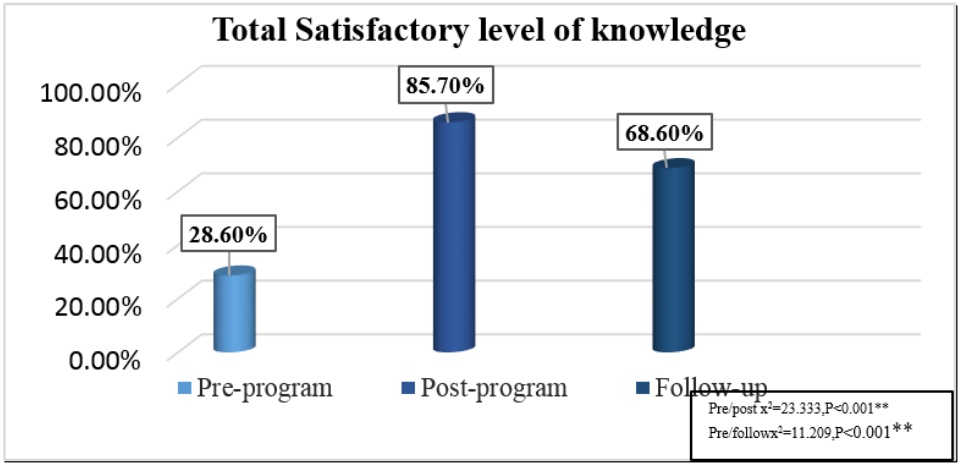

Figure (2): Percentage distribution of the studied nurses according to their total level of attitude toward care of patient with spinal cord injury pre-program, post-program and follow up phases (N=35)

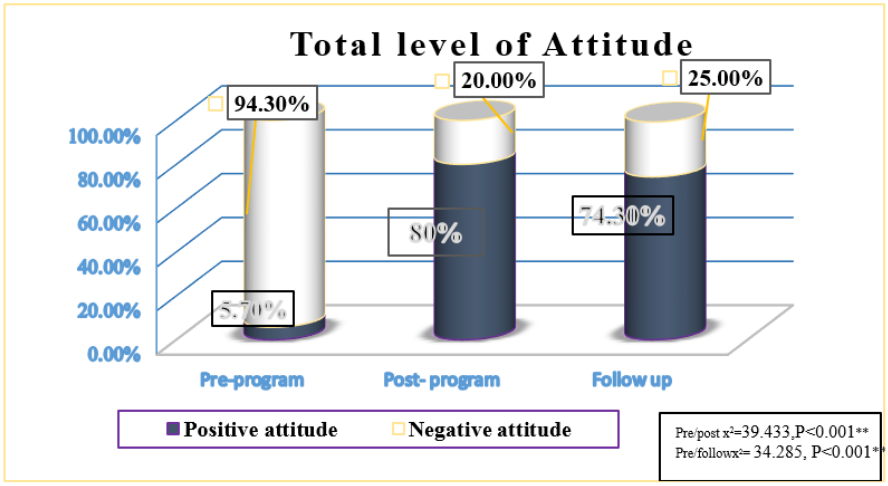

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Figure (3): Percentage distribution of the studied nurses according to their satisfactory level of practice regarding care of patient with spinal cord injury pre-program, post-program and follow up phases (N=35)

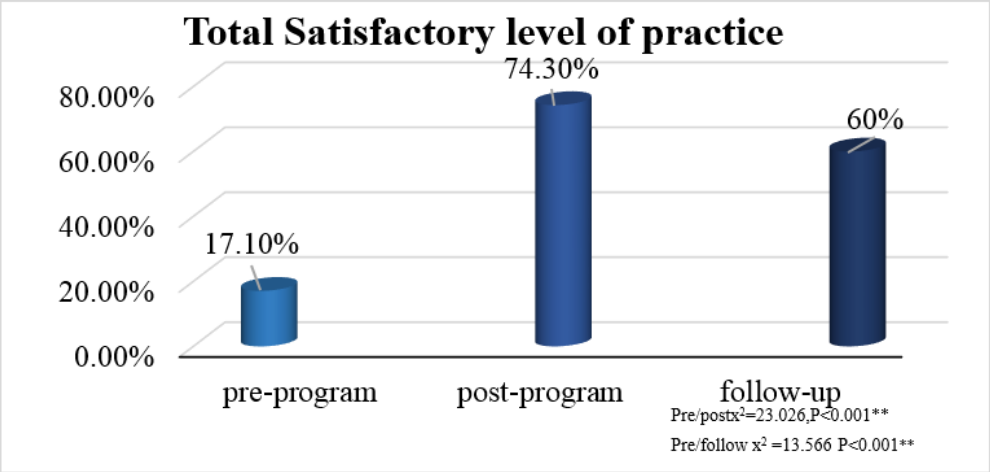

Table (2) Correlations between the studied nurses' knowledge and practices and attitude regarding care of patient with spinal cord injury at pre-program, post-program and follow up phases N = (35)

Pre-program phase	Knowledge		Attitude	
	R	P	r	p
Knowledge			0.155	0.373
Practice	0.066	0.707	0.332	0.051
Post-program phase	R	P	r	p
Knowledge			0.481	0.043*
Practice	0.358	0.035*	0.363	0.031*
Follow-up phase	R	P	r	p
Knowledge			0.438	0.008*
Practice	0.395	0.017*	0.387	0.026*

Statistically significant at P≤0.05 ** highly statistically significant at P≤0.01 Satisfactory level ≥ 90%

DISCUSSION

The present study aims to evaluate the effect of educational program on the performance of nurses for patients with spinal cord injury. The current study hypothesized that: educational program will improve nurses' performance for patient with spinal cord injury. Concerning the studied nurses' demographic characteristics, the results of the current study revealed that, half of the studied nurses were at the age group from 20 to less than 30 years old with mean age 29.2 ± 7.2 years old. This finding could be clarified in the light of the nature of ICU as an area of specialty necessitates a young qualified nurse for better quality of nursing care offered and ability to tolerate the working load. The previous finding

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is consistent with Maaroof (2012) [27] who studied nurses' performance for patients with traumatic head injury in golden hour and stated that about two thirds of the studied nurses age were less than thirty years old.

As regard gender of studied nurses, the current study showed that more than half of studied nurses were females. This result may be due to the old belief that nursing is a female profession so the majority of nurses utmost in Egypt are females. This is consistent with the finding AL-Gabri et al., (2020) [28] in a study titled "Factors Affecting Nurses Compliance Regarding the Care of Patients with Chest Trauma", and stated that more than two thirds of the studied nurses were females. This finding against the result of a study done by Ahmed et al., (2017) [29] titled "Nurses Knowledge and Practice of Trauma Patients during Golden Hours of Care" and reported that more than half of the study subjects were males. Concerning level of education, the results of this study revealed that about two thirds of the studied nurses graduated from technical institute. This finding may be due to the shortage of number of bachelor nurses who working in the intensive care units. So, technical institute nurses were recruited there to cover the activities needed the ICU units.

The previous finding is supported by a study conducted in Shehab, et al. (2018) [30], entitled "Impact of an Educational Program on Nurses' Knowledge and Practice Regarding Care of patients with Traumatic Brain Injury "and stated that the majority of the studied nurses who are working in the intensive care unit were technical institute nurses. Concerning years of experience, the present study revealed that more than two fifths of the studied nurses had previous experience from 1 to less than 5 years, and one third of the them had previous experience 5 to less than 10 years with mean years of experience 8.3 ±6.9 years. The previous finding is in the same line of a study done by Abd al Aziz (2014) [31] about the effect of educational program on nurses' knowledge and skills about the oral care for patients with trauma and found that more than two thirds of studied nurses had experience from 1 to less than 5 years.

Concerning previous training courses about care of patient with spinal cord injury, data analysis revealed that the most of the studied nurses did not attend any courses regarding care of patients with spinal cord injury. This may be due to lack of in-service educational programs inside the hospitals and work overload. So, they had not any opportunities to attend training courses during the working hours. This is in accordance with the findings of a study done Mohammed et al., (2020) [32] who stated that the majority of studied nurses did not receive any training programs.

Regarding the total satisfactory level of knowledge, the current study revealed that most of the studied nurses had statistically significant improvement in the total level of knowledge about spinal cord injury at post and follow up program implementation phases compared to preprogram phase. This finding could be attributed to the success of the educational program and booklet to meet needs of the studied nurses that includes theoretical sessions in Arabic language and effective presentation leading to retaining and understanding of knowledge. Educational program also had positive effect on nurses'

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knowledge regarding care of patients with spinal cord injury. It is important to meet the care needed of nurses through educational, support, supervision, reinforcement which improve total satisfactory level of knowledge among the studied nurses as well support the study hypothesis.

This is in agreement with Abd Elkader et al., (2020) [33] who done a study titled the effect of an educational program on nurses' performance regarding the care of patients with head injuries, and found that majority of the studied nurses got improvement in the total knowledge score of patients with head injuries immediately after implementation program and after three months later. Regarding the studied nurse's total level of attitude toward care of patient with spinal cord injury, the current study revealed that the most of the studied nurses revealed positive attitude toward care of patient with spinal cord injury at post and follow up program phases compared to pre-program phase with statistical significance difference between pre/post and pre/follow up program phases. This improvement in total attitude level reflects positive effect of the program on nurses' knowledge and raising awareness toward their role in providing care of patient with spinal cord injury. This explanation was supported by Burns et al., (2015) [34] who stated that attitude change was attributed to improvement of nurses' knowledge level regarding caring of such group of patients. Positive attitude increased as nurses' knowledge level increased, the obvious improvement of attitude might be an indicator of program success which result in increased knowledge level of the studied nurses about spinal cord injury therefore, nurses' attitude for such group of patients changes toward positive. This previous finding was supported by Elsensoy et al., (2020) [35] in study titled "Educational Guidelines for Nurses' Competence Level Caring for Patients with Accidental Chest Trauma during Emergency Period" and found that there was statistically significant improvement of the total nurses' attitude regarding care of patient with chest trauma during emergency period at pre and post implementation of the educational guidelines. Also, the previous finding is in agreement with Faheim et al., (2019) [36]. Who done a study titled "Effect of triage education on nurses' performance in diverse emergency departments", and revealed that there was an improvement in nurses' total attitude immediately after, and at the follow up post program implementation among the majority of them with statistically significant differences between the three phases. Concerning the total level of practice, the current study revealed that the majority of the studied nurses showed improvement in level of practice in satisfactory manner at the post and follow up program phases compared to pre-program phase, with statistically significant differences between pre/post and pre/follow up phases.This improvement might be due to the effect of educational program that enable the studied nurses to practice the essential nursing skills regarding care of patient with spinal cord injury effectively contributing to the success of the program. Also, as a result of effective teaching strategy in terms of practical sessions and using redemonstration. This improvement in the total satisfactory of practice level among the studied nurses supports the study hypothesis.

This is in accordance with study findings done by Samir et al., (2021) [37] in title "Nurses' Knowledge and Practice Regarding Care for Patients with Spinal Cord Injury in the Critical

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Care Unit", and stated that half of the studied nurses showed total unsatisfactory practice regarding caring for patients with spinal cord injury in critical care unit and there were highly statistically significant differences between pre/post and pre/follow up phases. Concerning correlations between the knowledge, attitude and practice, the current study also, revealed that there are statistically significant positive correlations between the studied nurse's knowledge, practices and attitude regarding care of patient with spinal cord injury at the post and follow-up phase.

This result could be justified that not all of the studied nurses attended any training courses regarding care of patients with spinal cord injury before the program so the effect of the educational program to enhance their knowledge and improve their skills and attitude. Also, the positive effect of the program application on nurses' level of knowledge and practice reflects the success of the program which as well affect positively on their attitudes as a result of increasing the knowledge level. This is consistent with a study done by Elsayed et al., (2021) [38] and revealed that, there was a positive correlation between level of practice and knowledge after implementation of the nursing intervention protocol.

This previous finding is with the same line with Naga, et al (2021) [39] who studied the effect of competency-based program on nurses' knowledge, skills and attitude toward the care of patients with stroke as they found positive correlation between nurses' knowledge and attitude during the pre and follow-up program phase. Whereas, in the follow-up phase, a significant moderate positive correlation was found between nurses' knowledge, practice and attitude. The educational program has a beneficial effect in improving the nurse's knowledge, skills and attitude. The educational program was organized according to the studied nurses. This improvement among the studied nurse's level of knowledge, practice and attitude support study hypothesis as well.

Finally, the educational program offered the nurses the opportunity to increase their knowledge and maintain practice in caring of patients with patient with spinal cord injury and enables them to provide safe care of such group of patients. The performance might be maintained easily when routine work is performed, and nurses' experience is high. Nurses' training and educational needs could not be discovered easily if there were not encounters very often. Educational program could increase those encounters, so the nurse allows ready to be competent when the need arises.

CONCLUSION

On the light of the current study results, it could be concluded that educational program had positive effect on performance of the studied nurses caring of patients with spinal cord injury with statistically significant improvement regarding total satisfactory level of knowledge, attitude and practice throughout program phases.

Finally, the present study concluded that the application of educational program had a positive effect on studied nurses' performance and this support the research hypothesis.

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The current study hypothesized that: educational program will improve nurses' performance for patient with spinal cord injury.

RECOMMENDATIONS

Based on the result of the current study the following recommendations could be suggested:

Regarding nursing practice:

- Workshops, seminars and conferences aiming to update nurses' knowledge, skills and attitude regarding care of patient with spinal cord injury should be arranged periodically at the critical care units.
- Nursing protocol related to care of patient with spinal cord injury should be available at the critical care units.

Regarding nursing education:

- Continuous educational programs should be planned on regular basis to nurses' caring of patients with spinal cord injury based on their needs.

Regarding further researches:

- Develop a system to evaluate nurses performance periodical to determine strategies for upgrading and enhancing their performance continuously with strict follow up plan during patient care.

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