Effect of an Educational Program on Nurses` Performance regarding Care for Patients with Subarachnoid Hemorrhage

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Abstract

Background: Subarachnoid Hemorrhage (SAH) , is hemorrhage into the subarachnoid space the space between the arachnoid membrane and pia membrane around the brain symptoms may include a severe headache vomiting, decreased level of consciousness, fever, and seizures. **Aim:** This study aimed to test the effect of an educational program on nurses` performance regarding care for patients with subarachnoid hemorrhage. **Design**: A quasi – experimental design was utilized to conduct this study. **Setting:** This study was conducted in the neurology unit at Benha University hospitals. **Subject:** A convenience sample (60) nurses working in neurology unit at Benha University hospitals. **Tools**: two tools were used in this study; structured interview questionnaire sheet, and observational checklist sheet to evaluate nurses' practice regarding care for patients with subarachnoid hemorrhage. **Results:** 50% of the nurses under the study were aged 20-30 years old, 66.7% of them were female, 66% of the studied nurses had satisfactory level of knowledge preprogram compared 95% of them had satisfactory level of knowledge post program and 91.6% in follow up, 26.6% of them had good level of practice preprogram compared with 73.3% of them had good level of practice post program and descend to 51.6% of them had good level of practice in follow up. **Conclusion:** There is positive correlation between nurses` information and skills regarding care for patients with subarachnoid hemorrhage post program. Implementation of educational program has a positive effect on improvement of the nurses` knowledge and practice regarding care for patients with subarachnoid hemorrhage post program than preprogram. **Recommendation:** Continuous evaluation of nurses' knowledge and practice is essential to identify nurses' needs for implementing educational program regarding care for patient with subarachnoid hemorrhage.

Keywords: Educational program, Nurses` Performance, Subarachnoid hemorrhage.

Introduction

Subarachnoid hemorrhage (SAH); hemorrhage into the subarachnoid space the area between the arachnoid mater and the pia mater around the brain. Symptoms may include a severe head ache of rapid onset, vomiting, decreased level of consciousness, fever, and sometimes seizures. Neck rigidity or neck pain are also relatively common. In about a quarter of people a small hemorrhage with resolving symptoms occurs within a month of a larger hemorrhage **(Rinkel et al., 2018).**

Causes of SAH; it may occur because of a head trauma or spontaneously, usually from a ruptured cerebral aneurysm. Risk factors for spontaneous hemorrhage included high blood pressure, smoking, family history, alcohol abuse , and cocaine use. Generally, the diagnosis can be determined by a CT scan of the head if done within six hours of symptom onset. Occasionally a lumbar puncture is also

required. After confirmation further tests are usually performed to determine the underlying cause **(Armin et al., 2016).**

The most common complications of SAH; vasospasm, in which the blood vessels constrict and so restrict circulation, is a serious complication of SAH. It can cause ischemic brain bleeding (referred to as "delayed ischemia") and permanent brain damage due to lack of oxygen in parts of the brain. It can be lethal if severe. Delayed ischemia is characterized with new symptoms, and can be diagnosed by transcranial Doppler or cerebral angiography. About one third of people hospitalized with subarachnoid bleeding have delayed ischemia, and half of those have permanent damage as a result. It is possible to screen for the development of vasospasm with transcranial Doppler every 24–48 hours. A blood flow viscosity of more than 120 centimeters per second is suggestive of vasospasm **(Tang et al., 2018).**

Neurology assigned nurses have understand and appreciate the evaluation that are called for in the field in same circumstances, as compared to judgments made regard the same patient once in neurology department. Nursing process of assessment analysis/ plan, intervention/ collaborative intervention and evaluation. Each professional component standard is assigned professional outcome criteria **(Ashcraft et al., 2021)**

Significance:

According to the Egyptian magazine of hospital (October 2018); Subarachnoid hemorrhage is a life-threatening condition. The overall incidence of SAH is nearly about 9 per 100 000 person-years. The preponderance of women starts only in the sixth decade. The decrease in incidence of SAH over the past 45 years is relatively moderate in comparison with for stroke in general. According to

statistical record, the incidence of subarachnoid hemorrhage (SAH) at Benha University Hospital during the period of (2017–2018) were approximately 360 patients, which motivate the researcher to improve quality of such group of patients' nursing care and eliminate complications occurrence of SAH.

Aim of the study

This research aims to estimate the effect of an educational program on nurses` performance regarding care for patients with subarachnoid hemorrhage.

Research hypothesis:

This study hypothesized that; the educational program affect positively on nurses` performance regarding to care for patient with subarachnoid hemorrhage.

Subject and Methods:

Research Design:

A quasi - experimental design was utilized in this study.

Setting:

The study was conducted in neurology unit at Benha University Hospital.

Sample:

Convenience sample of all available nurses (n=60) were recruited from the previously mentioned setting different age, gender, and different level of qualification, working in neurology unit and agreed to participate in this study.

Tools for data collection

The study included two different tools were used to collect data:

The first tool Structured Interview Questionnaire:

It was designed by the researcher based on recent literatures including **Schneider et al., 2019** :

A. Nurses' demographic characteristics of studied sample.

B. Nurses' knowledge assessment: It was concerned with assessment of nurses` knowledge regarding care for patients with subarachnoid hemorrhage 53 question were developed by the researcher as the following; 3 questions related to anatomy and physiology of the brain, 4 questions related to SAH definition, 2 questions related to SAH causes, 1 question related to SAH symptoms, 2 questions related to SAH diagnosis, 4 questions related to SAH treatment, 12 questions related to SAH medications, 22 questions related to SAH nursing care, and 3 questions related to infection control precautions to be considered by nurses regarding care for patients with SAH.

Scoring system:

Nurses' knowledge tool contains 53 questions (39 question in the form of multiple choice (MCQ) the response were constructed in the form of 4 different choices (a, b, c or d), 2 question in the form of list, 12 question in the form of matching). Each question has score: zero was given for each incorrect answer and 1 mark was given for each correct answer. the total score of questionnaire sheet was 53 marks which evaluated as the following:

- Satisfactory level of knowledge ≥ 85%
- Unsatisfactory score for knowledge < 85%

The second tool   Nurses`   practice Observational Checklist Sheet:

It was adopted from recent and relevant literature " **Lunn & LeBon (2019)** to evaluate nurses` practice regarding care for patients with subarachnoid hemorrhage which included seven check lists : assessing the studied nurses` practice regarding to obtaining an arterial blood specimen for blood gas analysis (22steps)**,** assessing the studied nurses` practice regarding to obtaining a urine form an indwelling urinary catheter (15 steps), assessing the studied nurses` practice regarding to caring for patient with an external ventriculostomy (intraventricular catheter-closed fluid-filled system)(13 steps) , assessing the studied nurses` practice regarding to employing seizure precautions and seizure management (22 steps), assessing the studied nurses` practice regarding to suctioning the nasopharyngeal and oropharyngeal airways (28 steps), to assessing the studied nurses` practice regarding to administering medications by intravenous bolus or push through an intravenous infusion (28steps), assessing the studied nurses` practice regarding to application of Glasgow Coma Scale (16 steps)

Scoring system:

The observational checklist tool contain 7 parts with 144 steps, the score for each step was given as follows :

1 score = done

0 score = not done

Total score of practice = 144 marks

Content validity & Reliability

- **Content validity** was conducted to attain whether the tools cover the purpose. Validity was detected by a jury of 7 experts from Medical Surgical Nursing department, Faculty of Nursing Benha University; 2 professors, 5 assistant professors of medical surgical nursing at Faculty of Nursing Benha University.

- The professors revised the tools for clarity and of sentences, consistency, appropriateness of the content, sequence of items, accuracy, relevance, generalized, simplicity, and applicability. The percentage of consensus among professors regarding the structured interviewing questionnaire pre & posttest was 95 %.

- **Testing reliability** of tools get by Alpha Cronbach's test. It was used to estimate even if the questionnaire had internal consistency; α test reached (0.91) for nurses' knowledge, and (0.87) for nurses' practice.

Ethical consideration:

- The research approval was obtained from the ethical committee to start the study.
- The researcher explains the objective and the intention of the study to nurses included in the study.
- The researcher makes sure maintaining anonymity and confidentiality of all the subjects' data.
- Nurses was identified that they have right to participate or withdraw from the study at any time.

Pilot study:

A pilot study contains 10 % of nurses to evaluate feasibility and applicability of the study tools. Obtained result was used as a reference to update the changes needed in the data collection tools, it was excluded from the study sample.

Field Work:

Assessment phase:

- Assessment of nurses' performance regarding care patients with subarachnoid hemorrhage was done. This assessment should light on current knowledge and practice level to detect the defect and help in developing the educational program according to it.
- Interviewing with all nurses to attain the aim of the study, the benefit of this study on their performance regarding to care for patients with subarachnoid hemorrhage and take their approval to share in the study prior to any data collection.

Planning phase:

- The researcher was collected data about the study settings to put a plan for carrying out the study. Educational program was developed by the researcher according to nurses' needs, moreover teaching materials e.g (discussion, demonstration, and booklets) was prepared to help in covering theoretical and practical information.
- Developing an educational program regarding nurses' performance (knowledge & practice).
- Educational program was designed by the researcher-based nurses' needs to improve their knowledge, and practice level; it was written in simple Arabic language.
- Educational program was given by the researcher to the nurses.

Content of the health educational program (Lunn & LeBon 2019), it divided into; theoretical part and practical part :

Related theoretical part:

- Anatomy of the nervous system.
- Definition of subarachnoid hemorrhage.
- Causes of subarachnoid hemorrhage.
- Risk factors of subarachnoid hemorrhage.
- Early detection, and early management of subarachnoid hemorrhage.
- Diagnosis of subarachnoid hemorrhage.
- Nursing care plan for patients with subarachnoid hemorrhage.
- Implementation of high qualified nursing care plan to prevent complications to patients with subarachnoid hemorrhage.
- Infection control measurements during care plan for patients with subarachnoid hemorrhage.

- Discharge plan including health teaching to patients with subarachnoid hemorrhage.

Related to practical part:

- Obtaining an arterial blood specimen for blood gas analysis
- Obtaining urine from an indwelling urinary catheter.
- Caring for patient with an external ventriculostomy (intraventricular catheter-closed fluid-filled system).
- Employing seizure precautions and seizure management.
- Suctioning the nasopharyngeal and oropharyngeal airways
- Administering medications by intravenous bolus or push through an intravenous infusion.
  - Application of Glasgow Coma Scale.

Phase III: Implementation of the educational program:

- The researcher was attended by rotation for three days / week morning, and afternoon shifts.
- The educational program is divided into five sessions, each session for one-hour hours (3 hours theoretical and 2 hours practical). The timeline of each session was (30-45) minutes, including the periods of discussion. Nurses are separated into six groups each partition consisted of (10) nurses, it take 2 months.
- At the beginning of session number one, nurses were explained regarding the program partitions, their purpose, and its effect on their practices. Nurses were discussed about the time of the next session at the end of each session.
- Each session begin a summery about what has been attained in the previous session and the rational of the new

session, using simple Arabic language , also the session ended a summary of its contents and feedback from the nurses were get to ensure nurse` maximum benefit.

- At the end of the program, obtaining feedback from nurses, thanking them for their cooperation, and ask them about their opinion regarding their benefits from the educational program.

Evaluation phase:

- This phase was included estimation the effect of the educational program on nurses' performance regarding to care for patient with subarachnoid hemorrhage by; comparison of the result pre, post, and three month after implementation of the educational program . It was done by using the same tool sheets to evaluate nurses' level of performance regarding care for patients with subarachnoid hemorrhage.

Statistical analysis:

Data entry and statistical analysis were done using the Statistical Package for Social Science (SPSS version 22.0). Descriptive statistics included frequencies and percentages, means and standard deviations. Inferential statistics as (Chi-square test) and Pearson correlation coefficient were used.

Results:

Table (1): This table obvious that demographic characteristics of the studied nurses, there were 50.0 % aged between (20 – 30) years old with (M±SD is 1.666 ± 0.751), and 66.7 % of them were female, 58.3% of them had diploma in nursing, 50.0% of them had less than 5 years of experience, 66.6% of them don't have training program regarding caring for patient with subarachnoid hemorrhage, 100.0% of them had no protocol of SAH care**.**

Effect of an Educational Program on Nurses` Performance regarding Care for Patients with Subarachnoid Hemorrhage

Figure (1): This figure illustrates that distribution of the studied nurses` about their knowledge regarding to care for patients with subarachnoid hemorrhage in program implementation, there were more than half of the studied nurses had fine level of knowledge regarding care for patients with subarachnoid hemorrhage preprogram in comparison with the majority of them had satisfactory level of knowledge in both post-program , and follow up. This figure also represents that there were highly significant not the same in all items related to the studied nurses` total level of knowledge regarding care for patients with subarachnoid hemorrhage pre and post program (p<0.001**)**

Figure (2): This figure give picture about the distribution of the studied nurses ` total level of practice regarding to most common procedures regarding care for patients with subarachnoid hemorrhage pre and post program, there were more than one quarter of the studied nurses had good level of practice regarding care for patients with SAH preprogram compared with about three quarter of them had good level of practice post program , while more than half of them had good level of practice in follow up. This figure also represents that there were highly significant not the same in all items regarding to the studied nurses` skills regarding to care for patients with subarachnoid hemorrhage pre , post program and follow up (p<0.001**(**

Table (2): Showed that there was statistically significant positive correlation between total nurses` knowledge and total nurses` practice post program and in follow up regarding care for patients with SAH.

Table (1): **Personnel characteristics of the studied nurses:**

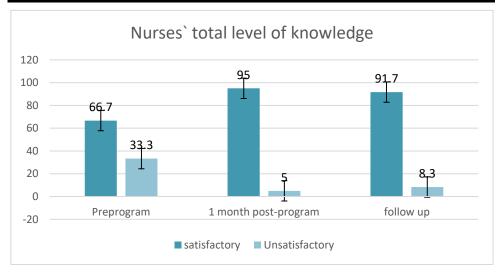| Demographic characteristics	No	%
Age (Year)		
20 – 30	30	**50.0**
31 – 40	20	33.3
> 41 M±SD 1.666 ± 0.751	10	16.7
Gender		
Male	20	33.3
Female	40	**66.7**
Marital Status		
Married	30	50.0
Not married	30	50.0
Qualifications		
Diploma	35	**58.3**
Technical Health Institute	15	25
Bachelor`s Degree	10	16.6
Years of experience		
1- 5 years	30	**50.0**
6-10 years	20	33.3
> 10 years	10	16.6
Training Courses		
Yes	20	33.4
No	40	**66.6**
Presence of protocol of care		
Yes	0	**100**
No	60	0.0

Figure (1): Total nurses' level of knowledge regarding care for patients with SAH
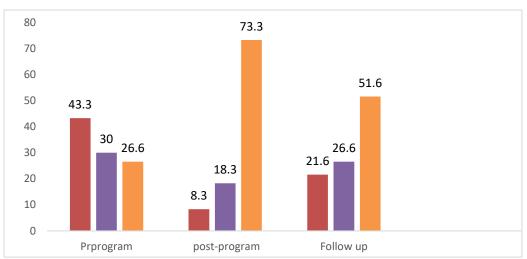
Figure (2): Total nurses' level of practice regarding care for patients with SAH

Table (2): Correlation knowledge and practice score related to care for patient with SAH

	preprogram		1 month post program		3 months post program	
	R	**p-value**	**R**	**p-value**	**R**	**p-value**
Total practice score preprogram	**0.028**	**0.832**				
Total practice score 1 month post program			**0.727**	****0.000**		
Total practice score 3 months post program					**0.763**	**0.000**

Discussion

The discussion of the study findings covered four main parts; to fill the objective of the study, findings are presented in four main parts. The first part discusses demographic characteristics of the studied nurses. The second part discuss nurses` knowledge regarding care for patients with subarachnoid hemorrhage pre, post program, and follow up, the third part discuss nurses` practice regarding care for patients with subarachnoid hemorrhage pre , post program , and follow up. finally the forth part discuss the relations and correlation between the studied nurses` total knowledge score, nurses` total practice score and demographic characteristics pre, post program, and follow up.

Regarding to demographic characteristics, most nurses were females, Finally the majority of them were having diploma or technical nursing institute degree. It may be cause of the most of Egyptian nurses were graduated of institute nursing or technical nursing institute. These personnel findings were consistent with **Symonds, (2019)** who study "Spontaneous Subarachnoid Hemorrhage",

Concerning nurses' knowledge about care for patients with subarachnoid hemorrhage, at the end yield by the study; the current study give picture about that more than half of the nurses had not very bad level of knowledge preprogram compared to most of them had satisfactory level of knowledge in both post-program and follow up regarding care for patients with subarachnoid hemorrhage.

From the researcher point of view, the inadequacy of nurses' knowledge might be as a result of shortage of staff nurse, a few training courses about care for patients with subarachnoid hemorrhage that already conducted but not include all the nurses, the wide base of diploma nurse in Egypt characterized by insufficient knowledge about care for patients with subarachnoid hemorrhage.

The current study is in the same line with **Bederson et al., (2019)** "Guidelines for the management of aneurismal subarachnoid hemorrhage: Statement of health care professionals from a special writing group of the stroke council " , who mentioned that nurses included in their studies in neurology unit, should improve their knowledge in relation to care of neurology patient. Also **Dubosh, et al., (2018)** "Sensitivity of Early Brain Computed Tomography to Exclude Aneurysmal Subarachnoid Hemorrhage: A Systematic Review and Meta-Analysis". Mentioned that nurses must have good knowledge of principles and practice of nursing. So it is very important for each nurse working in neurology unit to up to date their knowledge to assess and intervene appropriately, and also be capable of communication about any change in the patient condition and seek multidisciplinary interventions.

From the analysis of present update in the total score of nurses` information about care for patient with subarachnoid hemorrhage, the researcher attained highly statistical significant not the same in total score of knowledge among pre- program, post-program, and follow up. This getting well means that research had a positive impact on nurses` knowledge about care for patients with subarachnoid hemorrhage in the intensive neurology department. From the statistical study, it was clear that the significant was between preprogram, post program and follow up information score. This result is in the same line, with **Schneider et al., (2019)** "Hypothalam-opituitary dysfunction following traumatic brain defect and aneurysmal subarachnoid bleeding: a systematic review" who prove from the statistical analysis it was clear that the significant was in between the preprogram and post-program knowledge score.

This result disagree with **Allen et al., (2019)** "Cerebral arterial spasm: A controlled trial of Nimodepine in patients with subarachnoid hemorrhage". who stated that; concerning the relationships between nurses` information and practice and their years of experience in nurses, the findings statistical significant between diploma & bachelor`s degree arid older nurses with more years of experience and gaining of years of experience showed increased of knowledge and practice. Also found that; high education nurses, bachelor`s degree, had more knowledge and skills than diploma nurses in pre & post procedure program.

In the current study there were high statistically significant differences in knowledge scores related to basic care for patients with subarachnoid hemorrhage throughout the program intervention. The result indicated improvement in the total score ($p<0.001$). On the other hand, findings of the current study reported a gradual decrement in nurses` knowledge by time over

one- and three-months post program implementation. In this respect **McCarron et al., (2018)** "A systematic review of Terson's syndrome: frequency and prognosis after subarachnoid hemorrhage".

Finally, before the program, the majority of nurses had unsatisfactory level of both knowledge and practice related to care for patients with subarachnoid hemorrhage, while the majority of them had satisfactory level of knowledge and practice post program. That could be explained by the fact that all of studied nurses did not attend any training courses regarding care for patients with subarachnoid hemorrhage. Also reflect positive effect of program on nurses` knowledge, practice, and importance of their application. On the other hand, nurses` level of knowledge and practice descend in the follow up which revealed that nurses need in-service educational program to be conducted from time to another to refresh their knowledge and skills regarding care for patients with subarachnoid hemorrhage, and Those results justified the research hypothesis.

Conclusion:

The majority of nurses had unsatisfactory level of both knowledge and practice regarding care for patients with subarachnoid hemorrhage, while the most of nurses had satisfactory level of information and skills post program. There is positive correlation between nurses` information and skills regarding care for patients with subarachnoid hemorrhage post program. Implementation of educational program has a positive effect on improvement of the nurses` knowledge and practice regarding care for patients with subarachnoid hemorrhage post program than preprogram.

Recommendations:

▪ This study recommended that emphasize the importance of continuous in-service educational program regarding care for patients with subarachnoid hemorrhage.

▪ Further study with replication of the current study on larger probability sample is recommended to achieve generalization of the results and wider utilization of the designed educational program.

▪ Nursing administration should develop effective departmental policies and procedures for staff nurses regarding care for patients with subarachnoid hemorrhage.

▪ Provision of in-services training on a regular basis in order to update and refresh practice nurses` regarding care for patients with subarachnoid hemorrhage.

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تأثير برنامج تعليمي علي أداء الممرضين / الممرضات العاملين علي رعاية المرضي المصابين بالنزف تحت العنكبوتية

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النزف تحت العنكبوتية هو نزف في الحيز تحت العنكبوتية المنطقة الواقعة بين الغشاء العنكبوتي والأم الحنون في الطبقة المحيطة بالدماغ. لذا هدفت الرسالة الي تقييم تاثير برنامج تعليمي علي اداء الممرضين/ الممرضات العاملين علي رعاية المرضي المصابين بالنزف تحت العنكبوتية، أجريت الدراسة علي عينة شملت جميع الممرضين/ الممرضات العاملين في وحدة المخ والاعصاب بمستشفيات جامعة بنها ، وقد اسفرت النتائج ان 66% من الممرضين/ الممرضات علي مستوي جيد من المعلومات قبل البرنامج التعليمي بينما ارتفعت هذه النسبة الي 95% الممرضين/ الممرضات يتمتعون بمستوي معرفي جيد تجاه رعاية المرضي المصابين بالنزف تحت العنكبوتية بعد استخدام البرنامج التعليمي ، 26.6 % من الممرضين/ الممرضات علي مستوي جيد من المهارات الاكلينيكية (السريرية) قبل البرنامج التعليمي بينما ارتفعت هذه النسبة الي 51.6% من الممرضين/ الممرضات يتمتعون بمستوي جيد من المهارات الاكلينيكية (السريرية) تجاه رعاية المرضي المصابين بالنزف تحت العنكبوتية بعد استخدام البرنامج التعليمي . لخصت الرسالة ان استخدام البرنامج التعليمي قد ادي الي تحسن المعلومات و المهارات الاكلينيكية (السريرية) لدي الممرضين/ الممرضات تجاه رعاية المرضي المصابين بالنزف تحت العنكبوتية . وقد اوصت الرسالة بضرورة تطوير البرامج التعليمية المستمرة لتحسين المعلومات و المهارات الاكلينيكية (السريرية) لدي الممرضين/ الممرضات تجاه رعاية المرضي المصابين بالنزف تحت العنكبوتية.