

IMPACT OF A DESIGNED ACUTE STROKE NURSING MANAGEMENT PROTOCOL ON NURSE'S KNOWLEDGE AND PRACTICES

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ABSTRACT

Background: Stroke is a major public health problem worldwide and in Egypt. It is a life-threatening disease that requires early recognition, management and collaboration of all members of the health care team. Critical care nurses play an important role in all phases of care for stroke patients. **Aim:** the aim of this research was to study the impact of a designed acute stroke nursing management protocol on critical care nurses' knowledge and practices. **Hypotheses:** H.1. The mean post-test total knowledge scores of critical care nurses who are exposed to the designed nursing management protocol of care will be higher than their mean pre-test scores. H.2. The mean post-test total practices scores of critical care nurses who are exposed to the designed nursing management protocol of care will be higher than their mean pre-test scores. **Sample:** A convenience sample consisting of (30) nurses were included in this study. **Design:** A quasi-experimental, single group interrupted time series design was utilized. **Tools:** two tools were constructed and utilized for data collection; tool (1): Nurses Knowledge Assessment Questionnaire (2): Pre /post observational checklists for critical care nurses' management of patients with acute stroke. Critical care nurses were assessed three times: before implementing the protocol of care, immediately after implementing the protocol of care, and two months after implementing the protocol of care. **Results:** the current study revealed that most of the studied sample (80%) were female in the middle age groups ($X= 30.16$, $SD =7.71$), and the total mean knowledge scores in the second and third assessment times ($X= 70.47$, $SD =6.27$, $X= 66.67$, $SD= 8.1$) respectively, improved as compared to the first assessment time ($X= 24.23$, $SD= 11.24$) with a significant statistical difference between the three assessment times ($F= 246.344$, $P \leq 0.05$).The total mean practices scores in the second assessment and third assessment times ($X= 45.90$, $SD= 5.02$, $X= 39.87$, $SD= 4.54$) respectively, was higher than the total mean practices scores in the first assessment ($X= 22.10$, $SD= 7.42$) with a significant statistical differences between the three assessments ($F= 131.913$, $P \leq 0.05$).A significant statistical differences between the three assessments was found regarding utilization of NIHSS and GCS ($F= 420.310$, 123.189 , $P \leq 0.05$). **Conclusion:** the current study revealed the effectiveness of implementing the protocol of care where nurses' knowledge and practices, improved significantly as compared before implementing the protocol of care. So, the study recommends continuous training and education for nurses to improve their knowledge and practices with availability of Arabic references. Establishing flow chart for receiving, managing and caring of acute stroke patients

KEYWORDS: Acute Stroke, Management Protocol, Nurses Knowledge, Practices

INTRODUCTION

Stroke is one of the most critical neurological problems that lead to death or permanent neurological dysfunction and long term disability. Stroke is a sudden alteration of the brain function due to disruption of brain blood supply as a result of occlusion (87%) or hemorrhage (13%) that leads to brain cell damage as well as loss of function of the affected part (Hage, 2013). The term "brain attack" was used by the National Stroke Association (NSA) to describe stroke and referred to the importance of emergency / immediate treatment like "heart attack" to prevent permanent disability and death (Ignatavicius & Workman 2013). According to the NSA (2016) stroke is a burden disease that may occur suddenly to any person at any age and leads to long term disability. Only some patients can recover completely, but more than two thirds of stroke patients survive with a form of physical disability. Therefore, early recognition and treatment of stroke patients, meanwhile the early hours of occurrence can help in patients' progress and complication prevention. As indicated by Pugh, Mathiesen, Meighan, Summers, & Zrelak 2009 early recognition of initial stroke signs and symptoms by the health care team and awareness to the importance of time in its treatment is considered as a challenge that hinders stroke management.

Moreover, stroke management requires cooperation of all members of the multidisciplinary team. Critical care nurses are one of the important members of the multidisciplinary team. They are responsible for the coordination of care throughout the continuum of care and stroke phases (hyper acute and acute phase). As well, the nurses facilitate the work of the health care team through the provision of the needed information based on assessment and observation. Coordinated care of the acute stroke patient results in improved outcomes, decreased lengths of stay, and decreased costs (Summers et al., 2009). Nurses are vital in achieving successful outcomes for stroke patients through optimal rapid handling. The nurse must be aware of the benchmark treatment times for acute stroke, able to differentiate between the management of ischemic and hemorrhagic stroke, collaborate with other team members, and provide the appropriate care. The quick and, timely interventions are life-saving and minimize the complications and permanent disabilities (Hage, 2013).

Because nurses are vital members in providing patients' care, especially in acute settings, they must be knowledgeable, skillful, updated, and aware with the new modalities of stroke management and evidence based practices. However, evidence suggests that nurses are inadequately prepared to accomplish their roles regarding management of acute stroke patients (Emanuel & Cross, 2012). Therefore, it is important to increase nurses' awareness, knowledge and skills about caring for acute stroke patients through designing and implementing standardized protocol of care for such group of patients. Therefore, the aim of this research is to study the impact of a designed acute stroke nursing management protocol on nurses' knowledge and practices.

SIGNIFICANCE OF THE STUDY

According to the World Heart Federation (2016), 15 million people suffer strokes worldwide each year. In the developed countries, the overall rate of stroke remains high due to the aging of the population. Khedr, et al., (2013) documented in their published study done at Assiut Governorate, Egypt, that the stroke crude prevalence rate of 963/100,000 inhabitants with an age-adjusted local prevalence rate of 699.2/100,000 and an age-adjusted prevalence relative to the standard world population of 980.9/100,000. The prevalence among males was higher than females with a ratio 1.7: 1. There was a significantly higher prevalence of ischemic (895/100,000) than hemorrhagic (68/100,000) stroke. It is important for nurses to understand the burden of stroke as a public health issue in Egypt. Understanding stroke will guide nurses in developing skills and provision of care for emergency acute stroke patients.

As reported by Hamdy et-al., (2013) in a study done in Egypt about health care workers Knowledge of stroke revealed that health care workers, including nurses at two university hospitals had poor knowledge regarding stroke and the researchers recommended developing a specific educational programs to improve stroke knowledge among health care workers. Furthermore, Harper, (2007) documented in a published study pertaining to nurses' knowledge of ischemic stroke care that there is a significant knowledge deficiency of evidence-based ischemic stroke care in emergency department nurses, with average mean of 53% of questions on evidence-based ischemic stroke care. Hence, the importance of this study is that improving the knowledge and practices of the nursing staff will be maximizing successful outcomes for a patient presenting with a stroke as appropriate collective timely interventions may preserve patient's life and minimize the permanent deficits possible after a stroke

Aim of the Study

The aim of this research is to study the impact of a designed acute stroke nursing management protocol on nurse's knowledge and practices

MATERIALS AND METHODS

Research Hypothesis

To fulfill the aim of this study the following research hypotheses were formulated

H.1. The mean post-test total knowledge scores of critical care nurses who are exposed to the designed nursing management protocol of care will be higher than their mean pre-test scores.

H.2. The mean post-test total practices scores of critical care nurses who are exposed to the designed nursing management protocol of care will be higher than their mean pre-test scores

Research Design

A quasi-experimental research design (single group interrupted time series design) was utilized in this study.

Sample

A convenience sample consisting of (30) nurses who were willing to participate in the study were included. They represent the total number of nurses working in the involved settings and involved in the provision of care for acute stroke patients

Setting

The current study was carried out at two stroke units affiliated with Cairo University Hospitals.

TOOLS FOR DATA COLLECTION

To achieve the purpose of this study, the following two tools were constructed and utilized for data collection.

Nurses Knowledge Assessment Questionnaire Regarding Management of Patients with Acute Stroke. It Consists of Two Parts

Part one: concerning the nurse's demographic characteristics: it consists of 12 items covering data such as age, gender, level of education, workplace, job, years of experience in stroke, attended training programs, nurse / patient ratio,

and total hours of working per week.

Part two: Nurses' knowledge assessment regarding management of patients with acute stroke.

This questionnaire was developed by the researcher after extensive review of related studies, research articles, web site searches, and relevant literatures. It was developed to assess nurses' knowledge regarding to nursing management of patients with acute stroke (definition, causes, critical symptoms/signs, neurological assessment, complications, priority of care... etc). It consists of 50 questions with 82 points covering the following areas

Table: 1

	Knowledge Domains	No. of Questions	No. of items
1-	Anatomy and physiology of the brain	From 1 to 6	11
2-	What is a stroke (definition, types, risk factors)?	From 7 to 11	14
3-	Emergency/immediate stroke assessment	From 12 to 19	8
4-	Acute stroke treatments	From 20 to 30	22
5-	Nursing management of acute stroke patients	From 31 to 50	27

Scoring system: one score was allocated for each right answer and zero score for each wrong answer, scores of less than 80 % (65.6 degree) were considered unsatisfactory knowledge level.

Pre/Post Observational Checklists for Nurses Practices Regarding Management of Patients with Acute Stroke (Appendix B.). It Include Two Parts:-

Neurological assessment checklist: which is divided into two parts:-

The Arabic version of the National Institutes of Health Stroke Scale (NIHSS). It was adopted from Hussein, et al (2015). One score was allocated for each correctly done action and zero for not done or incorrectly done action; scores of less than 80 % (10.4) were considered unsatisfactory practice level.

Glasgow-coma scale (GCS). It was adopted from Teasdale and Jennett (1974) and translated into Arabic language by the researcher and revised by a panel of three experts. One score was allocated for each correctly done action and zero for not done or incorrectly done action; scores of less than 80 % (2.4) were considered unsatisfactory practice level.

Ongoing care observational checklist for patients with acute stroke.

It was developed by the researcher to assess nurses' practices in relation to care of acute stroke patients. It consists of 10 main items with 61 sub items covering the following areas:

Table: 2

		No. of items
1	initial assessment	5
2	Gas exchange and Respiratory care	3
3	Cardiovascular system care	2
4	Mobility care	6
5	Skin care	3
6	Nutrition	10
7	Elimination	8
8	Sensory perceptual	5
9	Communication	7
10	Medications	12

Scoring system: One score was allocated for each correctly done action and zero for not done action; scores of less than 80 % (48.8 degree) were considered unsatisfactory practice level.

Pilot Study

A pilot study was conducted on 10% of the sample to assess for feasibility, clarity and objectivity of the study tools.

Ethical Consideration

Written informed consents were obtained from involved nurses after explaining the purpose, nature and benefits of this research. Participation in this study was voluntary; each subject has the right to withdraw from the study at any time without any rational. Confidentiality and anonymity of the subjects were assured through coding the data. Participants were informed that data will not be reused in another research without their acceptance, and the obtained data will not be used in their evaluation.

Procedure

- The study conducted in three phases: designation, implementation and evaluation phases.
- The designation phase: this phase involved four main steps: (a-nursing management protocol designation, b-data collection tool construction, c-attending a training course on how to use the NIHSS, d- preparation of teaching materials)
- The implementation phase: this phase started with obtaining written acceptance from the head of stroke units, and written consents from all participants after explaining the purpose and nature of the study. Then, obtaining data base by assessing participants knowledge through pre-test using stroke knowledge questionnaire sheet (first assessment). At the beginning, the researcher gave the participants hard copies of the book (nursing management protocol of care for acute stroke patients) and some of them requested it in a compact disk (CD). The researcher divided the nursing management protocol of care into two main parts: the first one covered the theoretical aspects of acute stroke and its included six sessions, while the second part covered the practical aspects of caring for acute stroke patients and it included nine sessions. The total number of sessions was fifteen. Each session lasted for approximately 30 minutes and sometimes continued for one hour due to the presence of many interruptions.
- The researcher interviewed the participants three times per week in different shifts on their place of work, as the sessions given while they do their work and in front of patients (no structured place for giving the sessions). In relation to the practical part, the researcher explained the theoretical background about each scale, procedure, and technique using the explained teaching materials and demonstrated it on the patients throughout the shift.
- Evaluation phase: the researcher used two types of evaluation, the first used evaluation methods was formative evaluation, this type of evaluation helps to gain ongoing feedback about the participant's progress over the nursing management protocol of care. The second evaluation methods used was summative evaluation, it's done at the end, immediately after finishing the protocol of care (second assessment), then after two months from the second assessment (third assessment).

RESULT

Part (1) Demographic Characteristics of the Studied Sample: (Table 1&Figure 1).

Table 1: Percentage Distribution of the Studied Sample as Regards to Demographic Characteristics (N= 30)

Percentage $X \pm SD$ Variables	N	%
Gender		
Male	6	20%
Female	24	80%
Age		
20 – 25 years	12	40%
26 – 30 years	4	13.3%
31 – 35 years	4	13.3%
36 – 40 years	8	26.7%
40 – 45 years	2	6.7%
$X \pm SD$ 30.16\pm7.71		
Education		
Diploma	14	46.7%
Technical	14	46.7%
Bachelor	2	6.6%
Total Years of Experience		
1 – 5 years	11	36.7%
6 – 10 years	5	16.6%
11 – 15 years	3	10%
16 – 20 years	11	36.7%
$X \pm SD$ 10.80\pm7.88		
Experience in stroke care		
< 3 years	21	70%
3 – 5 years	7	23.3%
>5 years	2	6.7%
$X \pm SD$ 2.66\pm3.88		
Attended Training courses as General		
Yes	0	0%
No	30	100%

Table (1) shows that, female nurses represented the great majority (80%) of the studied sample. The age of more than one third (40%) of the studied sample ranged between 20 – 25 years. An equal percentage (46.7%) were diploma and technical nursing institute graduates, however a minority (6.6%) had a bachelor degree. Most of the studied sample (70%) had < 3 years of experience in stroke care. All (100%) of the studied sample did not attend any training program.

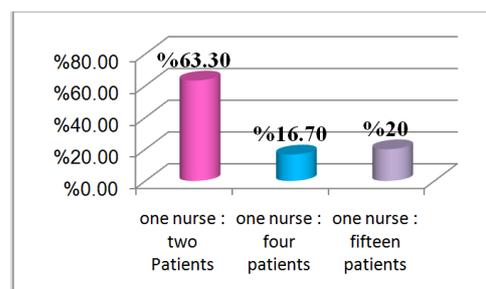


Figure 1: Percentage Distribution of Nurse-Patient Ratio in the Selected Units (N=30).

Figure (1) shows that, the nurse -patient ratio in the selected stroke units was one of two among approximately two thirds (63.3%) of the studied sample.

Part (2) Is Concerned With Testing the Research Hypotheses

Table 2: Comparison between Total and Subtotal Nurse's Knowledge Mean Scores during the Three Assessments Times (N=30)

Test $\bar{x} \pm SD$ Knowledge Domains	Before Protocol Implementation	After Protocol Implementation		F	P
	Pre test	Post I	Post II		
	1 st Assessment	2 nd Assessment	3 rd Assessment		
Anatomy and physiology	2.40±1.96	9.20±2.16	8.40±3.26	62.679	0.000*
Theoretical background of stroke	5.67±2.60	11.53±1.58	11.47±0.8	99.486	0.000*
Assessment about stroke patients	2.80±1.76	6.80±1.16	6.80±0.97	85.714	0.000*
Stroke management	2.60±4.36	20.40±2.41	17.93±3.04	236.994	0.000*
Nursing care of stroke patients	10.77±6.25	22.53±3.51	22.07±2.8	64.705	0.000*
Total Knowledge scores	24.23±11.24	70.47±6.27	66.67±8.1	246.344	0.000*

*Significant at the P value less than or equal 0.05

Table (2) shows an obvious increase in the total mean knowledge scores in the second assessment time as compared to the first assessment time (70.47±6.27 - 24.23±11.24) respectively. However, there was a slight decline in the third assessment mean knowledge scores to be 66.67±8.1 as compared to the second assessment mean scores.

Also, the same table illustrates an obvious increase in the subtotal mean knowledge scores regarding anatomy and physiology, theoretical background of stroke, assessment of stroke patients, and nursing care of stroke patients in the second assessment as compared to the first assessment (9.20±2.16 - 2.40±1.96, 11.53±1.58 - 5.67±2.60, 6.80±1.16 - 2.80±1.76, 20.40±2.41 - 2.60±4.36, 22.53±3.51 - 10.77±6.25 respectively).

The same table clarifies a significant statistical difference between the total mean knowledge scores in the three assessment times (F/P= 246.344/0.00). As regards to the subtotal knowledge scores, the same table shows a significant statistical difference in the mean sub-total knowledge scores in the first assessment as compared to the second and third assessment in relation to anatomy and physiology, theoretical background of acute stroke, assessment of acute stroke patients, acute stroke management, and nursing care of acute stroke patients (F/P: 62.67/0.00, 99.48/0.00, 85.71/0.00, 236.99/0.00, & 64.70/0.00) respectively.

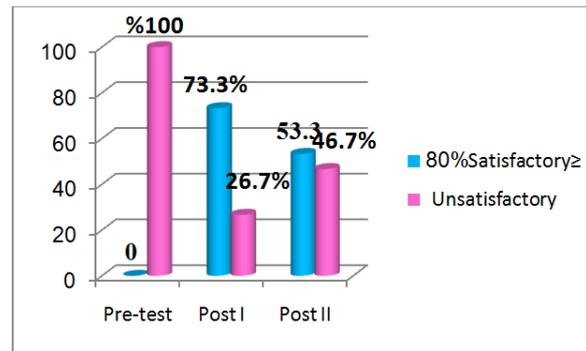


Figure 2: Percentage Distributions of the Studied Sample Knowledge Level About Acute Stroke Nursing Management in the Different Assessment Times (N=30)

Figure (2) delineates that all of the studied sample (100%) had unsatisfactory knowledge level in relation to acute stroke nursing management before implementing the protocol of care. However, around three quarters (73.3%) and more than half of the studied sample had satisfactory knowledge level in the second assessment and third assessment time respectively.

Therefore, all data presented in table (2) and figure (2) support the first research hypothesis

Table 3: Comparison between Total And Sub-Total Nurses 'Mean Practices Scores Regarding Neurological Examination And Ongoing Care For Acute Stroke During The Three Assessment. (N=30)

Test x±SD Practices Domains	Pre 1 st Assessment	Post I 2nd Assessment	Post II 3 rd Assessment	F	P
Neurological Examination					
Conscious level	0.67±0.69	2.93±0.25	2.6±0.7	123.189	0.000
Stroke severity	0.00	9.4±1.16	5.8±2.65	420.310	0.000
Ongoing care					
Initial assessment	1.40±0.88	3.87±1.20	3.87±1.14	49.876	0.000
Respiratory care	2.73±0.68	3.00±0.00	2.20±0.4	23.200	0.000
Cardiovascular care	0.93±0.25	1.00±0.00	1.00±0.00	2.071	0.132
Movement care	0.93±0.44	3.40±1.36	3.13±0.88	56.582	0.000
Skin care	2.27±0.77	3.00±0.00	2.73±0.44	15.152	0.000
Communication	1.33±0.94	6.33±1.07	4.53±1.35	143.312	0.000
Nutritional care	3.70±1.13	7.90±1.83	7.07±1.12	72.97	0.000
Elimination care	4.73±1.73	6.73±1.00	7.00±0.966	27.11	0.000
Sensory perceptual	0.73±0.93	3.60±0.61	1.53±1.257	67.56	0.000
Medication	3.33±2.39	7.06±1.08	6.8±1.12	47.70	0.000
Total	22.10±7.42	45.90±5.02	39.87±4.54	131.913	0.000

Table (3) shows that the subtotal mean practices scores of nurse's in the second assessment was higher than the first assessment regarding conscious level, stroke severity, initial assessment, movement care, communication, nutritional care, elimination care, sensory perceptual, and medication (2.93±0.25 - 0.67±0.69), (9.4±1.16 - 0.00), (3.87±1.20 - 1.40±0.88), (3.40±1.36 - 0.93±0.44), (6.33±1.07 - 1.33±0.94), (7.90±1.83 - 3.70±1.13), (6.73±1.00 - 4.73±1.73), (3.60±0.61 - 0.73±0.93), (7.06±1.08 - 3.33±2.39) respectively. However there was an obvious decline in the mean practices scores regarding stroke severity and sensory perceptual (5.8±2.65 - 1.53±1.257) respectively in the third assessment as compared to the second assessment time. Also, there was an obvious increment in the total mean practices scores in the second assessment (45.90±5.02) as compared to the first assessment (22.10±7.42), and there was a slight declines in the total mean

practices scores in third assessment (39.87 ± 4.54) as compared to the second assessment time. The same table clarifies a significant statistical difference between the total ongoing mean practices scores in three assessments ($F/P= 131.913/0.00$). also, there was a significant statistical difference between the three assessment times in relation to initial assessment, movement care, communication, nutritional care, sensory perceptual, and medications ($F/P= 123.189/0.000$; $420.310/0.000$, $131.913/0.000$; $49.876/0.000$; $23.200/0.000$; $56.582/0.000$; $15.152/0.000$; $143.312/0.000$; $72.97/0.000$; $27.11/0.000$; $67.56/0.000$; and $47.70/0.000$) respectively. Regarding conscious level and stroke severity, there was a significant statistical difference between the three assessments mean scores ($F/P:123.189/0.00$ & $420.31/0.00$) respectively.

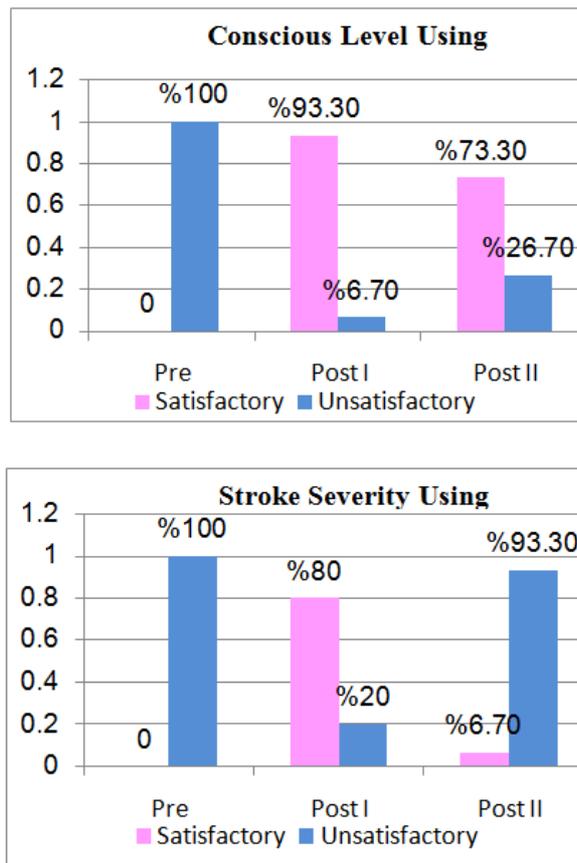


Figure 3: Percentage Distributions of the Studied Sample Practice Levels Regarding Neurological Examination of Acute Stroke Patients in the Three Assessments Times (N=30)

Satisfactory level is $\geq 80\%$

Figure (3) shows that all (100%) of the studied sample had unsatisfactory practice level regarding neurological examination before implementing the protocol of care. However, most of the studied sample had satisfactory practice in relation to GCS and NIHSS in percentages of 93.3%, & 80% respectively in the second assessment (posttest 1). An obvious decline in the NIHSS was found to be 6.7% and a slight decline in relation to GCS to be 73.3% in the third assessment time.

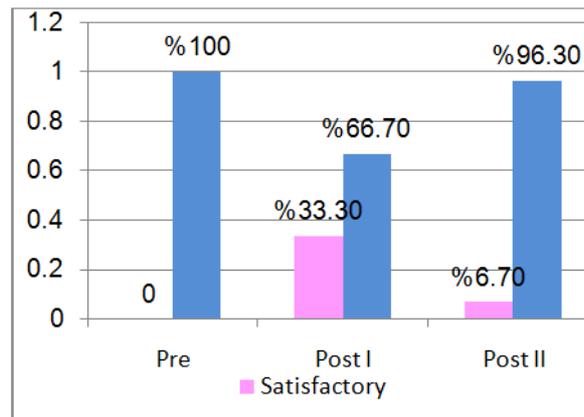


Figure 4: Percentage Distributions of the Studied Sample Total Practice Levels regarding Acute Stroke Nursing Management in the Three Assessment Times (N=30).

Satisfactory level is more than or equal 80%

Figure (4) shows that, all (100%) of the studied sample had unsatisfactory total practice level before implementing the protocol of care, while after implementing the protocol of care about one third (33.3%) had satisfactory total practice level in the second assessment (post-test 1). This slight increment in satisfactory practice level returned back again to become 6.7% in the third assessment time.

Table 5: Correlation between Demographic Characteristics, Knowledge and Practices scores of the Studied Sample.

Test Variables			Age	Years of experience	Practices
Nurses knowledge	Pretest	r	.028	-0.006	0.47*
		P	.883	0.976	.009
	Post I	r	-0.57*	-0.55*	-.026
		P	0.001	0.001	.891
	Post II	r	0.256	0.252	.282
		P	0.173	0.179	.131
Nurses practice	Pretest	r	0.022	-.015	
		P	0.907	0.936	
	Post I	r	0.229	0.297	
		P	0.224	0.111	
	Post II	r	0.49*	0.339	
		P	0.006	0.067	

*Significant at the P value ≤ 0.001 probability level

Table (5) shows a negative statistical significant correlation between the studied sample knowledge and age, knowledge and years of experience ($r/p = -0.57^*/0.001, -0.55^*/0.001$) respectively in post-test I. However, a significant direct correlation was found between nurse's practices and age in post-test II ($r/p = 0.49^*/0.006$).

DISCUSSIONS

Section I: Demographic Characteristics of the Studied Sample

The present study delineated that most of the studied sample were young adult females. Young adult is described by Eric Erikson (1950) in Mcleod (2013) as the age group ranging from 18 – 40 years. Having most of the studied sample

females “from the researcher’s point of view” could be attributed to the traditional nursing education system in Egypt where the majority of nursing schools graduates is females. This is of special concern where most of the studied sample is diploma and technical nursing institute graduates. In relation to years of experience, the current study revealed that, although the mean total years of experience among the studied sample was more than ten years, their mean years of experience in stroke care was less than three years, which may indicate the need for upgrading their knowledge and practice in order to provide the needed care for stroke patients.

The current study findings are supported by Santos, Vancini-Campanharo, Lopes, Pinto Okuno, & Batista (2016) who carried out a study about assessment of nurses’ knowledge regarding Glasgow coma scale at a university hospital and showed approximately the same picture of the current study findings where they found that most of participants were young adult females with a mean age of thirty one years, and their years of working experience were less than three years. As well, Abou El Enein, Abd El Ghany, & Zaghoul (2012) studied the effect of a training program about patients falls on nurses’ Knowledge and performance and revealed that more than half of participants were young adults, have less than four years of experience, and three quarters were diploma and technical nursing institute graduates.

Contradicting with the current study findings are Jaddoua, Mohammed, & Abbas (2013) who assessed nurse's knowledge about Glasgow coma scale in neuro surgical wards and they found that more than half of participants’ ages were more than thirty years, they were males, technical institute graduates and had more than five years of experience. As well, Rhoda & Pickel-Voight (2015) contradicting a study about nurses Knowledge regarding dysphagia among post stroke patients in Namibia and revealed that more than one quarter of participants’ ages were less than thirty, and around two thirds had more than ten years of experience. Also, Eldesouky, (2016) studied the impact of an educational program for nurse and revealed that half of participants had more than ten years of experience. Moreover, Abd El-Aziz, (2014) studied the effect of educational program about oral care for traumatized patients on critical care nurses, knowledge and skills and revealed that all of the studied sample were female in the middle age group, more than one third had bachelor nursing degree, and most of them had less than 5 years of experience.

From the researcher point of view thus, having the studied sample in the current study of young age may indicate their recency in work with stroke patients and the importance of enhancing their knowledge and practice. This point of view is supported by Clark, Freedberg, Hazeltine, & Voss, (2015): who found in a study about effect of age on the ability to learn and revealed that the cognitive and motor learning abilities of young age group were better than the older adult age group.

Section II: This Section is Concerned with Interpretation of Data Related to the Research Hypotheses.

As regards to the first research hypothesis, it states: the mean post-test total knowledge scores of critical care nurses who are exposed to the designed nursing management protocol of care will be higher than their mean pre-test scores.

The current study revealed that all of the studied sample had unsatisfactory knowledge level about acute stroke in the first assessment time (pretest). However, the subtotal and total mean knowledge scores became higher after their exposure to the protocol of care (post-test I) as compared to those before implementing the protocol of care (pre-test), with a significant statistical differences regarding anatomy and physiology of the brain, theoretical background about stroke, assessment of stroke patients, stroke treatment, and nursing care of stroke patients.

As well, it is noticed that there was a slight decline in the sub total and total mean knowledge score in the third assessments (post- test two) as compared to the second assessment. More than two thirds of the studied sample had satisfactory total knowledge level after introducing the protocol of care in the second assessment (post-test I), but this percentage slightly declined in the third assessment (post-test two) leading to having an equal percentages of those with satisfactory and unsatisfactory knowledge levels. This decline may be related to the time factor as evidence by Ebbinghaus (1885) in Amidor (2016) who stated that about two third of knowledge lost in the first day. While we can be overcome this problem by immediate repetition, fragmenting the information into small and simple topics, providing continues training and asking question, and this what the researcher did in the current study.

Having of unsatisfactory knowledge level among the studied sample from the researcher's point of view may be related to lack of training courses and knowledge updates, lack of Arabic references about management of stroke, lack of incentives and motivation. Also lack of nursing rounds, absence of teamwork, and fear to attend and share in the medical round as a member of the health care team or ask any questions. While when they are motivated, reinforced, explaining in a simple way, and provided with Arabic references, they are positively responded to education and learning. This point of view comes in line with Rosseter (2014) who carried out a study about the impact of education on nursing practice, and revealed that education has a significant impact on knowledge and competencies of nurses.

Findings of the present study are in congruence with that of McDaniel (2016) who revealed an increment in nurses' knowledge scores about stroke after educational program about stroke care. As well, Traynelis, (2012) carried out a study about Emergency Department Nurses' Knowledge of Evidence Based Ischemic Stroke Care, and was in the same line with the current study finding and revealed that participants had unsatisfactory knowledge scores regarding evidence-based ischemic stroke care and an overall knowledge deficit about ischemic stroke care guidelines. Also, Harper (2007) carried out a pilot study about Emergency Nurses' Knowledge of Evidence-Based Ischemic Stroke Care, and revealed that, all participants had unsatisfactory knowledge level regarding ischemic stroke care.

Consequently the current study finding is in consistent with a study done by Abd El-Aziz, (2014) who found that the majority of nurses had unsatisfactory knowledge before introducing the educational program. Also, Rhoda & Pickel-Voight, (2015) found in a study entiteled as "Knowledge of nurses regarding dysphagia in post stroke patients" that nurses had a moderate knowledge level about signs, symptoms, and complications of dysphagia; however, they had poor knowledge about dysphagia management. Also, Jaddoua. Mohammed & Abbas (2013) found that all nurses had inadequate knowledge about Glasgow coma scale uses and components.

In agreement with the current study finding is Mohammed (2014) who carried out un published study about assessment of emergency nurses knowledge regarding evidence based practice of managing ischemic stroke patients and revealed that most of the studied nurses had unsatisfactory knowledge level regarding management of acute stroke patients. As well, in addition, in agreement with the current study findings are Ahamed&Dutta (2016) who carried out a study about effectiveness of planned teaching program about Glasgow coma scale on nurses' knowledge and practice and revealed that more than half of participants had unsatisfactory knowledge, and the mean knowledge scores improved after exposure to an educational program as compared to pre- program scores.

In an attempt to identify the relationship between demographic characteristics of the studied sample and their knowledge, findings of the present study a negative statistical significant correlation found between the studied sample

knowledge, age and experience in the second assessment, indicating that the younger the age the higher the knowledge and the less the experience the better the knowledge.

This findings are in agreement with Santos, Vancini-Campanharo, Lopes, Pinto Okuno,&Batista (2016) who found in their study about assessment of nurse's knowledge about Glasgow coma scale at a university hospital that the lower nurses knowledge score was among those who have an experience of more than five years. However, Edmunds & Scudder (2009) are contradict with the findings of the present study where they assessed nurses knowledge about Glasgow coma scale and revealed that the experienced nurses had higher knowledge scores as compared with novice nurses. From the investigator point of view this indicates that nurse's knowledge improved over time by practicing of critical care nursing.

As regards to the second research hypothesis, it states: The mean post-test total practice scores of critical care nurses who are exposed to the designed nursing management protocol of care will be higher than their mean pre-test scores

The current study showed higher total mean practice score among the studied sample about neurological assessment of stroke patients using GCS and NIHSS after attending of the protocol of care as compared to those before implementing it. The total mean score in the second assessments were higher than the third assessments especially in relation to the NIHSS. Most of the studied sample had satisfactory practices in relation to GCS and NIHSS in the second assessments but there was a noticed decline in NIHSS in the third assessments scores where most of the studied sample had unsatisfactory practices level. And there was a twenty percent decline in relation to GCS practice level of the studied in the third assessment than the second one.

Moreover, a minority of the studied sample had satisfactory total practices practice level about ongoing acute stroke management and most of the studied sample had unsatisfactory practice level regarding initial assessment, skin care, respiratory care, patient transfer, exercises, leg position and massage, sensory perceptual, and communication, listening to the patient, asking yes and no questions in the third assessment.

From the researcher point of view this decline especially in NIHSS may be related to unavailability of the scale format in nursing documentation, no follow up from the supervisors about its application, lack of supervision, lack of continuous and on job training, lack of Arabic educational videos, and also some participants consider it so difficult, time consuming and also they see utilization of NIHSS is not of their responsibilities. This point of view is supported by Bajaj, Kaushal, &Kaur(2014) who carried out study about nurses' knowledge and practice of using GCS and found that more than two thirds of nurses had no formal training in using GCS and unsatisfactory practice related to GCS.

In agreement with the current study findings Han, Kim, Lee, & An (2013) where they were reported in their study done on 100 nurses and entitled as " Evaluation of NIHSS Application Program to Stroke Nurses" that nursing records of neurological assessment of NIHSS increased after nursing application program about the scale and help in detecting the patient neurologic changes by the nurse.

Consistent with the current study findings Falk (2015) as the author showed in a study done on 60 nurses and nurse aids, and entitled as " Educational Intervention to Improve Nursing Practice in the Critical Care Setting" that there was a significant increment in nurses practice regarding GCS assessments during one and two months after introducing an educational training but this level decline after three months.

Similarly, the current study findings is in agreement with Rawlins (2015) who added in study entitled as "National Institutes of Health Stroke Scale (NIHSS) and Tissue Plasminogen (tPA) Education for All Critical Care Nurses" on 110 nurses that all staff nurse's skills about NIHSS and rtPA improved after they were introduced to an educational training program. Nurses compliance toward NIHSS improved approximately ninety percent. Moreover, come in the same line with the current study findings Ahamed&Dutta (2016) as they stated in their study entitled as "Effectiveness of Planned Teaching Program on nurses knowledge and practice regarding glasgow coma scale for neurological Clients of a Selected Hospital, Kolkata" done on 60 nurses the mean practice score of nurses related to GCS after exposure to the educational program higher than before. There was no significant relationship between pretest knowledge and practice of nurses regarding monitoring Glasgow Coma Scale.

In agreement with the current study findings is Zagade&Madhale (2012) who evaluate the efficacy of learning package among staff nurses regarding neurological assessment on patients with altered sensorium and found that the post observation practices score of nurses about neurological assessment was increased as compared with before implementing the learning program, and there was a significant increase in post observation practice score

Also the current study revealed a significant statistical difference between the mean total pre-test ongoing practice scores and the mean total post-test ongoing practice scores in the first and second assessment. As regard to the subtotal ongoing practice scores, there is a significant statistical difference (increment) in the mean sub-total pre-test ongoing practice scores as compared to the first and second assessment in relation to initial assessment, movement care, communication, nutritional care, sensory perceptual, and medications. No significant statistical correlation between practice of the studied sample and years of experience, but there is a significant correlation between practice and age.

Consequently, In Agreement with the current study finding is Rahmati, Azmoon, Meibodi, & Zare (2013) who reported in their study about effects of triage education on nurses knowledge and practice that there was an immediate increment in performance scores after they were introduced to an educational training. But this study also contradict with the current study findings regarding the correlation between practice and years of experience as it showed significant positive correlation between years of experience and nursing performance scores.

CONCLUSIONS

Based on the finding of the current study; it can be concluded that the subtotal and total mean knowledge and practice scores of the studied sample improved after implementing the protocol of care and all of the studied sample had unsatisfactory knowledge and practice level before implementing the protocol of care while, around three quarters of the studied sample had satisfactory knowledge level after implementing the protocol of care in the second assessment and most of them had satisfactory practice level in the second assessment in relation to GCS and NIHSS, while a minority had satisfactory practices level about ongoing acute stroke management

RECOMMENDATIONS

- Organizing of periodic educational training sessions about new modalities of acute stroke management and role of the nurse.
- Establishing ongoing and hand by hand training to improve nurse's practices regarding neurological examination and ongoing stroke care.

- Establishing library containing Arabic references for nurses inside the unit
- Establishing, of policy, procedure, guideline, and flow chart for receiving, management and caring of acute stroke patients.
- Availability and activation of nursing documentation sheet regarding initial assessment, Glasgow coma scale, and NIHSS.
- Replication of the study on a larger probability sample from different geographical location in Egypt.

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