Effect of Competency Based Program on Nurses' Knowledge, Skills and Attitude toward the Care of Patients with Stroke

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Abstract

Background: Cerebrovascular stroke is a worldwide main concern and a leading cause of disability. It is one of the major health problems associated with complex neurological needs which increased the need for competent nursing care. Nurses working in stroke care units require multifaceted competence. Nurses frequently are the health care professionals who see the full impact of CVS and should have the skills that can faster the course of patient's recovery. Therefore, nurses need to have valuable knowledge, competent skills, and a positive attitude to help patients with stroke to achieve the best possible outcomes. Objective: To evaluate the effect of a competency-based program on nurses' knowledge, skills, and attitude toward the care of patients with stroke. Settings: The study was conducted at the Neurological Department and Stroke Center at El Hadara University Hospital and at the Neurological Department at El Nozha Hospital for Neurological and Psychiatric Diseases. Subjects: All the neurological nurses available at the time of data collection, about (n=50) from the above-mentioned settings who were providing direct care for patients with stroke. Tools: Three tools were used to collect data for this study, Tool I: Nurses' Knowledge of Stroke Questionnaire, Tool II: Nurses' Skills Competency Level Observational Checklist, Tool III: Nurses' Attitudes towards Patients with Stroke Questionnaire. Results: the study revealed highly statistical significant improvements in the studied nurse's knowledge, skill competencies and attitudes throughout the intervention periods of the study from pre, immediate, and two months after the implementation of the competency-based program. A slight decline was found in knowledge, and skills scores in the third assessment as compared to the second assessment time. Conclusion: the current study revealed the effectiveness of the competency-based program where nurses' knowledge, skills and attitudes, improved significantly as compared before implementing the program. Recommendations: Development and application of periodic educational and training courses for stroke unit nurses regarding the comprehensive care of stroke, to equip them with the sufficient knowledge and competencies essential for providing high quality care for patients.

Keywords: Competency, Knowledge, Skills, Attitude, Stroke.

Introduction

Cerebrovascular stroke "CVS", also known as a cerebrovascular accident "CVA" or "brain attack": is an umbrella term of the common, crippling, and deadly serious neurologic disease that causes a sudden loss of brain function followed by critical neurological deficits (Lau, Pendlebury & Rothwell,2018).

Stroke is one of the major health problems associated with complex neurological needs which increased the need for competent nursing care. Many researchers emphasized that management of patients with stroke requires competent nurses who successfully implement stroke management guideline (Reynolds, Murray, McLennon, & Bakas, 2016).

Nurses are the healthcare professionals who see the full impact of stroke and should have the skills that can faster patients' recovery (Allsassmah, 2020). Jarva et al. (2021) emphasized that nurses work in stroke units require multifaceted competence and defined nursing competency as the combination of skills, knowledge, and attitudes for effective or superior performance (Jarva et al., 2021)

Significance of the study:

According to the World Stroke Organization (2019), 15 million people suffer strokes worldwide each year (Lindsay et al., 2019). As documented in recent statistics, approximately 795,000 individuals experience stroke in the United States each year (Mozaffarian et al., 2015). In Egypt, it was estimated that around 150,000 to 210,000 strokes occurred per year (Farrag al., 2018). According to the statistical records of El Hadara University Hospital at Alexandria, there were 764 patients with stroke admitted to the hospital in 2020 (Statistical records of El Hadara University Hospital at Alexandria, 2020).

Due to, increasing numbers of stroke patients and the great impact of the disease, there is a great need for having a larger number of competent nurses. Many researchers emphasized that healthcare professionals especially nurses working in stroke care need up-to-date knowledge and superior clinical competence (Baatiema et al., 2017).

Nurses in stroke care units must have valuable knowledge, competent skills, and positive attitude to provide high-quality care and help patients to achieve the best possible outcomes. Hence, they must receive adequate education which strengthens their knowledge and practical skills (Catangui, 2015).

Accordingly, nurses who care for stroke patients require extensive education and training to deliver patient-focused care. So, it is vital to create a competency-based educational program for nursing staff to keep abreast of updated knowledge and guide them in developing skills and provision of competent care for patients.

Aims of the Study

This study aimed to evaluate the effect of competency-based program on nurses' knowledge, skills, and attitude toward the care of patients with stroke..

Hypothesis of the study

To fulfill the aim of the study, the following research hypotheses were tested:

H1: Nurses who receive competency- based program exhibit improvement in knowledge regarding care of patients with stroke.

H2: Nurses who receive competency- based program exhibit improvement in skills regarding the care of patients with stroke.

H3: Nurses who receive competency-based program exhibit a positive attitude regarding the care of patients with stroke

Materials and Method

Materials
Design: Aquasi-experimental research design was utilized to conduct the study.
Settings: The present study was conducted at the Neurological Department and Stroke Center at El Hadara University Hospital and at the Neurological Department at El Nozha Hospital for Neurological and Psychiatric Diseases, Alexandria, Egypt

Subjects: All the nurses available at the time of data collection, about (n=50) from the

above mentioned settings. There were 35 nurse from El Hadara University Hospital and 15 nurse from El Nozha Hospital for Neurological and Psychiatric Diseases.

Tools: Three tools were used for this study

Tool I: Nurses' Knowledge of Stroke Questionnaire

It was used to assess nurses' knowledge regarding stroke and its management, it consisted of two parts:

Part I: Nurses' Socio-demographic Data

It was developed by the researchers; it consisted of 6 items of questions covering data as age, gender, marital status, level of education, years of experience, attended formal training on stroke care.

Part II: Nurses' Knowledge of Stroke Questionnaire

This questionnaire was adapted from (**Jan, et al., 2016**) to assess nurses' knowledge regarding stroke. It included 30 multiple-choice questions covering the following areas:

1. Theoretical background of stroke (8 questions)
2. Diagnostic investigations of stroke (3 questions)
3. Treatment and precautions (2 questions)
4. Complications and prognosis (3 questions)
5. Prevention of stroke (2 questions)
6. Nursing care of stroke (12 questions)

Scoring System of Knowledge:

The total score ranged from 0-30. Each correct answer was given score (one) and the wrong or I do not know answer was given score (zero). Nurses' knowledge level was based on Benners' stages of competency (**Benner, 2001**), as follow:

Total scores	Category	Level of competency
≥ 90%	Excellent	Expert
80% to 89%	Very good	Proficient
70% to 79%	Good	Competent
60% to 69%	Fair	Advanced beginner
< 60%	Fail	Novice

Tool II: Nurses' Skill Competency Level Observational Checklist.

It was used to assess nurses' skills competency in relation to the care of patients with stroke, it consisted of two main parts:

Part I: Neurological Assessment

This part included The National Institutes of Health Stroke Scale (NIHSS). It was adopted from (*Lyden, et al., 1994*), It was used to assess nurses' skills in relation to performing NIHSS.

Part II: Nursing Care of Stroke Patients

This part was developed by the researcher guided by London Stroke Nurse Competency Framework (Baylon et al., 2016) and the recent relevant literature (Summers et al., 2009; Clare, 2018). It was used to assess nurses' skills in relation to the care of patients with stroke.

This part consisted of 15 domains of stroke nursing competencies:-

1. Monitoring of physiological functions
2. Respiratory care
3. Positioning and mobility
4. Care of paralyzed part
5. Preparing the patient for early ambulation
6. Nutrition and hydration
7. Elimination
8. Hygienic care
9. Exercises
10. Medications
11. Stroke patient safety
12. Managing sensory-perceptual difficulties
13. Communication
14. Patient and family education
15. Improve family coping

Scoring System for Nurses' skills

The total score ranged from 0-150. The item observed to be done correctly was scored "1" and the item not done or incorrectly done was scored " zero ". nurses' skills competency level was based on Benners' stages of competency (**Benner, 2001**), as follow:

Total scores	Category	Level of competency
≥ 90%	Excellent	Expert
80% to 89%	Very good	Proficient
70% to 79%	Good	Competent
60% to 69%	Fair	Advanced beginner
< 60%	Fail	Novice

Tool III: Nurses' Attitudes towards Patients with Stroke Questionnaire

This tool was adopted from **(Gibbon, 1991)** and translated into Arabic to assess nurses' attitudes towards the care of patients with stroke. It composed of 14 statements. Responses were measured through a five-points Likert Scale ranged from (1) strongly disagree to (5) strongly agree.

Scoring System for Nurses' attitudes:

Total scores of attitudes were ranged from 14 to 70 and categorized into three levels scores less than 75% was considered as negative, from 75% to 85% was considered as neutral, and more than 85% was considered as positive.

Method
The study was accomplished as follows:

- An official letter to conduct the study was presented to head of the departments of the selected hospital settings to obtain their permission to carry out the study.

- Three tools were developed to collect data. Tool I part I was developed by the researcher, part II was adapted from (Jan et al., 2016). Tool II part I was adopted from (Lyden, et al, 1994), part II was developed by the researcher guided by the recent relevant literature. Tool III was adopted from **(Gibbon, 1991)** and translated into Arabic language.

- Content validity of the study tools was tested by five experts in the field of Medical-Surgical Nursing, Faculty of

Nursing-University of Alexandria.

- Reliability of study tools was estimated using the Cronbach's Alpha test. It was 0.897 for Tool I , 0.871 for Tool II, and 0.789 for Tool III.

- Pilot study was conducted on 5 nurses to ascertain the clarity, feasibility, and applicability of the study tools.

Program development:
The actual study was carried out in four phases:
I. **Assessment phase**
- Initial assessment of all nurses was carried out using the three study tools to identify nurses' educational needs.

II. **Planning Phase:**

- A competency based program was designed by the researcher based on the assessment phase and review of recent literature.

- The program schedule was planned of (4-8) sessions over (2-4) weeks   The educative session was planned as (1 hour/day), one-third of the session for theoretical knowledge, and two-thirds for the practical part.
- Nurses in each setting were divided into groups. Thirty-five nurses from the stroke center at El Hadara University Hospital were divided into 10 groups, and fifteen nurses from the neurological department at El Nozha Hospital were divided into 5 groups
- An illustrated educational booklet was developed by the researcher and translated into Arabic language.

III. **Implementation Phase:**

The program was carried out in four training sessions.

- The First session included an introduction of the educational program, purpose, time schedule, benefits of the program, and the

first part of theoretical knowledge of stroke by using the teaching method as group discussion.

▪ The second session included was given to nurses regarding the remaining part of theoretical knowledge. Demonstration and re-demonstration of (neurological assessment), teaching aids were used such as images and videos of the National Institutes of Health Stroke Scale.

▪ The third session included demonstration and re-demonstration regarding the care of patients with stroke (respiratory care, positioning, mobility care, nutritional care, bladder, and bowel care, and hygienic care).

▪ The fourth session was conducted to continue the demonstration and re-demonstration regarding the remaining care of patients with stroke

▪ The Educational program was implemented for nurses during their official working hours at their break time, in the morning and evening shift on nurse station. Each session took approximately 45 minutes to one hour.

▪ Motivation and reinforcement techniques as praise and recognition during program sessions were used. Also, nurses were reinforced through online group discussions and videos to enhance their learning.

▪ Each nurse obtained a copy of the educational booklet that included all the training contents; the educational booklet help nurses understand and memorizing of the contents.

▪ The program implementation phase took two and a half months

IV. Evaluation phase:

▪ Nurses were evaluated three times, before conducting the program, immediately after the program, and after two months post the study interventions using previously mentioned data collection tools to evaluate the outcome of the program and to compare the change in nurses' knowledge, skills, and attitudes.

▪ Knowledge and skill competencies of nurses were evaluated three times by the previously mentioned tools to evaluate the improvement after conducting the educational program. While, nurses' attitudes were evaluated two times, in the initial assessment and in the follow-up.

▪ **Data collection:** data collection was started, and continued for a period of 7 months from February to August 2021.

Statistical Analysis

▪ Data were fed to the computer and analyzed. The used statistical tests were: ANOVA, Friedman test, Marginal Homogeneity Test, and Paired t-test.

Results

Table (1) illustrates the distribution of the studied nurses according to their overall knowledge levels regarding stroke during the pre, post, and follow-up phases. Results revealed that the total mean knowledge scores of the studied nurses immediately post implementation of the program were higher than before the program (22.38 ± 3.97-17.38 ± 3.29) respectively. However, there was an obvious decline in the follow up phase as compared to immediately post program implementation (21.80 ± 3.94 - 22.38 ± 3.97) respectively**.** Moreover, the table revealed highly statistically significant differences in nurses' overall knowledge levels between pre, post, and follow-up phases ($p<0.001$).

Table (2) shows a comparison between the sub-total nurses' mean skills scores regarding the care of stroke patients during the three assessment phases (pre, post, and follow-up. It was observed that the sub-total mean skills scores of nurses immediately post implementation of the program were higher than before the program implementation regarding the neurological assessment, monitoring of physiological functions, positioning, and mobility, care of paralyzed

part, patient ambulation, elimination care, hygienic care, exercises, medications administration, safety, communication, and patient/family teaching (6.57 ± 0.87 - 5.81 ± 1.56), (3.68 ± 0.94 - 2.23 ± 1.10), (3.90 ± 0.83 - 2.56 ± 1.02), (4.47 ± 1.63 - 3.32 ± 0.84), (4.01 ± 0.62 - 3.34 ± 0.54), (5.72 ± 1.41 - 4.00 ± 1.47), (4.84 ± 0.82 - 3.69 ± 0.99), (3.12 ± 0.72 - 1.88 ± 0.60), (7.87 ± 0.79 - 7.32 ± 1.13), (1.61 ± 0.75 - 1.56 ± 0.37), (24.74 ± 3.43 - 22.01 ± 2.93), (7.45 ± 0.94 - 5.36 ± 1.64), (7.26 ± 2.12 - 5.90 ± 2.52) respectively.

However, there was an obvious decline in the mean skills scores in the follow up as compared to immediately post the program implementation regarding monitoring of physiological functions, positioning and mobility, care of paralyzed part, patient ambulation, elimination care, hygienic care, medications administration, and managing sensory-perceptual difficulties (3.68 ± 0.94- 3.47 ± 0.72), (3.90 ± 0.83- 3.52 ± 0.68), (4.47 ± 1.63- 4.46 ± 0.86), (4.01 ± 0.62- 3.28 ± 0.68), (5.72 ± 1.41- 5.62 ± 0.76), (4.84 ± 0.82- 4.26 ± 0.80), (7.87 ± 0.79 - 6.46 ± 1.16), (3.47 ± 0.67 - 3.28 ± 0.76) respectively.

Table (3) illustrates the distribution of the studied nurses according to their overall skills competency levels regarding stroke care during the pre, post and follow-up phases. It was noticed that there was an obvious increment in the total mean skills scores in the second assessment (104.42 ± 14.22) as compared to the first assessment (82.53 ± 14.84), and there was a slight decline in the total mean skills scores in the third assessment (100.83 ± 11.94) as compared to the second assessment (104.42 ± 14.22). The table also shows a highly statistically significant differences between the pre, post, and follow-up phases regarding the nurses' overall skills competencies of stroke care (p<0.001).

Table (4) represents the distribution of the studied nurses according to their attitudes toward the care of patients with stroke. This

table shows that there was an obvious increment in the total mean attitudes scores in the third assessment (53.52 ± 9.21) as compared to the initial assessment (49.82 ± 11.49). Also, there was a statistical significant difference between the pre and follow-up attitudes scores of nurses (p=0.002*).

Table (5) illustrates the correlation between nurses' knowledge, skills and attitude during the pre and follow-up phase, the table shows that in the pre-test phase, insignificant weak negative correlation was found between the studied nurses' knowledge and skills, insignificant very weak positive correlation between nurses' knowledge and attitude, and insignificant very weak negative correlation between nurses' skills and attitude. Whereas, in the follow-up phase, the table shows a significant moderate positive correlation between the studied nurses' knowledge and skills. Also, a significant moderate positive correlation was found between nurses' knowledge and attitude.

Discussion

Cerebrovascular stroke is a worldwide main concern and a leading cause of disability. Nurses working in stroke care need up-to-date knowledge and clinical competence (Baatiema et al., 2017). Advancing nurses' knowledge, skills and attitudes is the starting point to develop nursing competency in stroke care (Rababah, Al-Hammouri, Al Nsour, 2021). So, this study aimed to evaluate the effect of a competency-based program on nurses' knowledge, skills, and attitude toward the care of patients with stroke.

Regarding the studied nurses' knowledge levels about stroke, the current results revealed highly statistically significant improvements in their knowledge throughout the study from pre, immediate, and two months after the implementation of the program. Thus indicating the effectiveness of the competency-based program on knowledge of nursing staff regarding stroke

From the researcher point of view, this improvement might be due to their exposure to the stroke competency program when they are provided with an Arabic educational booklet, motivated and reinforced and also, it is the first time for the studied nurses to attend educational sessions about cerebrovascular stroke. In the same line, Abd-Alla et al. and Reynolds et al., (2016) found improvement of nurses' knowledge post the implementation of an educational program. Also, these findings were supported by Abd El-Hay et al., and Zidan et al., (2018), who found highly statistically significant increase in nurses' knowledge after the implementation of nursing management protocol.

In addition, a slight decline was noticed in the total mean knowledge score two months after the implementation of the program as compared to immediately post the program. This may be related to the time factor, as they need periodic and continuous in service education to enable them to be more knowledgeable of the disease. This finding was supported by Abd-Alla et al., (2016), as they illustrated in their study that there was an obvious decrease in knowledge levels among the studied nurses two months post-implementation of the educational program

Regarding the studied nurses' overall skills competency levels, results highlighted statistically significant improvement of overall nurses' skills throughout the study from pre, immediate and two months post the competency-based program, which indicated the effectiveness of the competency-based program on the skills of the nursing staff.

This improvement of nurses' skills might be due to that all the studied nurses did not attend any training courses about nursing care of stroke and their participation in the program enable them to identify and obtain essential nursing competencies in stroke care. In agreement with these findings, Abd-Alla et al., (2016); Abd El-Hay et al., (2018); Zidan et al., (2018); and Ram, (2019), found in their studies that nurses had improved

performance after receiving educational interventions regarding stroke care.

Regarding levels of nurses' attitudes toward the care of stroke patients, the current study highlighted that there was highly statistically significant improvement of nurses' attitudes from the pretest phase to two months post the competency-based program, which indicates the effectiveness of the program on the attitudes of nurses.

From the researcher point of view, this improvement of nurses' attitudes could be related to the improvement of nurses' knowledge and skills and consequently improved their attitude as they became more aware of their role in providing care for stroke patients. These results were supported by Ram, (2019) who found highly significant improvement in nurses' attitude regarding stroke patients after educational guidelines implementation.

The current results revealed a significant positive correlation between the studied nurses' knowledge and skills in the follow-up phase. This association was confirmed in previous studies by Adika et al., (2012),who existed a positive relationship between nurses' knowledge and behaviors toward the care of elderly patients with stroke.

Also, Abd-Alla et al., (2016), found a positive correlation between nurses' knowledge and performance in stroke care after implementing the educational program. likewise, Nagep et al., (2020); Zhang & Ju, (2018), found a positive relationship between knowledge and practice among the studied nurses working in stroke units

An important finding of the present study, a significant positive correlation was found between the studied nurses' knowledge and attitudes during the follow-up phase. This result can be justified that the competency-based program improved nurses' level of knowledge which affecting positively on their attitudes. In this regard Shehata, et al., (2016), found that nurses' knowledge

regarding stroke greatly influence their attitudes , and stated that a more positive attitude can be achieved by an activation program and concurrent nurse education.

Conclusion

Based on the findings of the current study; it can be concluded that, nurses' competency level regarding the care of stroke patients significantly improved after the competency-based program as compared to before implementing it; which revealed the effectiveness of the program on nurses' knowledge, skills and attitude.

Recommendations

In line with the findings of the study, the following recommendations are made:

Recommendations for nursing staff

- Establishing ongoing educational workshops for continuous updating their knowledge of stroke
- Organizing of periodic educational training about the comprehensive care of stroke and role of the nurse.
- Developing and continuing in-service training for nurses on neurological assessment (NIHSS), range of motion exercises and ongoing stroke care.
- Establishing library containing up-to-date references inside the unit.

Recommendations for Further studies

- Study the factors affecting nurses' competence in the care of patients with stroke.
- Conducting the study in different settings in Egypt to generalize the results of the study and raise the competence of nursing care given for patients with stroke.
- Study the effect of implementing educational training program for nurses on the clinical outcomes of patients with stroke

- Study the impact of educational training program for nurses on the quality of life of patients with stroke

Table (1): Frequency Distribution of the Studied Nurses according to their Overall Knowledge Levels regarding the Cerebrovascular Stroke during the Pre, Post and Follow-up Phases (n=50)

Nurses' Knowledge of Stroke	Pre-program		Post-program		Follow-up		Test of Sig.	p
	No.	%	No.	%	No.	%		
Expert (excellent) ≥90%			3	6.0	4	8.0	Fr= 35.819*	<0.001*
Proficient (very good) 80%-89%			19	38.0	15	30.0		
Competent (good) 70% - 79%	10	20.0	16	32.0	14	28.0		
Advanced beginner (fair) 60%-69%	17	34.0	7	14.0	9	18.0		
Novice (fail) < 60%	23	46.0	5	10.0	8	16.0		
Sig. bet. periods	$p_1<0.001^*$, $p_2<0.001^*$, $p_1<0.001^*$							
Total Score	(0 – 30)							
Min. – Max.	9.0 – 22.0		11.0 – 28.0		13.0 – 28.0		F= 26.249*	<0.001*
Mean ± SD.	17.38 ± 3.29		22.38 ± 3.97		21.80 ± 3.94			

Pre: Pre-educational program / Post: Immediately post educational program
Follow-up: 2 months post educational program
Fr: Friedman test, Sig. bet. periods was done using Post Hoc Test (Dunn's) / F: F test (ANOVA) with repeated measures
p: p-value for comparing between the studied periods
p_1: p value for comparing between **pre** and **post**
p_2: p value for comparing between **pre** and **Follow up**
p_3: p value for comparing between **post** and **Follow up**
*: Statistically significant at $p \leq 0.05$

Table (2) Comparison between the Sub-total Nurses' Mean Skills Scores regarding the Care of Stroke Patients during the Three Assessment Phases (pre, post, and follow-up) (n=50)

Nurses' skills competencies	Pre	Post	Follow-up
	Mean ± SD.	Mean ± SD.	Mean ± SD.
Part I: Neurological assessment	5.81 ± 1.56	6.57 ± 0.87	7.05 ± 0.35
Part II: Nursing care of stroke			
Monitoring of physiological functions	2.23 ± 1.10	3.68 ± 0.94	3.47 ± 0.72
Respiratory care	2.53 ± 0.77	2.99 ± 1.07	3.31 ± 0.40
Positioning and mobility	2.56 ± 1.02	3.90 ± 0.83	3.52 ± 0.68
Care of paralyzed part	3.32 ± 0.84	4.47 ± 1.63	4.46 ± 0.86
Patient ambulation	3.34 ± 0.54	4.01 ± 0.62	3.28 ± 0.68
Nutritional care	5.17 ± 0.92	4.69 ± 0.90	5.41 ± 0.91
Elimination care	4.00 ± 1.47	5.72 ± 1.41	5.62 ± 0.76
Hygienic care	3.69 ± 0.99	4.84 ± 0.82	4.26 ± 0.80
Exercises	1.88 ± 0.60	3.12 ± 0.72	3.71 ± 0.25
Medication administration	7.32 ± 1.13	7.87 ± 0.79	6.46 ± 1.16
Patient safety	22.01 ± 2.93	24.74 ± 3.43	25.34 ± 2.68
Communication	5.36 ± 1.64	7.45 ± 0.94	7.56 ± 1.30
Managing sensory perceptual difficulties	3.04 ± 0.62	3.47 ± 0.67	3.28 ± 0.76
Patient/ family teaching	5.90 ± 2.52	9.26 ± 2.12	9.95 ± 1.86
Improving family coping	2.81 ± 0.76	3.06 ± 0.63	3.67 ± 0.52

n: number of studied nurses

Table (3): Frequency distribution of the studied nurses according to their overall skills competency levels regarding the stroke care during the pre, post and follow-up phases

Overall Skills Competency Level	Pre-program		Post-program		Follow-up		Test of Sig.	p
	No.	%	No.	%	No.	%		
Expert (excellent) ≥90%							Fr = 35.110*	<0.001*
Proficient (very good) 80% - 89%			9	18.0	8	16.0		
Competent (good) 70% -79%	8	16.0	16	32.0	14	28.0		
Advanced beginner (fair) 60%-69%	15	30.0	13	26.0	18	36.0		
Novice (fail) < 60%	27	54.0	12	24.0	10	20.0		
Sig. bet. periods	$p_1<0.001^*$, $p_2<0.001^*$, $p_3<0.001^*$							
Total Score	(0 – 150)							
Min. – Max.	64.0 – 106.5		80.50 –125.50		84.50 – 125.50		F= 51.640*	<0.001*
Mean ± SD.	82.53 ± 14.84		104.42 ± 14.22		102.83 ± 11.94			

Fr: Friedman test, Sig. bet. periods was done using Post Hoc Test (Dunn's) / F: F test (ANOVA) with repeated measures

p: p-value for comparing between the studied periods / *: Statistically significant at $p \leq 0.05$

p_1: p value for comparing between pre and post / p_2: p value for comparing between pre and Follow up

p_3: p value for comparing between post and Follow up

Table (4): Frequency Distribution of the Studied Nurses according to their Attitude toward the Care of Stroke Patients at Pre and Follow up phases (n=50)

Nurses' attitudes towards patients with stroke	Pre		Follow-up		Test of Sig.	p
	No.	%	No.	%		
Negative < 75%	19	38.0	6	12.0	MH= 3.153*	0.002*
Neutral 75% < 85%	24	48.0	33	66.0		
Positive ≥ 85%	7	14.0	11	22.0		
Total Score	(14–70)					
Min. – Max.	22.0 – 63.0		30.0 – 63.0		t=3.058*	0.004*
Mean ± SD.	49.82 ± 11.49		53.52 ± 9.21			

MH: Marginal Homogeneity Test/   t: Paired t-test

p: p-value for comparing between the studied periods/ *: Statistically significant at $p \leq 0.05$

Table (5): The Correlation between Nurses' Knowledge, Skills and Attitude during the pre and follow-up phase (n=50)

		Pre-test (1st Assessment)	
		Skills	Attitude
Knowledge	r	-0.256	0.188
	p	0.072	0.192
Skills	r		-0.195
	p		0.175
		Follow-up (3rd Assessment)	
		Skills	Attitude
Knowledge	r	0.481*	0.533*
	p	0.048*	0.018*
Skills	r		0.034
	p		0.817

r: Pearson coefficient / Statistically significant at *P ≤ 0.05

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