

# Effect of a Planned Health Teaching on Improving Knowledge and Competence of Home Care Practice of Post Stroke Patient Among Caregivers' Achievement

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## Abstract

**Background:** Stroke is one of the major healthcare challenges, being one of the leading causes of death, disability, and dependency in the activity of daily living worldwide. Homecare of stroke patients is having a great role in the patient recovery. Patient family caregivers and relatives can play an important role in the care of patients. But how to continue proper care of the patient at home after discharge, they don't know what to do and don't have practice as well. In this view, the researcher believes that it might be a great help for caregivers and the patients to teach theirs about stroke and home care of stroke patients. **Objective:** The study aims to evaluate the effectiveness of a planned health teaching on the caregiver's knowledge and competence of home care of stroke patients. Therefore, improve the patients' functional ability. **Methods:** The two group pre and post-test, quasi-experimental design was conducted among 50 caregivers of stroke patients, assigned to 25 caregivers as a control group and 25 caregivers as an experimental group. The study was done in the university hospital at El Fayoum city from 1st March 2019 to 31st August 2019. Four tools were used for data collection after reviewing relevant data as the following; a structured interviewing questionnaire, caregiver's knowledge questionnaire regarding stroke, caregiver's practices regarding bed position, Position Change and Transfer, and Range of Motion Exercises, and patient function ability assessment according to Barthel index. **Results:** revealed that there was a poor score level of knowledge and competence of home care practices before the intervention. However, there was an improvement of score level in the control and experimental group post-intervention, but the higher score was observed in the experimental group. The mean score level of patient functional ability in the experimental group improved than the control group through follow up. Highly statistical significance was found between control and experimental group post-intervention related to knowledge and practices. A positive significant correlation between caregiver's practices and patients function ability in the experimental group was found. **Conclusion:** planned health teaching is important after patients discharge to increase the caregiver's knowledge and competence of home care practices of post-stroke patients; resulting in improved patient functional ability.

**Keywords:** caregivers, post-stroke patient, a planned health teaching

## 1. Introduction

Stroke is the third leading cause of death worldwide in developing countries after coronary heart disease & cancer. [1-3] Stroke is one of the main causes of chronic disability worldwide.[4] Strokes are defined by the World Health Organization (WHO) as an acute, focal or diffuse dysfunction of the brain, originating from vessels and lasting for a period longer than a day. This definition will include intra-cerebral hemorrhages, subarachnoid hemorrhages, ischemic strokes and cerebral venous sinus thrombosis. [5] About 5.5 million people die each year from stroke and 44 million people lose their disability-adjusted life-years (DALYs). [6] Post-stroke patients in the range of moderate to severe disability rely entirely on help. Signs and symptoms of stroke are abrupt motor

and sensory deficits, including facial droop, hemiparesis, unilateral weakness of the extremity, slurred expression, vertigo, lack of control, disruption of the gait, loss of vision of either or both eyes, verbal or receptive aphasia, inability to communicate, reaction or orientation to a stimulus, usually on the opposite side of the lesion, Acute-onset quadriparesis, Loss of consciousness and Respiratory failure. [7, 8]

Common risk factors for stroke are age over 45, history of transient ischemic attacks, previous stroke or myocardial infarction, atrial fibrillation, sleep apnea, hypertension, heredity, ethnicity such as black, Hispanic and Asian, smoking, substance abuse, women between 55 and 75 years of age have a slightly higher risk of stroke than men. [9]

Stroke is considered a family disease and has the potential to affect the patients' health and quality of life, as well as their family caregiver, [10] Approximately 80% of stroke survivors live in the community after discharge, more than a third of whom are dependent on informal caregivers. [11, 12] Therefore, family caregivers become the key persons to care for them.

It is stressful to provide care during the first few months after a stroke, but it is important to provide adequate information, support, encourage early recovery & avoid complications. [13] If patients receive correct & proper care within the golden period (3-6 months), stroke recovery will improve significantly. [14, 15]. Emphasis on stroke rehabilitation should shift from a patient-focused approach to a patient-focused approach to both patients and their caregivers. [16]

Caregivers' roles for stroke patients are assisting in activities of daily living (ADLs) with such activities as transferring, grooming, feeding, bathing, toileting, mobility some range of motion exercise. [17] They also need to manage behavioral and emotional problems of the stroke patients promote rehabilitation, and prevent secondary complications. [18] Some caregivers who do not have enough knowledge and skills will have difficulty in performing their roles as caregivers. [19]

Researches showed that caregivers still lacked the expertise and skills required to provide home care after discharging the patients. [11, 20] Maeshima (2003) revealed that family members are unable to continue therapy at home because they don't know the care in stroke. If they are given teaching on how to care for the patients at home or how to continue rehabilitation care at home, then they may do better than without knowledge. [21]

Also, previous studies of home rehabilitation programs for stroke survivors show that post-stroke care is complicated and different from other chronic disease patients [22, 23].

So, patient family caregivers play a significant role throughout the post-stroke recovery process starting from day one and more importantly after discharge in continuing care at home. Care from the family members is very important to patient's recovery. Many studies proved that caregivers can promote positive post-stroke recovery outcomes. [24]

Therefore, Reasonable awareness of stroke knowledge and competence home care practices among the caregivers and family members could improve patient functional ability and prevent complications.

### *1.1 Significance of the Problem*

Stroke is a worldwide critical public health problem and one of the leading causes of morbidity, and mortality attributing to significant negative consequences on the society. [25] Almost, fifty percent of post-stroke patients suffer from moderate to severe disability, developed paralysis and were unable to care for themselves [26], Disability can include vocational, physical, language and psychological means as unable to lie, sit and stand; unable to speak, unable to do even activities of daily living. [27-30] These problems will affect their quality of life for up to 5 years post-stroke [31, 32] and possibly longer. [33, 34] Consequently, most stroke survivors return to live in the community and rely on family caregivers to meet their care and support needs. [35]

Because of the acute nature of the disease, many stroke survivor caregivers abruptly enter the caring role and have a little time to prepare for the caregiving role. [36-38]

Many studies found that caregivers often lacked the knowledge and skills needed to provide home care after discharging the patients. [39-41] Das et al., (2007) showed that 55-70% of stroke survivors become fully independent in a year while 7 to 15.7% remain physically impaired. [42]

There is an urgent need to educate post-stroke caregivers to help the patients and return to dependence on themselves for done routine daily living activities and return to the community. So, careful attention to the home care management of a patient with stroke is very essential. However, the researcher felt the need to conduct a study on caregivers of the stroke patients, who are attending to the neurology outpatient clinic at university hospitals to improve caregiver's knowledge and competence of home care practices; resulting in improved

patient function ability and prevent further complication.

### *1.2 Aim of the Study*

The study aimed to evaluate the effect of a planned health teaching on the caregivers' knowledge and competence of home care practice for post-stroke patients.

The aims of this study achieved through:

1. Assess the knowledge and practices of caregivers about their caring role.
2. Assess patient functional abilities as reported by caregivers using the Barthel index containing scores 100.

### *1.3 Research Hypothesis*

The hypotheses formulated by the researchers for the current study were:

1. Caregivers' knowledge and competence of home care practices of stroke patients will be improved.
2. The physical functional ability level of the stroke patients will be improved.
3. There will be a statistically significant association between caregivers' practices and improving the physical functional ability of the patient in the experimental group.
4. There will be a statistically significant association between caregivers' knowledge and practices in the experimental group.

## **2. Subjects and Methods**

### *2.1 Research Design*

A quasi-experimental study was utilized to conduct the study.

### *2.2 Setting*

The study was conducted at the Neurology outpatient clinic at the University hospital in El Fayoum city.

### *2.3 Participants*

The study subject consisted of 64 caregivers who had accepted to participate in the study. The study was conducted in the period between March 2019 and August 2019. Throughout the study, 14 were excluded: 8 women withdrawn during the program, 6 didn't attain post health teaching evaluation. So, the final study sample was enrolled 50 caregivers. The caregiver is the person who is with the patient and helping the patient with impairment to cope with his/ her daily routine.

Caregivers were eligible for recruitment to the study if they were: takes care of the patient at least 4 days a week, willing to participate in the study, able to read and write, both male and female and aged 18 years or older and must have been afflicted with stroke for the first time was included. Caregivers who were health care professionals, less than 18 years, and Patients attending the stroke clinic without their caregivers were excluded from the study.

### *2.4 Tools of Data Collection*

Four tools were used to gather the necessary data from the subjects of study as the following:

#### **Tool (1): A Structured interviewing questionnaire**

It was developed based on the review of currently-related literature and used by the researchers to collect the data needed on the subjects of the study. It included socio-demographic data of the participants and their general characteristics (name, age, sex, residence, telephone number, educational level, occupation, marital status, relation with the patients) as well as socio-demographic data, past medical history of the patient were obtained after receiving oral consent from the participating caregivers.

#### **Tool (2): stroke caregivers' knowledge questionnaire:**

It was developed by the researchers based on the review of currently related literature. It was composed 35 multiple choice questions about their caring role which including different areas such as stroke definition, types, signs and symptoms, causes, warning signs, risk factors, effects and consequences, stroke recovery, bladder and bowel management, skin care, maintaining proper hydration, meal maintenance and special diets, eating and swallowing after stroke, oral hygiene.

#### **Scoring system**

The total scores for all questions that concerned knowledge ranged from 0-70, two marks for each correct answer.

This score was graded into two levels as follows:

- a. Insufficient = less than 50% of total scores (less than 35 marks).
- b. Sufficient = more than 50% of total scores (35-70 marks).

This tool was used before teaching intervention and after one week following teaching intervention.

**Tool (3): stroke caregivers' competence of home care practices questionnaire:**

It was developed by the researchers based on the review of currently related literature. [43-45] The caregivers have done the practices they performed to the patient in front of me. The performance checklists consisted of three categories, correctly done step scored one mark, and the score of these categories was 77 classified as the following:

1. Bed Positioning, which included 10 items.
2. Position Change and Transfer, which included 8 items.
3. Range of Motion Exercises for Shoulder, Elbow, Wrist, Fingers, Hip, Knee, and Ankle, which included 59 items.

**Scoring system:**

The total scores for all steps that concerned the bed positioning ranged from 0-10. This score was graded into two levels as follows:

- a. Improper = less than 60% of total scores (less than 6 marks).
- b. Proper = more than 60% of total scores (6-10 marks).

The total scores for all steps that concerned the Position Change and Transfer ranged from 0-8. This score was graded into two levels as follows:

- a. Improper = less than 60% of total scores (less than 4.8 marks).
- b. Proper = more than 60% of total scores (4.8-8 marks).

The total scores for all steps that concerned the Range of Motion Exercises ranged from 0-59. This score was graded into two levels as follows:

- a. Improper = less than 60% of total scores (less than 35.4 marks).
- b. Proper = more than 60% of total scores (35.4-59 marks).

This tool was used before teaching intervention and after one week following teaching intervention.

The total scores for all steps that concerned the caregivers' competence in-home care practices ranged from 0-77. This score was graded into two levels as follows:

- a. Improper = less than 60% of total scores (less than 46.2 marks).
- b. Proper = more than 60% of total scores (46.2-77 marks).

**Tool (4): Patient function ability assessment according to Barthel index: [46]**

It operates on a scale of 10 items in which patients are judged on the degree of assistance required when performing a range of basic daily living activities. The evaluation is delivered through an established and validated questionnaire with a total score of 100 for the 10 items of the scale.

**Scoring system:**

- a. Each item is scored based on its actual ability. The usual score for each item is
- b. 0 points for "no ability" to do the item independently
- c. 5 points for "moderate help" with the item
- d. 10 points for being able to manage the item independently.

Mean, standard deviation and P-value of total Barthel index score were used.

This tool was used before teaching intervention and follow up for three months after stroke in outpatient clinic according to caregivers reporting based upon the actual ability to patient.

**2.4.1 Validity and Reliability of the Tool**

Validity testing was done by submitting the tool to a jury of experts with two community health nursing

professors, two medical nursing professors, and one expert biostatistician. The recommended modification was carried out, while its reliability was assessed by piloting & measuring the related value of Cronbach Alpha (Alpha = 0.93 for the knowledge questionnaire sheet, Alpha =0.91 for practices, Alpha = 0.93 for standard Barthel Index).

#### 2.4.2 Administrative Considerations

Necessary approval from the director at University hospital was taken after issuing an official letter from the dean of the Faculty of Nursing, El Fayoum University.

#### 2.4.3 Ethical Considerations

Data were collected after explaining the purpose of the study to all caregivers who participate in the study and that they had the right to withdraw at any time during the study period. At all stages of the study confidentiality was listed, as well as personal data obtained and the privacy of the participants was completely ensured.

#### 2.4.4 Pilot Study

The study was conducted among ten caregivers, who were excluded from the study sample. Total time required for evaluating the knowledge is 25-35 minutes and 60-80 minutes for evaluated the performance for a caregiver. The pilot study assessed the clarity of the language, the applicability of the items, and the time spent filling the tools. A pilot study revealed that depending on their functional abilities they need more information and education about the care of the stroke patients.

#### 2.4.5 Field-Work

Those caregivers who fulfilled the selection criteria enrolled in the study and asked to fill out a questionnaire containing socio-demographic questions, knowledge, and practice about the caring role and marked their responses to the data-sheet. Each caregiver takes approximately, 30-40 minutes to complete the knowledge questionnaire and 60-90 minutes to complete the performance checklist.

#### **Phases of field-work**

Four phases have been adopted to fulfill the purpose of the study as following mentioned; (1): assessment phase, (2): planning phase, (3): implementation phase of evaluation, (4): evaluation phase. The actual field analysis for data collected from the above-mentioned settings began between March 2019 and August 2019. The invitation was followed by a reminder what' up and telephone, knowledge, and practices post questionnaires were completed at one week post-teaching program and follow-up of patient functional ability assessment for three months.

#### **A. Assessment phase**

Caregivers' were interviewed during attending to stroke outpatient clinics to collect baseline data. Researchers started by introducing herself, the study aim and design were explained to caregivers. Data obtained from pre-program evaluation and review of the various aspects of current and past, local, and international related literature.

#### **B. Planning phase**

Developing the program according to the general objective was done. The health teaching program will improve the caregivers' knowledge and competence of home care practice to improve physical function ability of the patient with stroke. It composed of three sections mentioned; the knowledge section consisted of detailed knowledge about stroke definition, pathology, types, signs and symptoms, causes, warning signs, risk factors, consequences and severity of stroke, golden period of stroke recovery, bladder and bowel management, skin care and prevention of bed sores, patients' medications and their side effects, types and quantity of food, food preparation, method of feeding eating and swallowing after stroke, oral hygiene and aspiration prevention and support for patients to perform daily routine care, prevention of complications. The practice section consisted of three parts; Bed positioning (Lying Straight Facing Up, side-lying position, lying prone, sitting position, a description of the arm in the sling); Position Change and Transfer (How to move the patient to the bed, turn the patient side-by-side every two hours, change the patient's position from sitting to lying down, and transfer the patient from bed to chair or wheelchair, support the patient's arm, and prevent the patient from falling during the transfer); Range of Motion Exercises for Shoulder, Elbow, Wrist, Fingers, Hip, Knee, ankle dorsiflexion, ankle inversion, ankle eversion; the standardized Barthel Index section which originally described in 1955 by Dr Florence Mahoney and Dorothea Barthel , which has been widely used over the past 60 years by health- care practitioners working to measure patient improvement status during rehabilitation to measure the improvement in patient function ability, the weighted scale measures performance in self-care for Feeding, Bathing, Grooming,

Dressing, Bowels and Bladder care, personal Toilet Use, Transfers from bed to chair and back, Mobility on level surfaces and Stairs climbing.

### **C. Implementing phase**

A planned health teaching was implemented for six months as the following:

#### **The experimental group**

The intervention was carried out by the researcher for four weeks; the start date varied depending on the hospital discharge date and follow up in the Neurology outpatient clinic. Implemented were conducted either individually or with a group. Every session started with a summary of what had been offered in the previous session. Different methods of teaching such as brainstorming, discussion, demonstration and re-demonstration, were used. Moreover, Arabic booklets were distributed to all participants at the end of the program. The caregivers told about the contents of the next session and its duration at the end of each session.

#### **The First Week**

Consisted of presenting information on post-stroke care and skills practice over 2-day (one session per day). Activities lasted from 40-50 minutes each day.

**Day 1** covered basic knowledge of stroke pathology, stroke symptoms and severity of the stroke, golden stroke recovery time, stroke types, patient support for daily routine care, prevention of complications,

**Day 2** covered basic skill practices for bed positioning (Lying Straight Facing Up, side-lying position, lying prone, sitting position, a description of the arm in the sling);

#### **The second week**

**Day 1** covered knowledge about the causes, symptoms, warning signs, risk factors, bladder and bowel management, skincare, and prevention of bedsores.

**Day 2** covered basic skill practices for a range of motion exercises for Shoulder, Elbow, Wrist, Fingers, Hip, Knee, ankle dorsiflexion, ankle inversion, and ankle eversion

#### **The third week**

**Day 1** included awareness of patient food and medicine; in particular, correct food types and amounts, food preparation, feeding process, stroke eating and swallowing oral hygiene, and aspiration prevention. Family caregivers learned about patients' medications and side effects.

**Day 2** covered basic skill practices for position change and transfer (How to move the patient on a bed, turn the patient side by side every two hours, change the position of the patient from sitting to lying down and transfer the patient from bed to chair or wheelchair, arm support to prevent the patient from falling during transfer).

#### **The fourth week**

**Day 1** covered revision about all knowledge mentioned before.

**Day 2** covered revision about all practices mentioned before.

#### **Control group**

The caregivers in the control group were only receiving routine care from outpatient clinic specialists. The follow-up activities included evaluating the health and concerns of the patient, making recommendations related to the condition of the patient, or the risks of developing complications, and recommending physical rehabilitation.

### **D. Evaluating phase**

Evaluation was performed one week after the implementation of the health teaching during their follow up by using the same tools to assess the effect of the teaching process, follow up of function ability of patients for three months after stroke in outpatient clinic according to caregivers reporting.

#### **2.4.6 Statistical Analysis**

All reported data were obtained, organized & entered into SPSS-16 software (version 16.0 for Windows; SPSS Inc, Chicago, Ill) and analyzed by (1) count, percentage, arithmetic mean, standard deviation (Mean  $\pm$  SD); (2) Chi-square test and fisher-exact test; (3) Pearson correlation coefficient (g); (4) paired test (g); (5) Two-way repeated variance measurement analysis (ANOVA) (F). (6) Mcknemar TEST was used for comparing dichotomous qualitative variables before and after intervention at 95% confidence interval, The level of significance was considered at  $p \leq 0.05$ ; it was considered as not significant if  $p > 0.05$ , significant if  $p \leq 0.05$

and highly significance if  $p \leq 0.001$

### 3. Results

Table 1 illustrated that the mean age of caregivers in the experimental and control group was  $37.12 \pm 10.3$  years and  $35.16 \pm 10.5$  years old, respectively. The majority (76.0%) & (80.0%) of the caregivers were lives in rural areas, (84.0%) & (72.0%) them were married, and 64% & 52.0% of them not employed, caregivers were partners to patients (52.0%) & (56.0%) in the experimental and the control group, respectively. There was no statistically significant difference between experimental and control groups regarding Socio-demographic characteristics.

Also, this table showed that the mean age of post-stroke patient in the experimental and control group was  $54.4 \pm 8.58$  years and  $52.4 \pm 9.7$  years old, respectively, the majority live in extended family (84.0%) & (92.0%), married (68.0%) & (80.0%), and had hypertension 80.0% & 64.0%, respectively. There was no statistically significant difference between experimental and control groups regarding socio-demographic characteristics.

Figure 1 illustrated that most of the caregivers had secondary education (76.0%) & (68.0%). Also, the majority of post-stroke patients were read and write (56.0%) & (60.0%). There was no statistically significant difference between experimental and control group regarding educational level.

Figure 2 illustrated that the most of caregivers had low monthly income (76.0%) & (80.0%). Also, the majority of post-stroke patients had low monthly income (72.0%) & (84.0%). There was no statistically significant difference between experimental and control group regarding monthly income.

As presented in Table 2, all participant was insufficient score level of knowledge related to stroke pre-intervention in the experimental and control group. However, 84.0% of caregivers in the experimental group showed sufficient score level of knowledge post-intervention compared to 12.0% of caregivers in the control group who showed sufficient score level of knowledge relevant to the same items post-intervention. There was a high statistically significant difference between experimental and control group in post-intervention.

Table 3 illustrated that All participant was improper score level of practice related to stroke pre intervention in the experimental and control group. However, 68, 0%, 72.0% and 84.0% of caregivers in the experimental group showed proper scores level of practice post-intervention regarding to bed positioning, the range of motion exercise, and position change, and transfer respectively compared to 36.0%, 24.0%, and 36.0% of caregivers in the control group who showed proper score level of practice relevant to the same items post intervention. There was a highly statistically significant difference between the experimental and control group.

Table 4 reveals that all participant was improper score level of practice related to stroke pre intervention in the experimental and control group. However, 72.0% of caregivers in the experimental group showed proper scores level of practice post-intervention compared to 32.0% of caregivers in the control group who showed proper score level of practice relevant to the same items post-intervention- There was a high statistically significant difference between the experimental and control group in post intervention.

Table 5 presents the Mean, Standard Deviation and P-value of functional ability follow up for patient according to Barthel index. It appears that the mean score of patient functional ability increased from  $17.0 \pm 5.40$  at the baseline to  $24.2 \pm 2.77$  at the first month follow up, then increased to  $65.0 \pm 4.56$  at the second month, then increased to  $80.2 \pm 7.96$  at the third month in the experimental group and the mean score increased from  $16.0 \pm 5.40$  at the baseline to  $18.6 \pm 6.04$  at the first month follow up, then increased to  $27.0 \pm 13.77$  at the second month, then increased to  $37.6 \pm 14.29$  at the third month in the control group. But in the experimental group higher than the control group with was a high statistically significant difference ( $F = 158.6$ ,  $P \leq 0.001$ ).

Table 6 showed positive correlation between patient functional ability level and caregiver practice score level ( $r = 0.460$ ,  $p = 0.021$ ).

Table 7 shows that 100.0% of the caregivers in the experimental group who had sufficient knowledge related to stroke had proper practices compared to 12.5% of caregivers in the control group who had sufficient knowledge had proper practices, with highly statistically significant differences between the studied sample knowledge and their practices in the experimental group ( $P = 0.004$ ).

Table 1. Socio-demographic characteristics of the study sample

Items	Experimental group N= 25		Control group N= 25		Chi-square		
	Mean ± SD		Mean ± SD		X <sup>2</sup> /t	P value	
<b>Caregivers' Socio-demographic data</b>							
age	37.12±10.3		35.16±10.5		0.665	0.509	
<b>Sex</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>			
Male	12	48.0%	13	52.0%	0.080a	0.777	
Female	13	52.0%	12	48.0%			
<b>Residence</b>							
Rural	19	76.0%	20	80.0%	0.117a	0.733	
Urban	6	24.0%	5	20.0%			
<b>Marital status</b>							
Married	21	84.0%	18	72.0%	1.049a	0.306	
Unmarried	4	16.0%	7	28.0%			
<b>Occupation</b>							
Not employee	16	64.0%	13	52.0%	0.739	0.390	
Employee	9	36.0%	12	48.0%			
<b>Relation to patient</b>							
Partners (Spouses, Sons, Daughters)	13	52.0%	14	56.0%	0.321 <sup>a</sup>	0.571	
Relatives (mothers, Sisters, Brothers)	12	48.0%	11	44.0%			
<b>Post Stroke Patient Socio-demographic data</b>	<b>Mean ± SD</b>		<b>Mean ± SD</b>				
age	54.4±8.58		52.4±9.7		0.753	0.455	
<b>Sex</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>			
Male	12	48.0%	15	60.0%	0.725 <sup>a</sup>	0.395	
Female	13	52.0%	10	40.0%			
<b>Marital Status</b>							
Married	17	68.0%	20	80.0%	0.936	0.333	
Unmarried	8	32.0%	5	20.0%			
<b>Housing</b>							
Extended Family	21	84.0%	23	92.0%	0.758	0.384	
Separate Family	4	16.0%	2	8.0%			
<b>Underlying diseases</b>							
Diabetes Mellitus	No	17	68.0%	15	60.0%	0.347 <sup>a</sup>	0.556
	Yes	8	32.0%	10	40.0%		
Hypertension	No	5	20.0%	9	36.0%	1.587 <sup>a</sup>	0.208
	Yes	20	80.0%	16	64.0%		
Cardiac Disorders	No	25	100.0%	23	92.0%	**	0.490
	Yes	0	0.0%	2	8.0%		



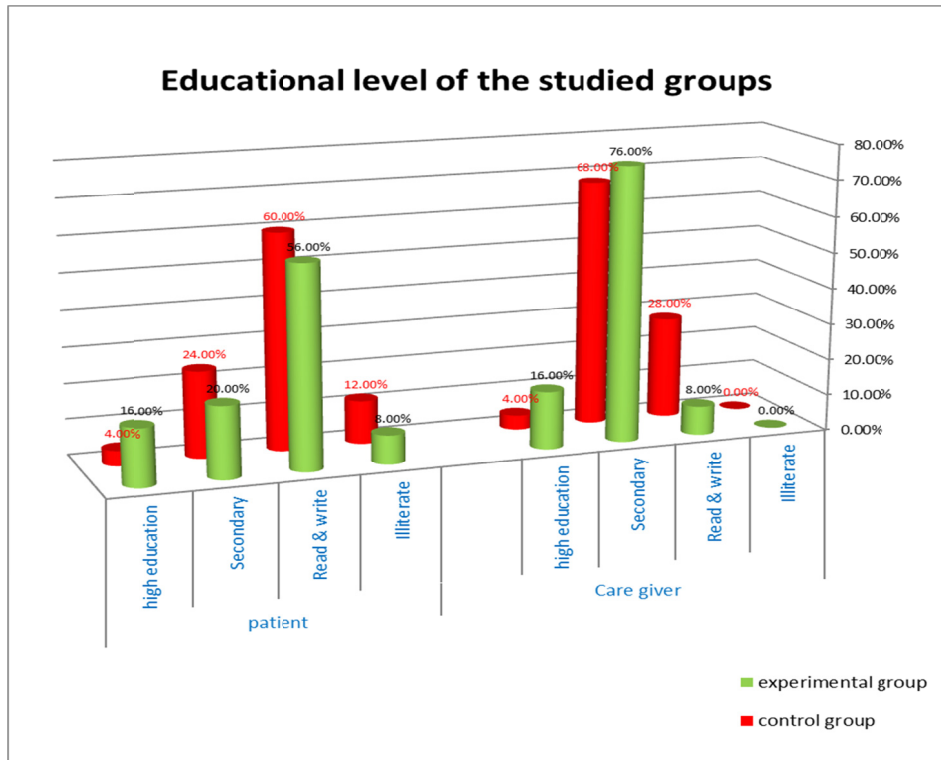


Figure 1. Educational level of the studied groups

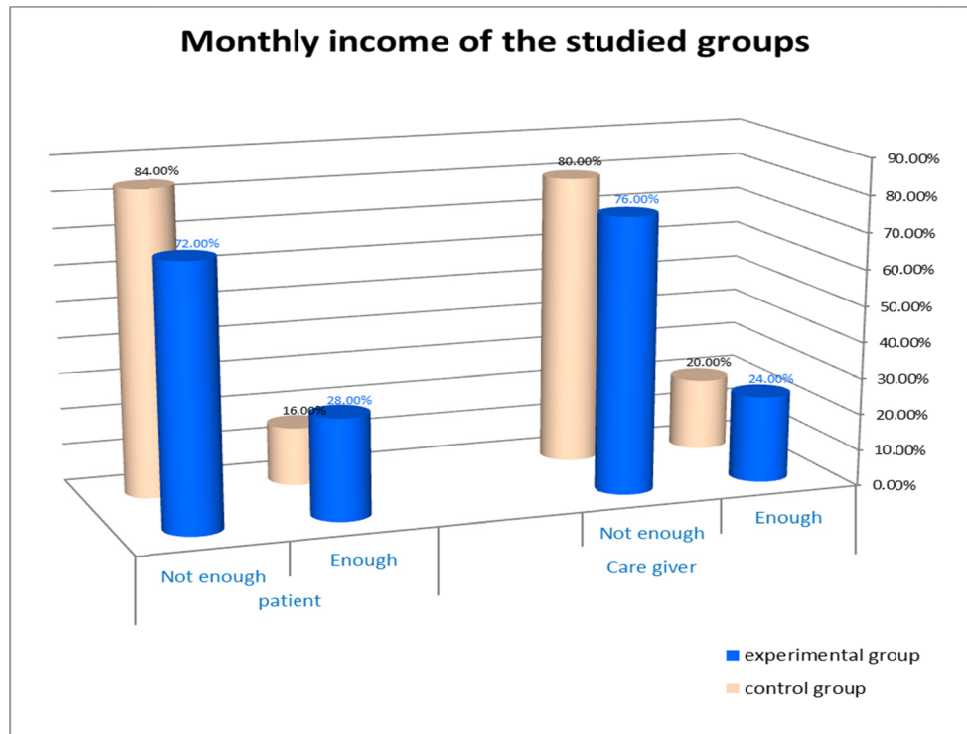


Figure 2. Monthly income of the studied groups

Table 2. Distribution of caregivers in the experimental and control groups according to their score level of knowledge pre and post-intervention

Knowledge level	Pre intervention				Post intervention				Chi-square	
	Experimental group N= 25		Control group N= 25		Experimental group N= 25		Control group N= 25		X <sup>2</sup>	P value
	N	%	N	%	N	%	N	%		
Insufficient	25	100%	25	100%	4	16.0%	22	88.0%	25.96	<0.001**
Sufficient	0	0.0%	0	0.0%	21	84.0%	3	12.0%		

\*\* P ≤ 0.001 High Significance

Table 3. Distribution of caregivers in the experimental and control groups according to their total score level of performance in bed positioning, change of position and transfer and range of motion exercise post-intervention

Score Level of practices	Experimental group N= 25				Control group N= 25				X <sup>2</sup>	P value
	Improper		Proper		Improper		Proper			
	N	%	N	%	N	%	N	%		
<b>Post Intervention</b>										
Range of Motion Exercises	8	32.0%	17	68.0%	16	64.0%	9	36.0%	5.1	0.024*
Position Change & Transfer	7	28.0%	18	72.0%	19	76.0%	6	24.0%	11.5	0.001**
Bed Positioning	4	16.0%	21	84.0%	16	64.0%	9	36.0%	12	0.001**

\* P ≤ 0.05 Significance

\*\* P ≤ 0.001 High Significance

Table 4. Distribution of caregivers in the experimental and control groups according to their total score level of practices pre and post-intervention

Total Practice Score Level	Pre Intervention		Post Intervention		X <sup>2</sup>	P value
	N	%	N	%		
<b>Experimental group N= 25</b>						
Improper	25	100%	7	28.0%	8.1	0.005**
Proper	0.0	0.0%	18	72.0%		
<b>Control group N= 25</b>						
Improper	25	100%	17	68.0%		
Proper	0.0	0.0%	8	32.0%		

\*\* P ≤ 0.001 High Significance

Table 5. Mean, Standard Deviation and P-value of Functional Ability Follow up for Patient According to Barthel index

Functional abilities	Experimental group	Control group	F	P value
	N= 25 Mean ± SD	N= 25 Mean ± SD		
At baseline	17.0 ± 5.40	16.0 ± 5.40	158.6	<0.001**
At first month	24.2 ± 2.77	18.6 ± 6.04		
At second months	65.0 ± 4.56	27.0 ± 13.77		
At third months	80.2 ± 7.96	37.6 ± 14.29		

Repeated measure ANOVA was done

\*\* P ≤ 0.001 High Significance

Table 6. Correlation of Patient Function Ability at the end of Follow up and Caregivers Practice After Intervention in the Experimental and Control Groups

Variable	Patient Function Ability			
	Experimental Group N = 25		Control Group N = 25	
	R	P	R	P
Caregivers Practice	.460*	.021*	.127	.545

\* P ≤ 0.05 Significance

P > 0.05 Not Significant

Table 7. Relation between the Experimental and Control Groups Regarding Caregivers Knowledge and Practice Score Level after Intervention

Caregivers Knowledge	Caregivers Practices							
	Experimental Group N = 25				Control Group N = 25			
	Improper		Proper		Improper		Proper	
	N	%	N	%	N	%	N	%
Insufficient Knowledge	4	57.1%	0	0.0%	15	88.2%	7	87.5%
Sufficient Knowledge	3	42.9%	18	100.0%	2	11.8%	1	12.5%
<b>P value</b>	<b>0.004**</b>				<b>0.999</b>			

\*\* P ≤ 0.001 High Significance

P > 0.05 Not Significant

#### 4. Discussion

Stroke is a family crisis due to the sudden onset of nature and the survivors having multiple impairments. Post-stroke patients depend entirely on assistance. Thus, Family caregivers are the primary ones to care for them. The sudden and unforeseen nature of the stroke leaves families with little time to prepare for the role of caregiver. Though working and through their own sorrow over the stroke case, families are learning a new role. So, promoting early recovery and preventing complications is a crucial aspect of caring for patients after a stroke. If patients provide adequate and proper treatment during the golden period (3-6 months), stroke recovery can be improved significantly. [14, 15] Thus, this study was done to evaluate the effect of a planned health teaching on the caregivers' knowledge and competence of home care practices. Therefore, improving the patient physical function ability was found.

The results of the current study reveal that improvement of the caregivers' knowledge among the study group post-intervention compared to caregivers in the control group who showed lowest sufficient score level of knowledge with Similar poor score level of knowledge in both groups prior interventions. There was a high statistically significant difference between the experimental and control group in post-intervention.

This suggests that The caregiver's lack of awareness of stroke as a result of the lack of social status and their

preoccupation with daily life and the search for a livelihood, perhaps also not being highlighted by the media despite its seriousness. But when we provided them with information, it improved a good level of knowledge.

Also, this may be due to the caregiver's desire to know more information about stroke, so that he can answer the patient's questions related to his health condition

This finding is supported by the results of Koenig et al. 2007, which conducted a study of the health behaviors of stroke patients and their caregivers undergoing inpatient rehabilitation. Results have shown that stroke patients participating in inpatient rehabilitation and their caregivers have large gaps in their knowledge of stroke and under-optimal personal health behaviors, putting patients at risk of a recurrent stroke. [47]

Our results are in consistence with a study that showed the majority of caregivers had inadequate knowledge regarding home care of stroke patients pre intervention and 51.66% of caregivers had adequate knowledge, 40% had moderate knowledge in post-test and there were highly statistically significant improvements among caregivers' knowledge on home care of stoke patient. [48]

Also, these findings were in accordance with the results of some studies, they reported that improvement of the caregivers' knowledge in the experimental group than control group. [49-51] In the same, line the results agreed with the finding of other previous studies. [52-54] However, these previous findings were in contrast to the findings of a study that reported only one third (33.8 %) of caregivers had insufficient knowledge of how to adequately care for patients with strokes. [41]

Concerning to socio-demographic characteristics of the studied sample, the present study revealed that the mean age of caregivers who participated in the experimental and control group was  $37.12 \pm 10.3$  years old and  $35.16 \pm 10.5$  years old, respectively. Moreover, the majority of the studied caregivers in both groups were lives in rural areas, and had secondary educational level, and married, while slightly more than half of the studied sample in the experimental group was female and male in control group, not employed. As a result of the limited economic status of families in Upper Egypt including El Fayoum city, this led to a lower level of education and, therefore, most of the caregivers don't work despite their average age. Most of the caregivers were spouses, sons, or daughters to the patients. This suggests that due to nature, rural environment, and Egyptian culture, most families living together in an extended family, so sons and daughters became responsible for the service of their parents.

It was clear that there was no statistically significant difference between the experimental and control group. As a result of the similar social characteristics of the people and rural environment

These results were in accordance with a finding that reported most of the caregivers are having secondary education, 60% not working, 73.33% are male. [55] Nayeri (2011) showed that the average age of caregivers in the family was  $45.88 \pm 12.67$  years, 66.5% of caregivers were female. More than 90% of the caregivers' had an average and below-average monthly income. [56]

Similarly, previous study concluded that the majority of the caregivers were women, Most of the caregivers were sons followed by daughters or spouses. [57, 58]

In the same line, the results agreed with the finding showed that in the experimental, the mean age of family caregivers was (Mean = 49.13; SD = 11.53) and control groups (Mean = 51.32; SD = 13.39) respectively. Many female family caregivers were daughters of experimental group patients (80.6 %) and those in the control group (83.9 %). Most caregivers were married. There was no statistically significant difference in socio-demographic characteristics for family caregivers between the two groups. [51] 80 % of the caregivers are unemployed showed by Amritha (2009). [59]

Also, these findings were in consistence with the results of a study that concluded the majority of the participants were in the age group of 36 year and above, 80% of caregivers were male and 58.33% of caregivers were from rural areas, 25% of caregivers were from urban and 16.67% of caregivers were from semi-urban. [48] However, these previous findings were in contrast to the finding showed that most of the caregivers in the experimental group had elementary education. [48, 50]

It was clear that the mean age of post-stroke patient in the experimental and control group was  $54.4 \pm 8.58$  years old and  $52.4 \pm 9.7$  years old, respectively. The majority of patients were able to read and write, living in an extended family, low monthly income and had hypertension. As a result of the lack of financial levels for families in Upper Egypt in previous periods and the agricultural environment inherited from parents as work for them, this has resulted in neglecting education and being satisfied with reading and writing.

There was no statistically significant difference between the experimental and the control group regarding socio-demographic characteristics.

It was consistent with the findings of a study that identified older post-stroke patients in the experimental and control group at a mean and SD age of  $64.74 \pm 12.09$  and  $69.03 \pm 12.83$ , respectively. Most were female (58.1 percent of the experimental group and 64.5 percent of the control group) and had basic education. More than half of the experimental group patients were married while more than half of those in the control group were single, widowed or divorced. These groups lived within their extended families. The majority of patients had hypertension. For post-stroke cases, there was no statistically significant difference between the two groups in socio-demographic characteristics. [50] In the same line, the results agreed with Nayeri (2011) that showed that the patients averaged  $65 \pm 5.43$  years and 55% were female and 45 % were male. [56] The differences between the study's results regarding socio-demographic characteristics may be due to the differences between the setting's culture and environments.

This result conveying and confirming similar poor score level of skill practices in both group prior interventions. However, post-intervention, The results showed that the caregivers who participated in the experimental group significantly higher improved their post-stroke scores level of practices regarding the range of motion exercises, position change and transfer and bed positioning compared to the caregivers' in the control group relevant to the same items. Moreover, the majority of the studied sample in the experimental group showed proper total scores level of practice rather than the control group. There was a highly statistically significant difference between the experimental and the control group post-intervention regarding caregivers' competence in home care practices.

This may have attributed that the caregivers in the control group forgot one step or more on the sequence of their performance related to the embarrassment of some caregivers to ask for repeated the forgotten steps when losing their attention. In contrast to caregivers' in the experimental group were performed procedure steps sequentially as a result to the good relationship between them, they were able to ask and repeat the demonstration at any point, anywhere at several times and evaluate their performance and reinforce their weakness points, to demonstration in providing patients with feedback from the researcher with different levels of treatment, moreover, integration of multi-material method helps the caregiver to sustain their interests and grasp their attention.

This was supported by the findings that concluded the overall percentage of correct responses was 66.2% (64.3% for bed positioning and 62.4% for change of position and transfer). The ROM exercises were performed most often at the knee joint (70.5 %), followed by the wrist joint (67.5 %). Approximately half of the caregivers replied that they are doing ROM exercises at the other joints, the percentage of correct responses among caregivers who did not receive training was significantly lower than those who received training at least once ( $p=0.05$ ), and caregivers who received daily training displayed a slightly higher percentage of correct responses than those who received training, but not regularly ( $p<0.05$ ). [41]

This view was in accordance with the findings showed that family caregivers who participated in the intervention program substantially strengthened their post-stroke care skills relative to those in the control group of family caregivers. [50]

Also, this point of view was in agreement with the findings of Gurjar (2019) who carried study regarding caregivers' competence of home care of stroke patients, the study results revealed that there were highly statistically significant improvements among caregivers' competence on home-care of stroke patients after the educational program. Hence, the educational program was effective to improve competence in home care of stroke patients among caregivers. [48]

This improvement could be attributed to the variety of educational methods that the researcher used as lectures, audiovisual materials and discussion, as well as Arabic book- letting each caregiver was gotten. Too much reliance on the distribution of written materials in the form of booklets is placed in many educational programmes. They can remind caregiver of the topics they've learned in other ways. They can provide additional information for those who have a particular interest in any health practice. Booklets are better used when they're short, written in plain language, full of good pictures and used to back up certain educational types. [60-63] This is in accordance with the Pyramid of Learning cited by Masters K as by Edgar Dale or by the NTL; as many authors cited. [64-67] The pyramid showed that people can retain 10% of what they read, and 20% of what they see and understand (audiovisual). The same authors added that some would retain 50% of what he learned through discussion. [68]

Choi 2006 emphasized that the significant promotion of caregivers' practice among the experimental group after the educational program. [49]. Also, this finding was in contrast to a study that reported there was no statistically significant difference in post-stroke care skills between intervention group caregivers and control group caregivers. [50]

The present study revealed that a similar poor score level of patient physical function ability in both groups prior

interventions. While higher improved the patient physical functional ability; in the experimental group than the control group at the end of the follow up. There was a highly statistically significant difference between experimental and control group ( $F = 158.6, P \leq 0.001$ ).

This explained that the improvement in patient activity daily life in the experimental group, it appears that family caregivers benefit from the correct and early continuation of extremity physical rehabilitation.

This was supported by a previous study that showed an improvement of ADLs in patients in the study group tends to benefit from the correct and early continuation of upper and lower extremity physical rehabilitation by family caregivers who participated in the intervention program. [50, 69, 70]

Similarly, another study concluded that the mean scores of overall ADL showed improvement in each test than the previous test in both groups but the difference was high in the study group than the control group which was not statistically significant. [51]

Teel et al. 2001 conducted a care study providing after-stroke experiences by distributing mailed questionnaires to 83 caregivers. The outcome of this study was that after the stroke program the caregivers showed stable perceptions of symptoms of the physical health state. [71]

Previous studies also stressed that the crude mean Barthel Index scores showed a higher trend at the time of discharge to three months after discharge. [58, 72]

These findings support existing literature that shows that early recovery can be attributed to the spontaneous neurological processes [73], and this occurs within 3 months after stroke [74].

The result of the present study showed a positive correlation between patient functional ability level and caregivers practice score level ( $p = 0.021$ ).

Suggesting that correct and regular training and movement the patient's muscles will keep of the muscles and tissues from contracting, so the patient's function ability will be improved.

This was supported by Kalra et al. (2004), who implemented a standardized caregiver training that provided information on stroke control, engagement target setting planning, informal guidance for facilitating transfers, mobility, and ADL patients in the caregiver training group enhanced function and quality of life. [75]

Similarly, the previous studies illustrated that a self-care exercise program can improve the independence of post-stroke patients and higher functional status [76, 77]. Another research showed that informal caregivers had more awareness & expertise after engaging in a post-stroke education and skills programme, which included re-demonstration, resulting in enhanced functional status and less stress for patients with a post-stroke. [53]

In the same line, our results agreed with the finding that reported patients who were regularly guided by their families to carry out daily activities independently had better functional capacity. [78]

Also, this point of view was in agreement with the findings concluded that by reducing muscle and tissue contracture and maintaining the number of sarcomers, joint ROM can be maintained when muscles are maintained in the extended position. Therefore, proper placement of the bed is an important part of stroke care, as it can help functional activities like ADL or gait. [43, 79, 80]

This was supported by a previous study that proved exercises in physical adaptation can improve post-stroke patients' physical health and fitness. [81]. Research by Tseng, Chen, Wu and Lin showed that movement exercises can improve joint mobility and reduce pain. [82]

The present study shows that there are highly statistically significant differences between the knowledge of caregivers and their practices, all participants (100.0%) in the experimental group who had sufficient knowledge towered stroke had proper practices towered range of motion exercises, position change and transfer and bed positioning. In contrast, The minority of the studied sample (12.5 %) in the control group who had sufficient knowledge had proper practices.

This may have attributed that providing regular caregivers training could improve their knowledge of adequate care for patients with stroke. But in the control group could also be a result of their insufficient knowledge of stroke disease in Egypt despite its seriousness, its prevention, its complications and role in caring, and being considered a risk group.

This point of view was in agreement with the findings that the performance of the caregivers resulted from the recapitulation of the knowledge and information received in each session, the practice of skills, and the demonstration of returns in providing the patients with input from the researcher with different levels of care. [50]

In the same line, the results agreed with the finding that illustrated the level of training and the percentage of the correct answers, were significantly correlated. [41]

This result supports current research that shows awareness and knowledge on the essence of stroke, rehabilitation and secondary prevention as key components of skill development. [83]

Health teaching is very important and essential for post-stroke caregivers' after patient discharge from the hospital to increase knowledge, and competence of home care management. Led to early patient recovery, improve patient function ability, and prevent further complications.

### 5. Limitations of the Study

1. The caregivers took a lot of time longer than expected to assess their performance.
2. The evaluation of the patient's functional ability dependent on the caregiver's reporting.

### 6. Conclusion

The main conclusion drawn from the present study was that stroke caregivers had a poor score levels of knowledge and practices in both experimental and control groups prior interventions. However, there were statistically significant improvement of scores level of knowledge and practices in both experimental and control groups post-intervention, but the higher scores were observed in the experimental group. This improvement resulting in improved patient functional ability to perform the daily living activities. So, this study illustrated the importance of caregivers with critical expertise and skills in caring for post-stroke patients in the home.

### 7. Recommendations

In light of the findings of this study, the following is recommended:

1. Primary Prevention is a key element in reducing stroke potentially among high-risk people. So, Increase health awareness campaigns about the disease and direct the mass media to highlight them.
2. Activate the role of the community and medical nurse in the neurological outpatient clinics and centers and all neurological branches to enhance their knowledge and practices and take good care of them.
3. Healthcare providers should continue to support and promote the knowledge and skills of a family caregiver in the care of post-stroke patients and provide follow-up contact concerning the condition of a patient and sustainable support at home is needed for a good recovery.
4. Similar studies can be conducted and replicated in other healthcare institutions on a larger representative group of caregivers to generalization of the findings.
5. Adequate and variable scientific books or pamphlets should be available in rural areas, with simple explanations including materials related to stroke knowledge and practices.
6. The researcher will consider study methodologies for patients with disabilities for future studies and should track long-term efficacy to ensure full benefits for patients.

### References

- [1] Seshardi, S., Beiser, A., Kelly-Hayes, M., Kase, C., Au, R., Kannel, W., *et al.*. (2006). The lifetime risk of stroke: estimates from the Framingham study. *Stroke*, 37, 345-350.
- [2] Scherbakov, N., & Doehner, W. (2011). Sarcopenia in stroke-facts and numbers on muscle loss accounting for disability after stroke. *Journal of Cachexia, Sarcopenia and Muscle*, 2(1), 5-8.
- [3] Kokubo, Y. (2012). Traditional risk factor management for stroke: a never-ending challenge for health behaviors of diet and physical activity. *Curr Opin Neurol*, 25, 11-17. <https://doi.org/10.1097/WCO.0b013e32834eb58e>
- [4] Johnston, S., Mendis, S., & Mathers, C. (2009). Global variation in stroke burden and mortality: estimates from monitoring, surveillance and modeling. *Lancet Neurology*, 8, 345-354.
- [5] Mozaffarian, D., Benjamin, E., Go, A., Arnett, D., Blaha, M., Cushman, M., *et al.*. (2016). On behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics-2016 update: a report from the American Heart Association. *Circulation*, 133(4), 38-360.
- [6] Mukherjee, D., & Patil, C. G. (2011). Epidemiology and the global burden of stroke. *World Neurosurg*, 76(6), 85-90. <https://doi.org/10.1016/j.wneu.2011.07.023>
- [7] Anderson, J. A. (2016). Acute Ischemic Stroke: The Golden Hour. *Nursing 2016 Critical Care*, 11(3), 28-36.

<https://doi.org/10.1097/01.CCN.0000482731.69703.82>

- [8] Powers, W. J., Rabinstein, A. A., Ackerson, T., Adeoye, O. M., Bambakidis, N. C., Becker, K., *et al.* (2018). Guidelines for the early management of patients with acute ischemic stroke: A guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*, *49*(3), <https://doi.org/10.1161/STR.000000000000158>
- [9] Davis, C., & Lockhart, L. (2016). Update: Stroke Guidelines. *Nursing Management*, *47*(2), 24-33. <https://doi.org/10.1097/01.NUMA.0000479442.68020.46>
- [10] Han, B., & Haley, W. E. (1999). Family caregiving for patients with stroke. Review and analysis. *Stroke*, *30*, 1478-1485. <https://doi.org/10.1161/01.STR.30.7.1478>
- [11] Smith, L., Lawrence, M., Kerr, S., Langhore, P., & Lees, K. (2004). Informal careers; experience of caring for stroke survivors. *Journal of Advanced Nursing*, *46*, 235-244.
- [12] McCullagh, E., Brigstocke, G., Donaldson, N., & Kalra, L. (2005). Determinants of caregiving burden and quality of life in caregivers of stroke patient. *Stroke*, *36*, 2181-2186.
- [13] Cecil, R., Thompson, K., Parahoo, K., & McCaughan, E. (2013). Towards an understanding of the lives of families affected by stroke: a qualitative study of home carers. *Journal of Advanced Nursing*, *69*(8), 1761-1770.
- [14] Good, D., Bettermann, K., & Reichwein, R. (2011). Stroke rehabilitation. *Continuum (Minneapolis)*, *17*(3), 545-67.
- [15] Chaiyawata, P. (2012). Kulkantrakornb K. Effectiveness of home rehabilitation program for ischemic stroke upon disability and quality of life: a randomized controlled trial. *Clinical Neurol Neurosurg*, *114*(7), 866-870. <https://doi.org/10.1016/j.clineuro.2012.01.018>
- [16] Blake, H., Lincoln, N., & Clark, D. D. (2003). Caregiver strain in spouses of stroke patients. *Clinical Rehabil*, *17*(3), 312-317.
- [17] Bowsher, D. (2013). Sensory consequences of stroke. *Lancet*, *341*, 156. [https://doi.org/10.1016/0140-6736\(93\)90015-9](https://doi.org/10.1016/0140-6736(93)90015-9)
- [18] Bakas, T., Austin, J., Okonkwo, K., Lewis, R., & Chadwick, L. (2012). Needs, concerns, strategies, and advice of stroke caregivers the first 6 months after discharge. *Journal of Neuroscience Nursing*, *34*(5), 242-251.
- [19] Weltermann, B. M., Berger, K., Rogalewski, A., Homann, J., Schulte, H., Assmann, G., & Ringelstein, B. (2009). Knowledge about stroke in a German occupational cohort [in German]. *Aktuelle Neurol*, *8*, 834-839.
- [20] Given, B. A., *et al.* (2011). Family support in advanced cancer. *CA Cancer Journal of Clinicians*, *51*(4), 213-231. <https://doi.org/10.3322/canjclin.51.4.213>
- [21] Maeshima, S., Ueyoshi, A., Osawa, A., *et al.* (2003). Mobility and muscle strength contralateral to hemiplegia from stroke: benefit from self-training with family support. *American Journal of Physical Medicine & Rehabilitation*, *82*, 456-462.
- [22] Sangngam, A. (2006). The development of a home-based rehabilitation program for primary caregivers of stroke patients. *Master's thesis*. Bangkok (Thailand), Mahidol University.
- [23] Danzl, M. M. (2013). Developing the rehabilitation education for caregivers and patients (recap) model: application to physical therapy in stroke rehabilitation. *Dissertation*. Lexington (Kentucky): College of Health, Sciences, University of Kentucky.
- [24] National stroke association (US). (2017). *Caregivers and Family*, National Stroke Association (America). Retrieved from <https://www.stroke.org/we-can-help/caregivers-and-family/>
- [25] Feigin, V., Lawes, C., Bennett, D., & Anderson, C. (2003). Stroke epidemiology: a review of population-based studies of incidence, prevalence, and case-fatality in the late 20th century. *Lancet Neurol*, *2*, 43-53.
- [26] Ovbiagele, B., Kautz, S., Feng, W., & Adkins, D. (2014). Poststroke outcomes. *Stroke Res Treat [internet]*. Retrieved from <https://www.hindawi.com/journals/srt/2014/828435>
- [27] Hartman-Maeir, A., Soroker, N., Ring, H., Avni, N., & Katz, N. (2007). Activities, participation and satisfaction one-year post stroke. *Disabil Rehabil*, *29*, 559-566.



- [28] Lynch, E., Butt, Z., Heinemann, A., Victorson, D., Nowinski, C., Perez, L., & Cella, D. (2008). A qualitative study of quality of life after stroke: the importance of social relationships. *Journal of Rehabilitation Medicine*, 40(7), 518-523. <http://doi.org/10.2340/16501977-0203>
- [29] Urban, P. P., Wolf, T., Uebele, M., *et al.* (2010). Occurrence and clinical predictors of spasticity after ischemic stroke. *Stroke*, 41, 2016-2020.
- [30] Wissel, J., Olver, J., & Sunnerhagen, K. S. (2013). Navigating the poststroke continuum of care. *Journal of Stroke & Cerebrovascular Diseases*, 22, 1-8.
- [31] Murray, J., Ashworth, R., Forster, A., & Young, J. (2003). Developing a primary care-based stroke service: a review of the qualitative literature. *British Journal of General Practice*, 53, 137-142.
- [32] Haacke, C., Althaus, A., Spottke, A., Siebert, U., Back, T., & Dodel, R. (2006). Long-term outcome after stroke: evaluating checklist for standard poststroke care e179 health-related quality of life using utility measurements. *Stroke*, 37, 193-198.
- [33] Hare, R., Rogers, H., Lester, H., McManus, R., & Mant, J. (2006). What do stroke patients and their carers want from community services?. *Family Practice*, 23, 131-136.
- [34] Bear, M., Connors, B., & Paradiso, M. (2007). *Neuroscience Exploring the Brain* (3rd ed.). London: Lippincott Williams & Wilkins.
- [35] Salter, K., Zettler, L., Foley, N., *et al.* (2010). Impact of caring for individuals with stroke on perceived physical health of informal caregivers. *Disability & Rehabilitation*, 32, 273-281. <https://doi.org/10.3109/09638280903114394>
- [36] White, C., Korner-Bitensky, N., Rodrigue, N., *et al.* (2007). Barriers and facilitators to caring for individuals with stroke in the community: the family's experience. *Canadian Journal of Neuroscience Nursing*, 29, 5-12.
- [37] King, R. B., Ainsworth, C. R., Ronen, M., & Hartke, R. J. (2010). Stroke caregivers: pressing problems reported during the first months of caregiving. *J Neurosci Nurs*, 42(6), 302-311.
- [38] Brandon, I. L. (2013). Easing the burden on family caregivers. *Nursing*, 43(8), 36-42.
- [39] Bakas, T., Austin, J. K., Jessup, S. L., Williams, L. S., & Oberst, M. T. (2004). Time and difficulty of tasks provided by family caregivers of stroke survivors. *J Neurosci Nurs*, 36, 95-106.
- [40] Pinquart, M., & Sorensen, S. (2006). Helping caregivers of persons with dementia: which interventions work and how large are their effects?. *International Psychogeriatrics*, 18(4), 577-95. <https://doi.org/10.1017/S1041610206003462>
- [41] Lee, K., Choi, S., Kim, S., *et al.* (2015). A Survey of Caregivers' Knowledge About Caring for Stroke Patients. *Annals of Rehabilitation Medicine*, 39(5), 800-815.
- [42] Das, S. K., Banerjee, T. K., Biswas, A., Roy, T., Raut, D. K., Mukherjee, C. S., *et al.* (2007). A prospective community-based study of stroke in Kolkata, India. *Stroke*, 38, 906-910.
- [43] Kottke, F. J., & Lehmann, J. F. (1990). *Krusen's handbook of physical medicine and rehabilitation* (4th ed.). Philadelphia: Saunders.
- [44] Kim, J. J. (2002). *Fundamentals of current nursing*. Seoul: Jeong Dam Books.
- [45] Halar, E. M., & Bell, K. R. (2010). Physical inactivity: physiological and functional impairments and their treatment. In W. R. Frontera, & J. A. DeLisa (Eds.), *DeLisa's physical medicine & rehabilitation: principles and practice* (pp. 1249-72). Philadelphia: Lippincott Williams & Wilkins.
- [46] Mahoney, F. I., & Barthel, D. (1965). Functional evaluation: The Barthel Index. *Maryland State Medical Journal*, 14, 56-61.
- [47] Koenig, K., Whyte, E., Munin, M., O'Donnell, L., Skidmore, E., Penrod, L., & Lenze, E. (2007). Stroke-related Knowledge and Health Behaviors Among Poststroke Patients in Inpatient Rehabilitation. *Archives of Physical Medicine and Rehabilitation*, 88(9), 1214-1216.
- [48] Gurjar, N. (2019). Effectiveness of educational program on knowledge and competence of home care of stroke patients among care givers. *International Journal of Health Sciences & Research*, 9(5), 260-265.
- [49] Choi, J. S., Seo, Y. M., & Kwon, I. S. (2006). Effects of education on knowledge and practice of caregivers of the stroke patient. *Taehan Kanho Hakhoe Chi*, 36(7), 1175-1182.

- [50] Pitthayapong, S., Thiangtam, W., Powwattana, A., Leelacharas, S., & Waters, C. (2017). A Community Based Program for Family Caregivers for Post Stroke Survivors in Thailand. *Asian Nursing Research*, 11(2), 150-157.
- [51] Baminidevi, N. (2019). Comprehensive Stroke Education Programme (CSEP) on knowledge and quality of life among patients with stroke and burden among caregivers. *Nursing and Health Care*, 4(1), 71-80.
- [52] Green, T., Haley, E., Eliasziw, M., & Hoyte, K. (2007). Education in stroke prevention: efficacy of an educational counseling intervention to increase knowledge in stroke survivors. *Canadian Journal of Neuroscience Nursing*, 29(2), 13-20.
- [53] Shebl, A. M., & Elhameed, S. (2014). Impact of informal caregivers training program on geriatric patients' functional status and post-stroke depression. *IOSR Journal of Nursing And Health Science*, 3(4), 45-53. <https://doi.org/10.9790/1959-03414553>
- [54] Bhatia, R., Thomas, A., & Agarwal, M. (2015). Effectiveness of a structured teaching programme in improving the knowledge and skills of the care givers and preventing secondary complications in hospitalized stroke patients. *Neurology*, 84(14), 147.
- [55] Lekshmy, J. (2005). *A study to assess the knowledge and practice of caregivers about home care management of stroke patients*. Scimst Trivandrum.
- [56] Nayeri, N., Mohammadi, S., & Arazi, T. (2011). Examining the Level of Adherence of Therapeutic Regime by the Family Caregivers of Stroke Patients. *Canadian Journal on Medicine*, 2(4), 87-98
- [57] Olai, L., Borgquist, L., & Svardstudd, K. (2015). Life situations and the care burden for stroke patients and their informal caregivers in a prospective cohort study. *Uppsala Journal of Medical Sciences*, 120, 290-298.
- [58] Tsai, P., Yip, P., Tai, J., & Lou, M. (2015). Needs of family caregivers of stroke patients: a longitudinal study of caregivers' perspectives. *Patient Preference and Adherence*, 9, 449-457.
- [59] Amritha, C. (2009). *Knowledge assessment of caregivers of stroke patients about their caring role*. Trivandrum.
- [60] Hassan, H., & Nasr, E. (2017). Improving nurses' knowledge and skills regarding tocolytics for inhibiting preterm labor. *Clinical Nursing Studies*, 5(1), 1-12. <https://doi.org/10.5430/cns.v5n1p1>
- [61] Mohamed, W., & Hassan, H. (2020). Effect of Instructional Supportive Guideline for Improving Women's Awareness towards Endometriosis. *American Journal of Nursing Research*, 8(1), 38-47. <https://doi.org/10.12691/ajnr-8-1-5>
- [62] Hassan, H., Malk, R., Abdelhamed, A., & Genedy, A. (2020). Infection Control Knowledge and Practices: Program Management in Labor Units According to Standard Infection Control Precautions in Northern Upper Egypt. *American Journal of Nursing Research*, 8(4), 412-425. <https://doi.org/10.12691/ajnr-8-4-1>
- [63] Sheha, E., Hassan, H., Genedy, A., & Hassanine, Sh. (2020). Effect of educational program on mother's knowledge and practice regarding Hepatitis C Virus in rural areas. *American Journal of Nursing Research*, 8(3), 303-310. <https://doi.org/10.12691/ajnr-8-3-1>
- [64] Hassan, H. (2019). Integrative Nursing Science in Women's Pre-conceptual Wellness. *International Journal of Health and Biological Sciences*, 2(1), 17-18.
- [65] Hassan, H., Mohamady, Sh., & Abd El-Gawad, N. (2017). Protocol for improving nursing performance towards placental examination at labor units. *Clinical Nursing Studies*, 5(2), 1-11. <https://doi.org/10.5430/cns.v5n2p1>
- [66] Gamel, W., Genedy, A., & Hassan, H. (2020). Impact of puerperal sepsis self-care nursing guideline on women's knowledge and practices. *American Journal of Nursing Research*, 8(2), 132-141. <https://doi.org/10.12691/ajnr-8-2-1>
- [67] Mohamed, W., & Hassan, H. (2019). Educational program to enhance pregnant women's knowledge about dental care and periodontitis outcomes. *ARC Journal of Nursing and Healthcare*, 5(3), 23-33. <https://doi.org/10.20431/2455-4324.0503004>
- [68] Masters, K. (2013). Edgar Dale's Pyramid of Learning in medical education: A literature review. *Medical Teacher*, 35(11), e1584-e1593. <https://doi.org/10.3109/0142159X.2013.800636>
- [69] Signal, N. (2014). Strength training after stroke: rationale, evidence and potential implementation barriers for physiotherapists. *NZJP*, 42(2), 101-7.

- [70] Persson, C., Hansson, P., Lappas, G., & Danielsson, A. (2016). Physical activity levels and their associations with postural control in the first year after stroke. *Physical Therapy, 96*(9), 1389-1396. <https://doi.org/10.2522/ptj.20150367>
- [71] Teel, C. (2001). Duncan P. Lai S. Caregiving Experiences After Stroke. *Nursing Research, 50*(1), 53-60.
- [72] Musa, K., & Keegan, T. (2018). The change of barthel index scores from the time of discharge until 3-month post-discharge among acute stroke patients in Malaysia: a random intercept model. *PLoS One Journal, 13*(12).
- [73] Tveiten, A., Ljostad, U., Mygland, A., & Naess, H. (2014). Functioning of long-term survivors of first-ever intracerebral hemorrhage. *Acta Neurologica Scandinavica, 129*(4), 269-275.
- [74] Kong, K., & Lee, J. (2014). Temporal recovery of activities of daily living in the first year after ischemic stroke: a prospective study of patients admitted to a rehabilitation unit. *Neuro Rehabilitation, 35*(2), 221-226.
- [75] Kalra, L., Evans, A., Perez, I., Melbourn, A., Patel, A., Knapp, M., *et al.* (2004). Training care givers of stroke patients: randomised controlled trial. *BMJ, 328*, 1099.
- [76] Tang, Y., & Chen, S. (2003). Health promotion behaviors in Chinese family caregivers of patients with stroke. *Health Promotion International, 17*(4), 329-339.
- [77] Sahebalzamani, M., Aliloo, L., & Shakib, A. (2009). The efficacy of self-care education on rehabilitation of stroke patients. *Saudi Medical Journal, 30*(4), 550. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/19370286>
- [78] Dharma, K., Damhudi, D., Yarden, N., & Haeriyanto, S. (2018). Increase in the functional capacity and quality of life among stroke patients by family caregiver empowerment program based on adaptation model. *International Journal of Nursing Sciences, 5*(4), 357-364.
- [79] Light, K., Nuzik, S., Personius, W., & Barstrom, A. (1984). Low-load prolonged stretch vs. high-load brief stretch in treating knee contractures. *Physical Therapy, 64*, 330-333.
- [80] Moseley, A. M. (1997). The effect of casting combined with stretching on passive ankle dorsiflexion in adults with traumatic head injuries. *Physical Therapy, 77*, 240-247.
- [81] Stuart, M., Chard, S., & Roettger, S. (2008). Exercise for chronic stroke survivors: a policy perspective. *Journal of Rehabilitation Research & Development, 45*(2), 329-338. <https://doi.org/10.1682/JRRD.2007.02.0027>
- [82] Tseng, N. C. Chen, C. C. H., Wu, S. C., & Lin, L. C. (2007). Effect of a range-of-motion exercise programme. *Journal of Advanced Nursing, 57*(2), 181-191. <https://doi.org/10.1111/j.1365-2648.2006.04078.x>
- [83] White, C. L., Cantu, A. G., & Trevino, M. M. (2015). Interventions for caregivers of stroke survivors: an update of the evidence. *Clinical Nursing Study, 3*(3), 87-95. <https://doi.org/10.5430/cns.v3n3p87>

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