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Effect of Feeding Strategies on Nurses Performance regarding Stroke Associated Pneumonia and Patients Outcomes

(1)Asmaa Mohamed Ahmed, (2) Nadia Mohamed Taha, (3) Howida Kameel Zytoon, (4) Mona Abdullah Mohammed

(1)Clinical Instructor in Medical Surgical Nursing, Faculty of Nursing, Zagazig University, Egypt.

(2)Professor of Medical Surgical Nursing, Faculty of Nursing, Zagazig University, Egypt.

(3)Assistant Professor of Medical Surgical Nursing, Faculty of Nursing, Zagazig University, Egypt.

(4)Assistant Professor of Medical Surgical Nursing, Faculty of Nursing, Zagazig University, Egypt.

Abstract

Feeding strategies for stroke associated pneumonia ”SAP” that enhance swallowing capacity and overall health include assessing swallowing ability, staying upright when feeding, and appropriately adjusting food texture. For patients with reduced consciousness, enteral or parental feeding, keeping an eye on their hydration levels, and practicing good oral hygiene. *The study aimed to* evaluate effect of feeding strategies on nurses' performance regarding stroke associated pneumonia and patients' outcomes. A quasi-experimental design was used. The present study was conducted in stroke ICU at Zagazig university hospitals, Zagazig Governate, Egypt. data was gathered using four tools: Self-administered questionnaires for nurses regarding demographic data, and nurses` knowledge. Observational checklist to assess level of nurses' practices. Patients' interviewing questionnaire about demographic characteristics, and clinical data. A convenience sample of all available nurses (40). Purposive sample of (80) patients split into two groups case and control. Nearly two thirds (62.5) of studied nurses were between the ages of 25 and 30. In terms of nurses' qualification, (72.5%) of nurses completed a technical institute. The majority (87.5%) of studied nurses' had satisfactory total level knowledge post intervention of feeding strategies. The most (90.0%) of studied nurses' had satisfactory total level of practice post intervention. The majority (87.5%&82.5%) respectively of patients in the control and case groups were between the ages of 50 and 60. All patients in the control and case groups had a nasogastric tube inserted after suffering an ischemic stroke. There was a significant improvement in patients' outcome at case group compared to control group. There was significant improvement in nurses' performance and outcomes of patients with SAP after implementation of nursing feeding strategies program. Continuous feeding strategies programs for nurses caring for patients with SAP.

Keywords: *Feeding strategies, Nurses Performance, Patient's Outcome, and SAP*

Full length article **Corresponding Author*, e-mail: *asmaaabdelmaksoud121@gmail.com*

1. Introduction

A stroke is a type of cerebrovascular emergency that is defined by an abrupt loss of neurological function brought on by an interruption in the blood flow or a bleed in the brain tissue. Stroke is a cerebrovascular condition that can be broadly classified into two types: hemorrhagic stroke, which is caused by vascular irregularities, and ischemic stroke, which is caused by an embolism or in situ small vessel disease. Unilateral weakness, numbness, diplopia, impaired speech, ataxia, and other related symptoms like headaches are often the first signs of a stroke. However, stroke patients are at a higher risk of developing stroke-associated pneumonia, or "SAP," because of swallowing issues and a weak cough reflex brought on by neurologic abnormalities [1]. Stroke is the second most prevalent cause of mortality after ischemic heart disease, accounting for 11.8% of all fatalities worldwide. As such, it lays a significant burden on society. Additionally, it ranks third in terms of disability-adjusted life years. After a stroke, SAP is a common clinical consequence that usually manifests during the first week. Although the prevalence varies greatly between studies, SAP complicates about 14% of strokes. When SAP happens, it has significant clinical ramifications and is thought to be responsible for the greatest increase in mortality among all post-stroke medical sequelae, with estimates ranging from 10.1 to 37.3%. Additionally, with the expected cost of each case, SAP places a significant financial strain on medical systems [2].

As defined by[3]**:**SAP is a spectrum of lower respiratory tract infections that complicate the first seven days following stroke hospitalization. SAP associated with longer hospital stays, less favorable outcomes for survivors, and higher mortality rates. The range included temperature exceeding 38°C, leukocytosis, increasing respiratory secretions, a worsening cough with purulent sputum, dyspnea or tachypnea, and worsening chest discomfort.

About 20% of acute stroke patients experience SAP, one of most prevalent stroke sequelae. SAP results in brain cell hypoxia, which impairs brain function as a whole. Additionally, it is linked to a threefold rise in mortality, an average of seven extra hospital days, and higher medical expenses. Research on risk factors and predictive models has been spurred by necessity of SAP prevention. Although there is no set risk factor, each prediction model considers different risk parameters and has distinct diagnostic criteria Generally speaking, known risk factors include advanced age, dysphagia, and a high National Institute of Health Stroke Scale "NIHSS" score [4].

Concomitant pneumonia increases the risk of dehydration, malnourishment, and oxygen insufficiency in stroke patients, which can exacerbate neurological abnormalities and endanger their lives. Treatments for pneumonia may not always produce the expected results since stroke patients frequently have numerous comorbidities. Thus, it is essential to prevent SAP [5]. General feeding strategies for SAP to enhance the overall health and swallowing abilities of people with dysphagia. Feeding strategies include utilizing a direct or indirect swallowing test to assess a person's capacity to swallow, making sure they are alert before delivering food, and staying upright during feeding. Food texture should be changed appropriately based on the patient's swallowing abilities. For patients with moderate to severe dysphagia or a reduced degree of consciousness, gastric or parental feeding is advised, along with nutrient intake and hydration status monitoring. Consistent and diligent dental hygiene is an essential component of patient care and is profoundly affected on the overall wellness and health of patients [6].

1.1. Significance of the study

Up to 78% of all stroke patients have morbidity following an acute stroke. Nearly 50% of stroke patients still have dysphagia, a chronic condition that increases mortality, mobility, and institutionalization because of malnutrition and SAP. Pneumonia is around five times more common in people with dysphagia than in those without it. One of the most common causes of death following a stroke is thought to be pneumonia. Due to inappropriate feeding strategies, the majority of SAP resulted in dysphagia and the subsequent aspiration of oropharyngeal food particles into the lung. There is compelling evidence that teaching nurses SAP feeding techniques lowers mortality rates and enhances patient outcomes [7].

395 people were admitted to Zagazig University hospitals' intensive care units (ICUs) for stroke patients with SAP up to 2023 [30]. With a reported frequency ranging from 12.4% to 47%, SAP (newly developed pneumonia following stroke start) is a common stroke-related event. SAP can lead to severe disability, worsen stroke outcomes, and even contribute to death [9].

Success of stroke unit care in lowering post-stroke morbidity and death recognized to be significantly influenced by requirement for skilled nursing care. Registered nurses play a specific role in treating patients who exhibit SAP risk factors by using appropriate feeding strategies based on patient's condition. A crucial component of nursing care is preventing and managing stroke consequences, including SAP, which can drastically lower hospital admission costs, length of stay, and mortality rates [10]. In order to evaluate the effect of feeding strategies on nurses' performance regarding stroke associated pneumonia and patients' outcomes, the current study was conducted.

Aim of the study

It was to evaluate effect of feeding strategies on nurses' performance regarding stroke associated pneumonia and patients' outcomes.

- ***Through the following objectives***

- Asses nurses' level of knowledge about feeding strategies regarding SAP.
- Asses nurses' practice about feeding strategies regarding SAP.
- Develop, implement and evaluate the effect of feeding strategies program on nurses' knowledge, practices and patients' outcomes.

1.2. Research Hypothesis

H_1: Nurses' mean knowledge scores post implementing feeding strategies will be higher than their pre-implementation scores.

H_2: Nurses' mean practice scores will be higher after implementing feeding strategies than they were before.

H3: There is a significant improvement in patients' outcomes in case group than those in the control group.

Operational definition:

Effect: The significant increase in nurses' level of knowledge , and practice about feeding strategies regarding SAP as evidenced by the mean and standard deviation pre-test and post-test score**.**

Strategy: is a techniques or modification which seeks to identify, pursue, and achieve desired outcomes. In this study, the implementation of feeding strategies for SAP includes swallowing ability assessment , residual amount assessment, gastric gavage, administering medications via a gastric tube , hydration status assessment) and, oral care.

Performance: The term performance refers to the act of carrying out or doing. It is an execution, accomplishment or achievement. For the purpose of this study, the term means knowledge and practice of the nurse at stroke ICU.

Patient outcomes: The result of feeding strategies program given to the studied nurse, including (length of hospital stay, degree of dysphagia and signs and symptoms of SAP).

1.3. Research design

To accomplish the study's aim, a quasi-experimental design was conducted.

1.4. Setting

The study was carried out in a 14-bed stroke intensive care unit (ICU) on the second floor of an internal hospital in the Zagazig Governate, Egypt.

2. Subjects

- **A Convenience sample** of all accessible certified nurses (40) employed in the aforementioned context based on the following criteria: those with more than six months of experience, both sexes, and those who agreed to participate but had never had any associated training before as well as, nurses who have bachelor degree were excluded from the study.
- **Purposive sample** of (80) adult patients with SAP. They were split up into two groups, "case" and "control," each with 40 patients. based on the following criteria: Patients with ischemic stroke, both sexes, aged 20–60 years, severe and moderate dysphagia on nasogastric tube, positive swallowing test, conscious patient, able to communicate, and Glasgow Coma Scale "GCS" greater than 9 (spontaneous eye opening, following simple instructions, and maintaining a supported sitting position), as well as those with hemorrhagic stroke, stroke that affected brain stem, and those connected to mechanical ventilation were excluded from the study.

2.1. Tools of data collection

Tool I: Self-administered questionnaires: for nurses

- Divided into two parts:-

Part I: Nurse's Demographic data: Eight closed-ended questions covering age, gender, marital status, residence, education level, years of experience, attendance at SAP courses which adapted from [11].

Part II: Assessment of nurses' knowledge: To assess nurses knowledge regarding care of patients with SAP. The list contained 59 items in total. The items in question were divided into four sections as follows:

1- First section (Assessment of nurses' knowledge regarding anatomy and physiology of respiratory system): composed of 10 questions Multiple Choice Questions about (the main function of the respiratory system, components of the upper respiratory system, components of the lower respiratory system, function of the nose and sinuses, the main function of the epiglottis, description of the pharynx, site of gas exchange, definition of inspiration, the membrane surrounding each lung and normal respiratory rate in an adult) which adapted from [10].

2- The second section (Assessment the nurses' knowledge regarding SAP): It consisted of 18 Questions in the form of 12 True and False Questions and 6 Multiple Choice Questions. These questions covered (definition of SAP, the incidence of SAP, the main cause of SAP, major risk factor for SAP, dysphagia and improper feeding strategies lead SAP, signs and symptoms of SAP**,** laboratory tests to diagnose SAP, if SAP considered a one of post stroke complication, whether SAP increases the risk of death ,complications of SAP, treatment of SAP, prevention of SAP, precautions to reduce the risk of SAP, patient position to improve breathing, purpose of chest physiotherapy, nurse actions before and after suctioning, time for changing the distilled water inside the humidifier, and actions to avoid hypoxia during suction. Which adapted from [10] and modified by researcher to suite aim of the study.

3-The third section (Assessment nurses knowledge regarding feeding strategies for SAP): It included 20 Multiple Choice Questions which included (assessment swallowing ability to determine appropriate feeding method for patient, nurse actions before performing a swallowing test, indications for gastric tube or parental nutrition, reason for preferring a gastric tube instead of parental nutrition, the method of a gastric tube to reduce aspiration, actions to reduce the incidence of SAP during gastric feeding, nurse actions during gastric feeding to determine completion of the digestion process, disadvantages of parental nutrition, nurse actions during gastric tube or parental nutrition, indications of feeding patient orally, the patient's position after oral or gastric tube feeding , nurse actions when GRV reaching 500, signs and symptoms of dysphagia ,nurse actions for dysphagia signs appear during or after the patient's oral feeding, nursing care for a patient with SAP who suffers from dysphagia, nurse actions when feeding a patient with hypertension, nurse actions when feeding a patient with diabetes mellitus, nurse actions when feeding a patient with heart disease, nurse actions when feeding a patient with liver cirrhosis, and nutrition strategies for patients with dysphagia. Which adapted from [12-13] and modified by researcher to suite aim of the study.

4-The fourth section (Assessment of nurses' knowledge regarding oral care): It consisted of 11 Questions in the form of seven True and False Questions and four Multiple Choice Questions which included (definition of oral care ,impact of oral care, risk factor for the growth of bacteria, oral care is swabbing mouth, nurses role during oral care assessment the oral cavity, steps of oral care, oral care considered one of the nursing intervention to prevent SAP, times of oral care equipment needed for oral care, solutions used in oral care, the correct patient position) which adapted from [14] and modified by researcher to suite aim of the study.

- ***The scoring system***

Response score were assigned as the following: Each question was assigned one for each correct answer and zero for incorrect answer. Total score of knowledge was 59 point. Total nurses' knowledge equal or above 80 % was deemed satisfactory, and unsatisfactory if less than 80% based on statistical analysis.

Tool II- Observational checklists for nurses

It was used to assess level of nurses' practices regarding feeding strategies for SAP. Attenuated observational checklist was adopted by the researcher as guided by [14-19]. It consists of six parts:

- Swallowing test: which included 5 items
- Residual amount assessment: It included 15 items.
- Nurses' practice before, during and after gastric Gavage: It included 29 items.
- Administering medications via a gastric tube: It included 38 items.
- Hydration Status Assessment: It included 27 items.
- Oral care: It included 21 items.

- ***Scoring System***

Each item in each technique was checked as (done) and (not done). These were scored from one and zero respectively, so that a higher score indicate better practice. The total score of all techniques were summed-up and divided by the number of the steps to calculate a mean

score. Mean and standard deviation were calculated for nurses in the pre and post program phase. The overall practice score deemed satisfactory when total score equal or above 80% and unsatisfactory if it below 80% based on statistical analysis.

Tool III: Patients' interviewing questionnaire

Includes two parts as follows: -

First part: Demographic characteristics of patient: Eight closed ended questions including age, gender, date of ICU admission, date of discharge, marital status, educational level, occupation, and residence.

Second part: Clinical data of patient: Which were composed of six closed ended questions including previous CVS, stroke type, side of affection, feeding condition, NG tube insertion, and past medical history which adapted from **Abd El-Hamid, *et al.,*. [20]**

Tool IV: Patients outcomes indicators

Which were composed of three parts (length of hospital stay, degree of dysphagia, signs and symptoms and occurrence of SAP)

- **Degree of dysphagia:** By employing the Gugging Swallowing Screen (GUSS), which was adapted from **Hussein & Mahmoud,[31].** to assess acute stroke patients' risk of aspiration and the degree of their dysphagia. Saliva was swallowed first in the test, and then semisolid, fluid, and solid textures. It included four subtests and was separated into two sections: the direct swallowing test, which had three subtests, and the preliminary assessment, also known as the indirect swallowing test (Subtest 1). It is necessary to complete these four subtests in order. 1. Vigilance; 2. Voluntary coughing and/or throat clearing; and 3. Saliva swallowing (swallowing, drooling, and voice change) were evaluated in the indirect swallowing test. In the semi-solid swallowing, liquid swallowing, and solid swallowing trials, the direct swallowing test evaluated deglutition, involuntary coughing, drooling, and vocal changes. Each subtest has a maximum score of five points, and the evaluation is based on a point system. The maximum score a patient can achieve is 20 points, which indicates normal swallowing skills without aspiration risk. Four severity levels can be identified in total: Severe dysphagia and high aspiration risk are represented by scores of 0–9; moderate dysphagia and moderate aspiration risk are represented by scores of 10–14; mild dysphagia and mild aspiration are represented by scores of 15–19; and normal swallowing capacity is represented by scores of 20**.**

-Signs & symptoms and occurrence of SAP: Adapted from **Abd El-Hamid, *et al.*, [20]** which included fever, chest pain, cough, WBC $\geq 10\times109/l$ or $\leq 4\times109/l$, and signs of pulmonary consolidation in chest X-ray.

Scoring system: Each item was marked as yes and No, these are each scored from 1 to zero.

2.2. Administrative and ethical consideration

The general director of Zagazig University Hospitals received the required approvals, which were acquired from the dean of the nursing faculty. The head of the aforementioned setting then granted permission to conduct the study after outlining its aim and obtaining verbal consent from nurses and patients to participate in it, with the assurance that the data would only be used for research. Following an explanation of its objective, they were offered the option to decline participation and were reassured that the data would only be used for research. Every ethical concern was taken into account at every stage of the research. The following were among the ethical research considerations in this study: Research approval was acquired prior to the implementation of Program, participants were informed of the study's goals and objectives, confidentiality and anonymity were guaranteed through the coding of all data, and subjects were free to opt out of the study at any time without incurring any penalties. The researcher affirmed that there was no risk to the study participants throughout the implementation of the research and that the data and information gathered would be kept private and utilized exclusively to enhance the health of the patients.

2.3. Pilot study

A pilot study was carried out on four nurses and eight patients (10%) of the total study sample to test clarity, applicability, relevance and feasibility of the tools and to estimate the required time to fill in each form. Necessary modification were done according to the pilot study results. Pilot subjects were later excluded from the main study sample.

2.4. Field work

After an official permission was taken from the dean of the faculty of nursing, from the manager of Zagazig University Hospitals and from the head of internal medical hospital with agar, the implementation phase for data collection started as following: The selection of nurses and patients, the collection of data, and the implementation of the feeding strategies lasted over a period of 8 months, began from January 2023 to the end of August 2023. The questionnaire was designed by the researcher. Data used was collected where the researcher was available four days weekly from nine am to five pm where the feeding strategies were implemented. According to finding of the pilot study the time was shortage to fill out the interviewing questionnaire so increase to 30-45 min and some questions modified accordingly. Nurses were grouped (eight groups) each group included five nurses while each patient was interviewed individually. It was necessary for the researcher to introduce herself for the nurses and patients and explain the purpose of the study. The study carried out through phases: preparatory, assessment, planning, implementations, and evaluation.

Preparatory phase: This phase involved creating the study tools and developing of feeding strategies by the authors based on a thorough analysis of recent, pertinent articles. [14-17-19].It was written in simple Arabic language and contained pictures for more illustrations to facilitate patients' understanding.

Assessment phase: The sample was first gathered by the researcher based on being eligible restrictions. The data collection form was used to conduct individual interviews with those who consented to participate. The data collected acted as a pretest or baseline and helped the researcher prepare the booklet on feeding strategies.

Planning phase: The researcher created educational feeding strategies based on nurses' needs and performance gaps using assessment data and relevant literature to train nurses and enhance their practice, knowledge, and patient

outcomes. Both a theoretical and a practical component were included in the educational feeding strategies. A variety of teaching methodologies were chosen to best meet the individual needs of each nurse through lectures, demonstration, and re demonstration to make understanding and incorporation of theory and practice easier. Instructional materials were used as presentation slides, videos, and coloured printouts. To accomplish study's aim, researcher created an illustrated feeding strategies booklet in plain Arabic to assist nurses in acquiring, reviewing contents.

Implementation phase: Nurses were split up into eight small groups, with five nurses in each group, and the devised program was implemented as sessions conducted in the study settings. The program's content was spread out over 20 sessions, each lasting roughly 30 to 45 minutes. The program's aim and contents, general objectives, teaching methods, learner activities, and evaluation techniques were all explained in the initial orientation session. The program's theoretical portion was covered in seven sessions, while the practical portion was handled in the remaining twelve. The 1st Theoretical session covered anatomy and physiology of respiratory system. The 2nd and 3rd session included necessary knowledge about SAP (definition, causes, risk factors, symptoms, diagnosis, prevention, complications, treatment and nursing role). The 4th, 5th and 6th session covered necessary knowledge about feeding strategies for SAP, gastric tube feeding, and parental nutrition. 7th session covered necessary knowledge about oral care.

Practical session covered the following: Performing swallowing test, how to assess residual amount, gastric gavage, how to administer medication via gastric tube, how to perform hydration status assessment, and finally, oral care technique. For demonstration and re-demonstration, each technique was completed in one session. The morning and afternoon shifts served for these sessions. To get nurses' attention and encourage their participation, the researcher employed a variety of learning strategies throughout training. A variety of teaching materials were employed. The researcher had nurses re-demonstrate each step using observation checklists. The nurses received the booklet preprogram. A variety of instructional techniques, including lectures, group discussions, and demonstrations, were employed. Regarding the patients under study, the researcher took them after the nurses had applied for the program; the patients were admitted to the intensive care unit prior to any nursing interventions being administered as a pretest. The patients were chosen by the researcher based on inclusion criteria. Individual interviews with each patient lasted roughly thirty to forty-five minutes.

Evaluation phase: Following implementation, the researcher evaluated how the feeding strategies program affected nurses' practice and knowledge as well as patient outcomes. It was completed as a post-test two months into the program. However, the assessment of patient (case group) outcomes will be conducted as soon as the feeding strategies are put into implementation. The evaluation was conducted using the identical nurses' data collection tools that were used for the pretest. The control and case groups were evaluated using the same patient data collection tools.

2.5. Content validity& Reliability

Of the proposed tools by using face and content validity. Face validity aimed at inspecting the items to determine whether the tools measure what supposed to measure. Content validity was conducted to determine whether the content of the tools cover the aim of the study. This stage developed by a jury of five experts, one of them professor in therapeutic nutrition at faculty of medicine, and one of them professor of medical surgical nursing and three assistant professors of medical surgical nursing who reviewed the tool's content for clarity, relevance, comprehensiveness, understanding, and ease for implementation. All recommended modifications were done.

2.6. Testing reliability

The reliability of the tools was tested by using the internal consistency method. It was found that Cronbach's alpha reliability coefficient was 0.867 for nurses' knowledge questionnaire (knowledge), and observational checklist (practice) was reliable at 0.932. While Gugging Swallowing Screen for patients was 0.853.

2.7. Statistical analysis

IBM compatible computers running the Statistical Package for Social Science (SPSS) version 25 for Windows were used to arrange, tabulate, and statistically analyze the acquired data. The use of descriptive statistics, such as frequency, percentages, mean, and standard deviation, was implemented. The Chi square test was used to compare qualitative variables, and the paired t test and independent samples T test were used to evaluate quantitative variables. The correlation between the variables under study was examined using the correlation coefficient test (r). Cronbach's Alpha was used to assess the study tools' reliability. $P < 0.05$ was regarded as a significant level value, and $p < 0.01$ as a highly significant level value. When $p \geq 0.05$, no statistically significant difference was taken into account.

3. Results and discussion

3.1. Results

Table 1: Illustrates that, nearly two thirds (62.5) of studied nurses their age between 25-30 years old with mean± SD=27.08±4.01 and more than half (55.0%) of studied nurses were females. Nearly three quarters (72.5%) of studied nurses had technical institute. More than half (52.5%) of studied nurses had 1-5 years of experience with mean± SD=5.68 ± 3.24, while nearly, more three quarters (77.5%) of studied nurses hadn't attended training course regarding care of patients with SAP. Three quarters (75%) of studied nurses hadn't enough income.

Figure 1: Reveals that, majority (87.5%) of studied nurses' had satisfactory total level knowledge post intervention of feeding strategies compared to, more than one tenth (15.0%) had satisfactory total level knowledge pre intervention of feeding strategies with mean± SD= (52.47±4.53&28.70±9.38) respectively. Finally, there was a highly statistically significant differences in nurses' knowledge pre and post intervention (X^2 42.07 at p-value 0.000).

Figure 2: Reveals that, most (90.0%) of studied nurses' had satisfactory total level of practice post intervention of feeding strategies compared to two fifths (20.0%) of them had satisfactory total level of practice pre intervention of feeding strategies with mean± SD=

(126.92±10.4&86.85±14.1) respectively. Lastly, the level of practice of nurses before and after the intervention differed in a highly statistically significant way (X^2 39.59 at p-value 0.000).

Table 2: Illustrates that, the majority (87.5%&82.5%) respectively of patients in the control and case groups their age between 50-60 years old with mean± SD (55.1±5.6&54.9±5.7) respectively. More than half (55.0%) of patients in the control group compared to less two thirds (62.5%) of the patients in the case group were males. In addition to more than two fifths (45.0%&42.5%) respectively of the patients in the control and case groups weren't educated. Finally, there was no statistically significant difference between patients in the control and case groups regarding demographic characteristics.

Table 3: Presents that, one quarter (25.0%) of the patients in the control group compared to more than one tenth (17.5%) of the patients in the case group had previous CVS. All patients (100.0%) in the control and case groups were ischemic stroke. In addition to the majority (80.0%&85.0%) respectively of the patients in the control group and case groups were left hemisphere affection. All patients (100.0%) in the control and case groups had nasogastric tube insertion. The most (97.5&95.0) respectively of the patients in the control group and case groups had hypertension. Finally, there was no statistically significant difference between patients in the control and case groups regarding clinical data.

Table 4: Shows that, this table clarified that half (50.0%) of patients in case group compared to more than one tenth (12.5 %) of the patients in control group their length of hospital stay were less than ten days with mean± SD (11.7±3.7&17.2±5.3) respectively. Less than one tenth (7.5%) of the patients in case group compared to, more than two fifths (42.5%) of the patients at the control group had severe dysphagia with mean± SD (17.2±3.1&9.28±2.6) respectively. Finally, there was high statistically significant difference between patients in the control and case groups regarding length of hospital stay and degree of dysphagia (X^2 18.724at p-value 0.000& X^2 50.766 at p-value 0.000) respectively.

Table 5: Clarifies that, there was highly statistically significant negative correlation b/w total nurses' knowledge pre intervention and all items of patient outcomes in control group at (p= 0.000, p= 0.001& p= 0.000) respectively compared to in case group there was highly statistically significant negative correlation between total nurses' knowledge pot intervention and all items of patient outcomes at (p= 0.000, p= 0.006& p= 0.000) respectively. In addition to, there was highly statistically significant negative correlation between total nurses' level of practice pre intervention and all items of patient outcomes in control case at (p= 0.000, p= 0.003& p= 0.001) respectively, compared to in case group there was highly statistically significant negative correlation b/w total nurses' level of practice pot intervention and all items of patient outcomes at (p= 0.000).

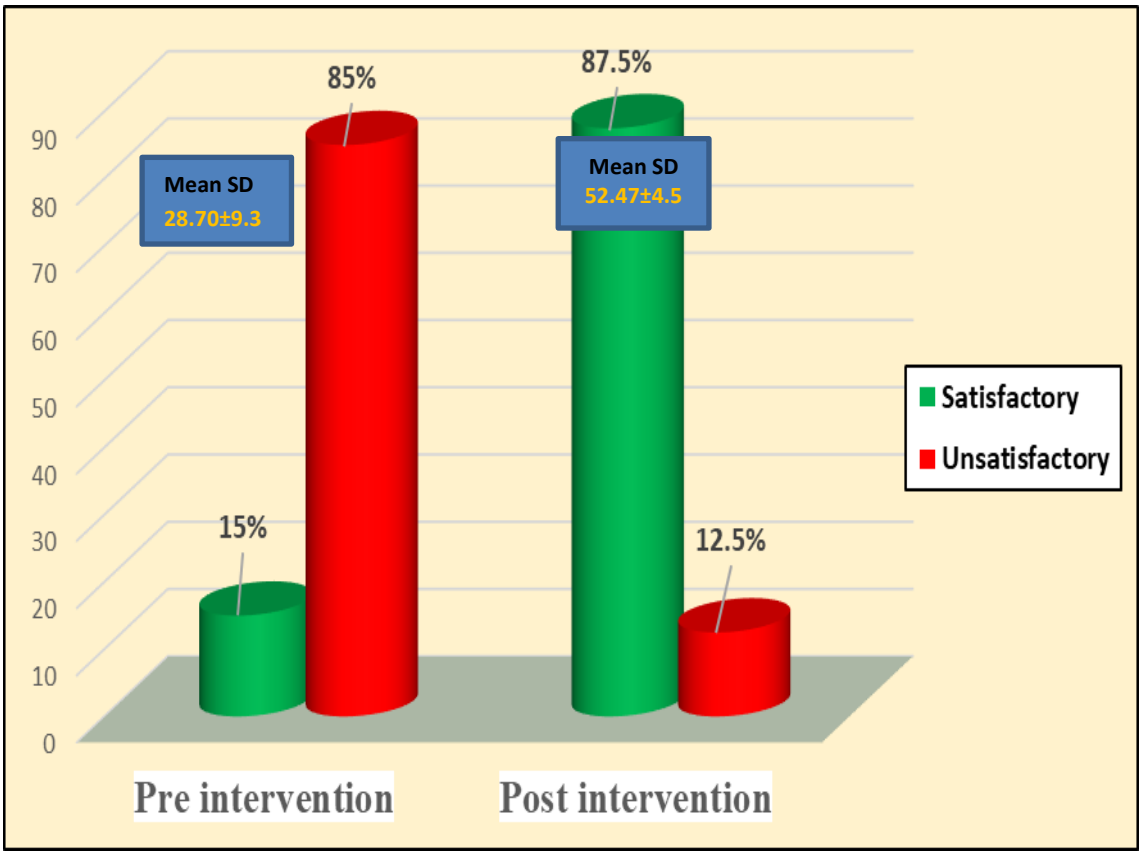

Figure 1: Frequency Distribution of Total Nurses' knowledge Regarding Stroke Associated Pneumonia at Pre and Post Intervention of Feeding Strategies (n=40).

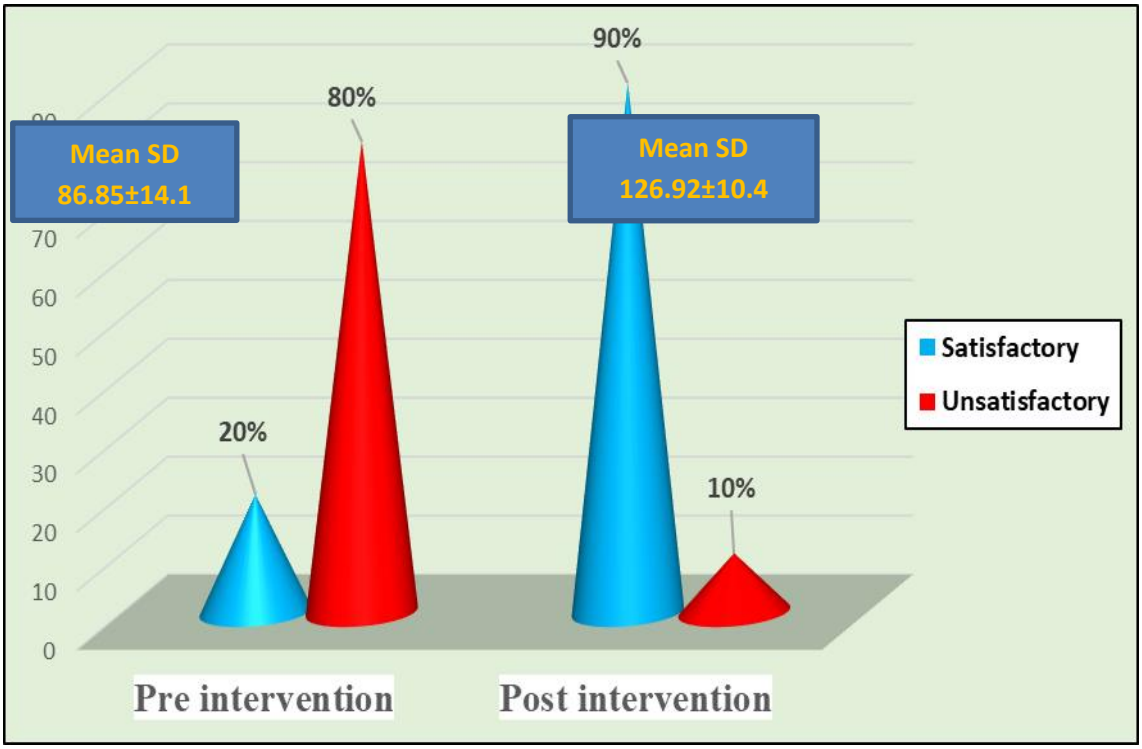

Figure 2: Frequency Distribution of Total Nurses' Practice Regarding Feeding Strategies for Stroke Associated Pneumonia at Pre and Post Intervention of Feeding Strategies (n=40).

Table 1: Frequency and Percentage Distribution of Demographic Characteristics of the Studied Nurses (n=40)

Demographic data	No.	%
Age (years)		
20-<25	7	17.5
25-<30	25	62.5
30-<35	5	12.5
35-40	3	7.5
Mean ± SD 27.08±4.01		
Gender		
Male	18	45.0
Female	22	55.0
Marital status		
Married	15	37.5
Not married	25	62.5
Residence		
Rural	22	55.0
Urban	18	45.0
Educational level		
Nursing Diploma	11	27.5
Nursing Technical Institute	29	72.5
Years of experience		
1-<5	21	52.5
5-<10	12	30.0
10-15	7	17.5
Mean ± SD 5.68 ± 3.24		
Training courses regarding stroke associated pneumonia		
Yes	9	22.5
No	31	77.5
Monthly income		
Enough	10	25.0
Not enough	30	75.0

SD= Standard deviation

Table 2: Frequency Distribution of the Studied Patients According to Their Demographic Characteristics (n=40)

Demographic characteristics of the studied patients	Control		Case		X^2	P-Value
	No.	%	No.	%		
Age (years)					0.392	0.531
40-<50	5	12.5	7	17.5		
50-60	35	87.5	33	82.5		
Mean ± SD	55.1±5.6		54.9±5.7		t=0.215	0.831
Gender					0.464	0.496
Male	22	55.0	25	62.5		
Female	18	45.0	15	37.5		
Marital status					FET	0.675
Married	38	95.0	36	90.0		
Not married	2	5.0	4	10.0		
Educational level					0.051	0.822
Educated	22	55.0	23	57.5		
Not educated	18	45.0	17	42.5		
Occupation					0.205	0.651
Working	24	60.0	22	55.0		
Not working	16	40.0	18	45.0		
Residence					0.220	0.639
Rural	25	62.5	27	67.5		
Urban	15	37.5	13	32.5		

$X^{2:}$ Chi Square Test, **FET:** Fisher exact test, **t**: Independent t-test, No significant at $p > 0.05$**.**

Table 3: Frequency Distribution of the Studied Patients According to Their Clinical Data (n=40)

Clinical data of the studied patients	Control (n=40)		Case (n=40)		X^2	P-Value
	No	%	No	%		
Previous CVS					0.672	0.412
Yes	10	25.0	7	17.5		
No	30	75.0	33	82.5		
Type of stroke					0.000	1.000
Ischemic	40	100.0	40	100.0		
Hemorrhagic	0	0.0	0	0.0		
Side of affection					0.346	0.556
Right hemisphere	8	20.0	6	15.0		
Left hemisphere	32	80.0	34	85.0		
Feeding condition					1.257	0.262
Liquid	21	52.5	16	40.0		
Semisolid	19	47.5	24	60.0		
Solid	0	0.0	0	0.0		
Nasogastric tube insertion					0.000	1.000
Yes	40	100.0	40	100.0		
No	0	0.0	0	0.0		
Past medical history					0.576	0.622
No associated illness	0	0.0	0	0.0		
Hypertension	39	97.5	38	95.0		
Diabetes mellitus	1	2.5	2	5.0		
Dyslipidemia	13	32.5	12	30.0		
Ischemic heart diseases	21	52.5	18	45.0		

CVS: Cerebral Vascular Stroke, **$X^{2:}$** Chi Square Test, **FET:** Fisher exact test, No significant at $p > 0.05$

Table 4: Frequency Distribution of the Studied Patients According to Their Outcome's Indicators (n=40)

Items	Control (n=40)		Case (n=40)		X^2	P-Value
	No.	%	No	%		
Length of hospital stay (days)					18.724	0.000**
<10	5	12.5	20	50.0		
10-<15	8	20.0	11	27.5		
15-<20	12	30.0	5	12.5		
≥20	15	37.5	4	10.0		
Mean ± SD	17.2±5.3		11.7±3.7		t=5.257	0.000**
Degree of dysphagia					50.766	0.000**
Slight/ No	0	0.0	10	25.0		
Mild	0	0.0	21	52.5		
Moderate	23	57.5	6	15.0		
Severe	17	42.5	3	7.5		
Mean ± SD	9.28±2.6		17.2±3.1		t=12.25	0.000**

X^2: Chi Square Test, **t**: Independent t-test, **High significant at p ‹ 0. 01.

Table 5: Correlation between Total Nurses' Knowledge, Total Nurses' Practice and Patient Outcomes

Variables		Total nurses' knowledge		Total nurses' practice	
		Pre	Post	Pre	Post
Length of hospital stay	**r**	-0.626-	-0.607-	-0.627-	-0.563-
	p	0.000**	0.000**	0.000**	0.000**
Degree of dysphagia	**r**	-0.489-	-0.598-	-0.455-	-0.549-
	p	0.001**	0.006**	0.003**	0.000**
Occurrence of stroke associated pneumonia	**r**	-0.684-	-0.614-	-0.497-	-0.542-
	p	0.000**	0.000**	0.001**	0.000**

r= correlation coefficient test. **p**= p-value**. (-) negative correlation. **highly significant at p ‹ 0.01.**
Interpretation of r: **Weak** (0.1-0.24) **Intermediate** (0.25-0.74). **Strong** (0.75-0.99)

3.1. Discussion

The current study's findings regarding the demographic characteristics of the nurses under study showed that two-thirds of the nurses were between the ages of 25 and 30. This finding was consistent with that of Weheida *et al.[*29] who discovered that over two-thirds of the nurses in their study were under 30 years old in their study on the "Effect of designed bundle protocol about ventilator associated pneumonia on nurses' performance, compliance, and patient outcomes.".

This was further corroborated by Amin *et al.,* [11] who discovered that two-thirds of the nurses in their study were between the ages of 25 and 30. The study focused on the "effect of care bundle strategies on nurses' performance regarding prevention of ventilator associated pneumonia at neonatal intensive care units". In contrast, the majority of the nurses in Castillo *et al.,* [21] thesis, "Improving nurses' knowledge of aspiration pneumonia prevention for stroke patients with dysphagia: A quality improvement project," were older than thirty.

In terms of gender, two-fifths of the nurses in the study were married, and over half were female. This finding is consistent with Gerida *et al.,* [22]who reported that two-thirds of the nurses in their study were female, and over half of them were married, in a study titled "Nurses knowledge and performance regarding infection preventive measures for ventilators associated pneumonia"

Regarded level of education, three quarters of studied nurses had technical institute. This finding was in harmony with Castillo, *et al.,* [21] who reported in thesis entitled" Improving nurses' knowledge of aspiration pneumonia prevention for stroke patients with dysphagia: A quality improvement project " that more than two thirds of studied nurses had technical institute. The present study was not correspondent with Abdel-Fattah & Mohammed, [10] who reported in study about" Impact of nursing guidelines on nurses' knowledge and performance regarding to prevention of ventilator associated pneumonia in neonates" that approximately two thirds of studied nurses had diploma in nursing.

Also this result was disagreement with Kalyan *et al.,* [23] who found in study about" Knowledge and practices of intensive care unit nurses related to prevention

of ventilator associated pneumonia in selected intensive care units of a tertiary care center, India" that half of participants, were graduate from bachelor of nursing.

The present study was found that more than half of studied nurses had 1-5 years of experience in stroke ICU. This was in agreement with Weheida et al., [29]. who found in study about" Effect of designed bundle protocol about ventilator associated pneumonia on nurses' performance, compliance, and patient outcomes" that more than half of nurses had between 5-10 years of experience. Additionally, this was consistent with Amin et al., [11]who found in study about " Effect of care bundle strategies on nurses' performance regarding prevention of ventilator associated pneumonia at neonatal intensive care units" that half of studied nurses had between 1-5 years of experience. Controversy, Aloush, [24] who stated in a study entitled " Nurses' implementation of ventilator-associated pneumonia prevention guidelines: an observational study in Jordan" that more than half of studied nurses had more than five years of experience. The current study findings illustrate that three quarters of studied nurses do not receive any previous training in SAP. This result might be due to a lack of hospital financial resources, shortage of nursing staff, and work overload, which is considered a barrier for attend any training course, and this might be the reason behind their unsatisfactory knowledge, practices before implementation of feeding strategies. This was supported by Abdel-Fattah & Mohammed, [10]who reported in study about" Impact of nursing guidelines on nurses' knowledge and performance regarding to prevention of ventilator associated pneumonia in neonates "that nearly two thirds had not attended of previous training programs about prevention of ventilator associated pneumonia "VAP".

Regarding total nurses' knowledge regarding SAP:

Majority of the nurses in the study reported higher levels of satisfaction with the knowledge they had after implementing feeding strategies as opposed to before. This improvement of nurses' knowledge post implementation of designed program may be due to the fact that there was lack of previous in-service training programs among nurses and absence of updated knowledge through workshop sessions which improved the quality of nursing care. Moreover, the nurses lacked the efficiency of updating their knowledge after being settled in the clinical environment for a longer time.

Similar findings were made by Zhang *et al.,* [7], in their study on "Implementation strategies to improve evidence-based practice for post-stroke dysphagia identification and management" According to a before-and-after study, nurses' knowledge significantly improved when the strategies were put into practice.

In terms of total nursing practice, the most researched nurses' practice improved once feeding strategies had been implemented. The findings of Zhang *et al.,* [7]study are consistent with this one who found in study about". Implementation strategies to improve evidence-based practice for post-stroke dysphagia identification and management: A before-and-after study ", revealed that the most researched nurses' practices significantly improved following the adoption of strategies. This improvement of nurses' practice post implementation of designed educational program may be attributed to that inadequate updating clinical training course for neurological nurses regarding management of the stroke patient due to overloaded area of working, lack of funding for organizing regular workshops and the nurses' time shortage but the researchers tried to overcome these challenges

This findings goes in the same line with Abdel-Fattah & Mohammed [9] who reported in study about" Impact of nursing guidelines on nurses' knowledge and performance regarding to prevention of ventilator associated pneumonia in neonates" that the most studied nurses had satisfactory level of practice regarding VAP. This finding disagreed with Gerida *et al.,* [22]who stated in a study entitled " Nurses' knowledge and performance regarding infection preventive measures for ventilators associated pneumonia " that the most of studied nurses had unsatisfactory level of practice regarding VAP.

Regarding to demographic characteristics of the studied patients, the result of the present study revealed that the majority of the patients in the control and study group their age 50-60 years old. This result is consistent with that of Abd El-Hamid *et al.,* [20]who reported in a study named " Effect of early dysphagia screening, feeding strategies and oral care on occurrence of stroke associated pneumonia among critically ill patients with acute stroke " that most of the study and control groups their age ranged between 51 and less than 60 years old. This finding disagreed with Xu *et al.,* [26]who stated in a study entitled " Study on the related risk factors and targeted nursing effects in multi-drug resistant bacteria infections in elderly patients with stroke-associated pneumonia" that the patients' ages ranged from 60 to 89 years old.

Concerned with patient's gender, findings of the current study reveal that more than half of the patients at the control group were males, and two thirds of the patients at the case group were males. This result is in agreement with Akhtar *et al.,* [25] who reported in study entitled" Sex-specific differences in short-term and long-term outcomes in acute stroke patients from Qatar " that most of the studied patients were males.

On the other hand, these results are in disharmony with Abd El-Hamid *et al.,* [20]who presented in a study entitled " Effect of early dysphagia screening, feeding strategies and oral care on occurrence of stroke associated pneumonia among critically ill patients with acute stroke " that more than half of the study and control groups of patients were females with no statistically significant difference between the two groups.

Regarding level of education, more than two fifths of the patients in the control and case group weren't educated. This finding similar to Kalani *et al.,* [23]who presented in a study entitled " Effects of the liaison nurse management on the infectious stroke complications: a randomized controlled trial " that about two thirds of patients in the case group and the control group had high school diploma or lower education.

As regarding clinical data of the studied patients, findings of the current study reveal that all patients of the control and case groups were ischemic stroke. Similar finding was documented by this finding agreement with Xu *et al.,* [26]who stated in a study entitled " Study on the related risk factors and targeted nursing effects in multi-drug

resistant bacteria infections in elderly patients with stroke-associated pneumonia" that two thirds of the studied patients were ischemic stroke.

Regarding the insertion of an NG tube. Every patient in the case and control groups had an NG tube inserted. This result was consistent with the findings of Abd El-Hamid *et al.,* [20] who reported that all patients in the case and control groups underwent NG tube insertion in their study titled "Effect of early dysphagia screening, feeding strategies, and oral care on occurrence of stroke associated pneumonia among critically ill patients with acute stroke." In contrast, more than two-thirds of the patients in the control group were oral feeding, according to Kalani *et al.,* [23]in their study "Effects of the liaison nurse management on the infectious stroke complications: a randomized controlled trial."

As regarding: patients' outcomes indicators, length of hospital stay, the current study revealed that half of the patients in the case group their length of hospital stay were less than ten days. Similarity, Palli *et al.,* [28] who found in study about " Early dysphagia screening by trained nurses reduces pneumonia rate in stroke patients: a clinical intervention study" that patients in the intervention group had a shorter stay in the hospital

There was a highly statistically significant improvement on patients' outcomes. More than half of the patients had mild dysphagia and one quarter have slight or no dysphagia at the case group. These results were consistent with Bassiouny *et al,* [27] who stated that two fifths of patients had no dysphagia so normal diet is advised, one fifth had slight dysphagia, and one quarter had moderate dysphagia. These results were in contrast with Abd El-Hamid *et al,* [20] who mentioned that more than two thirds of the study and control groups of patients had severe dysphagia with no significant difference b/w both groups. These findings related to heightened severity of stroke among acute stroke patients involved in study which correlated with increased dysphagia severity in addition omission of patients with mild dysphagia.

Concerning with signs and symptoms and occurrence of SAP. There was a significant improvement in patients' outcome at case group compared control group regarding signs and symptoms, and occurrence of SAP. This agreement with Abd El-Hamid *et al.* [20] who presented in a study entitled " Effect of early dysphagia screening, feeding strategies and oral care. on occurrence of stroke associated pneumonia among critically ill patients with acute stroke" that the occurrence of SAP decreased significantly among study group patients after application of combination of early dysphagia screening, feeding strategies and oral care compared to patients in the control group .This suggest that application of certain feeding strategies by nurses as , determine swallowing ability by using direct or indirect swallowing test, and ensure that the person is alert before offering food, and maintain upright positioned during feeding. Appropriate change in food texture or consistently according patient ability to swallowing. Enteral or parental feeding recommended for patients with a decreased level of consciousness or patient have moderate or severe dysphagia, monitoring nutrition intake and hydration status, and good oral care improved patient outcomes.

The current study demonstrated that, there was negative correlation between nurses' knowledge and nurses' practice and patients' outcomes. This negative correlation indicate that as level of nurses knowledge and practice improved after feeding strategies intervention , and patient outcomes which include (length of hospital stay, degree of dysphagia, signs and symptoms and occurrence of SAP) were decreased this reflect the effect of feeding strategies in improving nurses performance and improving patients outcomes. Finally, the findings of the present study supported the research hypothesis that the mean knowledge scores of studied nurses was improved post feeding strategies intervention compared to pre intervention, the mean practice scores of studied nurses' was improve post feeding strategies intervention than pre intervention and there was a significant improvement in patients' outcomes in case group compared to their outcomes in control group.

4. Conclusions

Based on findings of the present study, There was significant improvement in nurses' performance and outcomes of patients with SAP after intervention of nursing feeding strategies program. The majority of studied nurse's had satisfactory level of knowledge post intervention compared to pre intervention. The most of studied nurse's had satisfactory level of practice post intervention compared to pre intervention. The present study findings revealed that patients exposed to nursing feeding strategies program (case group) experienced short length of hospital stay, slight or no dysphagia, less or no signs and symptoms of SAP. There was a significant improvement in patients' outcome at case group compared to control group regarding degree of dysphagia, fever, chest pain, cough, WBC $\geq 10\times109/l$ or $\leq 4\times109/l$, and occurrence of SAP. The present study findings supported all research hypotheses.

Recommendations

Centered on the findings of the current research, it may be suggested that:

- Continuous feeding strategies programs for nurses caring for patients with SAP to refresh and update their knowledge and practice.
- Standard nursing practices books should be available in the stroke ICU to guide nurses provide appropriate feeding strategies for patient with SAP.
- Ongoing training are recommended for nurses working in stroke ICU on using Gugging Swallowing Screen(GUSS) test to assess swallowing ability to grade severity of dysphagia.

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