# The Effect of Implementing Initial Emergency Care Bundle on Early Outcomes among Acute Ischemic Stroke Patients

**WafaaWahdanAbd El-Aziz[(1)], Heba A. Al-Metyazidy[(2)], Hend Elsayed Mansour[(2)], Soheir M. Weheida[(3)]**

[1 ,3]lecturers of Critical Care and Emergency Nursing, Faculty of Nursing, Mansoura University, Egypt
[2]Assistant Prof of Critical Care Nursing, Faculty of Nursing, Tanta University, Egypt
[3]Prof of Medical Surgical Nursing, Faculty of Nursing, Alexandria University, Egypt

## Abstract

Implementing an initial emergency care bundle for acute stroke patients bridges the gap between evidence-based and clinical practice to improve patients outcomes. **Aim:** To evaluate the effect of implementing the initial emergency care bundle on early outcomes among acute stroke patients. **Setting:** This study was conducted at the emergency department and neurocritical care unit at Mansoura University Hospital, Egypt. **Method:** An experimental research design was utilized in this study. A random sample of 120 adults patient with acute stroke was selected and divided into two equal groups of 60 patients in each group. Two tools were utilized to collect data: Tool (I): Tool I: Stroke patient assessment. Tool II: Stroke patients' outcomes assessment. **Results:** It was noticed that nearly one-third (30.0%) of patients of the control group were died compared to only 11.7% of the study group during 7 days post-admission to the intensive care unit. Also, there were highly statistically significant improvements among patients of both control and study groups regarding patient outcomes which include physiological parameters, pre-feeding assessment, hydration status, and activity level on admission, 3 days, and 7 days following implementation of stroke care bundle. **Conclusions:** Acute stroke patients who received the initial emergency care bundle had a statistically significant reduction in mortality rate, higher independency, and normal pre-feeding assessment compared to those who receive routine care on admission, 3 days, and 7 days post-admission **Recommendations:** The recent evidence-based practice should be integrated into the management of acute stroke patients to improve the patients' outcomes.

**Keywords:** Acute ischemic stroke, Initial emergency care bundle, Patients' outcomes.

**E-mail:** roka_omarali@yahoo.com

## Introduction

Stroke is the main reason for morbidity and mortality, especially in the developing world. The morbidity and mortality related to stroke remain high. A brain attack happens every 40 seconds, and each four minutes someone dies due to a stroke. According to the World Health Organization (WHO), stroke is the second common cause of death worldwide. It is expected that deaths due to stroke will increase to 6.5 million by 2015 and 2020 **(WHO, 2015).**In Egypt, the incidence of strokes

may be around 150000 to 210000 each year **(Abdullah &Moustafa, 2014)**.

According to WHO the stroke is defined as an acute, focal or diffuse, dysfunction of the brain, originating from vessels and lasting for a period longer than a day**(WHO, 2017)**. There are two main types of stroke, ischemic and hemorrhagic stroke ischemic stroke results from the occlusion of a cerebral vessel that blocks 80% or more of the vessel, hemorrhagic stroke arises from

rupture of blood vessels resulting in bleeding into the brain. Approximately 80% of strokes are ischemic stroke; on the other hand, an ischemic stroke can originate from three main etiologies: thrombosis, hypo-perfusion, and embolism **(Alrabghi, Alnemari, Aloteebi, Alshammari, Ayyad, Al ....& Aljuwayd, 2018, Ojaghihaghighi, Vahdati, Mikaeilpour, & Ramouz, 2017).**

Declining the incidence of ischemic stroke among the population necessitates identification of the risk factors for stroke. There are numerous risk factors for ischemic stroke; these risk factors are either modifiable or non-modifiable. Non-modifiable risk factors include age, family history of strokes, male gender, and race. On the other hand, other risk factors can be modified with behavioral changes, leading to a significantly decreased risk of a stroke **(Johnson, Onuma, Owolabi, & Sachdev, 2016)**. Clinical manifestations of an ischemic stroke may include paralysis, ataxia, paresis, eye gaze, and vomiting. The specific site of the lesion will determine the symptoms and signs that will appear on the patient **(Boehme, Esenwa, &Elkind, 2017)**.

Nursing management for patients with ischemic stroke is an essential responsibility of critical care nurses (CCNs) **(Alrabghi et al., 2018).** CCNs play a vital role in proper rapid nursing management within the first hours following the onset of ischemia. Using of initial emergency stroke care bundles for ischemic stroke management leads to improved outcomes, safety assessments, decreased hospital cost and the length of in intensive care unit (ICU) stay, and patient satisfaction **(Kummarg, Sindhu, & Muengtaweepongsa, 2018, Muengtaweepongsa, 2015, Turner, Barber, Dodds, Murphy, Dennis, … & Macleod, 2015).**

Stroke care bundles are a set of evidence-based practices (EBP), which help health care providers to improve patient care and clinical outcomes. Tying these practices together into a bundle with their implementation increases these interventions to be applied more consistently within different settings. Many studies suggest that implementation of a care bundle for ischemic stroke may decrease hospital costs, reduces the length of hospital stay, enhance clinical patient outcomes, functional recovery, and reduce mortality rate and quality improvement **(Turner et al., 2015, Katzan, Spertus, Bettger, Bravata, Reeves, ...& Howard,2014).**

Implementation of evidence-based stroke care bundles is challenging, it requires the time and effort of all members of the multidisciplinary team in healthcare settings to translate the bundle into practice. The initial emergency care bundle of acute stroke patents includes

patients' rapid initial assessment within 24 hours of admission, regular neurological assessment, nothing per mouth until bedside swallow screen within the first day of admission, thrombolytic therapy, and early mobilization **(Çetiner**, **Arsava & Topçuoğlu, 2020, Chang, Rostanski, Willey, Miller, Shapiro, ...& Elkind, 2019, Trapl et al., 2007**). The grading and level of evidence for each evidence-based recommendation were allocated by the researcher, according to the National Health and Medical Research Council (NHMRC) interim levels of evidence **(NHMRC, 2007)**.

The effect of the initial emergency care bundle includes the stability of physiological parameters such as vital signs and neurological status, reduction of mortality rate, higher independence, and normal pre-feeding assessment. But there are a restricted number of scientific studies regarding enhancements of patient outcomes after stroke. Hence, this study was accomplished to determine the effect of implementing the initial emergency care bundle on early outcomes among patients admitted within seven days post-stroke to ICUs **(Langhorne, 2014, Teale, Forster, Munyombwe, & Young, 2012, Turner et al., 2015).**

### Significance of the Study

In Egypt caring for patients with ischemic stroke is very complex because of the high mortality rate and increased prevalence of stroke risk factors. There are many studies on stroke care in Egypt but these studies were conducted in a form of programs, standards, and protocol but there are no initial emergency care bundles for caring of these patients in the intensive care unit.

Additionally, few research studies in Egypt were conducted on the care bundle for ischemic stroke and its effect on patients' outcomes. Their findings revealed that the implementation of an initial emergency care bundle is essential to improve patients' clinical outcomes and decline the length of ICU stay, patients' morbidity, and mortality. Consequently, this will lead to lower hospital costs and improve the quality of patient care in healthcare organizations **(Kummarg et al., 2018, Bhatt, &Jani, 2011)**. Hence, this study is critically needed to implement a stroke care bundle among patients admitted to intensive care units post-stroke.

## Aim of the study:

This study aimed to evaluate the effect of implementing an initial emergency care bundle on early outcomes among acute stroke patients

### Research Hypothesis

There were two research hypotheses for this study including:

1) Acute stroke patients who receive initial emergency care bundle had the stability of physiological parameters such as vital signs, neurological status, and hydration status than those who receive routine care.
2) Acute stroke patients who receive an initial emergency care bundle exhibit reduction of mortality rate, higher independency, and normal pre-feeding assessment compared to those who receive routine care.

## Subjects and Method

### Study Design

An experimental research design was utilized in the present study.

### Study Setting

Participants' recruitment and data collection occurred at the emergency department (ED) and neurocritical care unit (NCCU) at Mansoura University Hospital (MUH), Egypt. ED has a radiology department with a Computerized Tomography (CT) scan and other imaging facilities, and highly trained specialists such as radiologists, cardiologists, and neurosurgeons to help interpret findings of imaging investigations, this NCCU included five beds and well equipped with advanced technology and manpower needed for patient care. The nurse-patient ratio in this unit is approximately 1:1.

### Subjects

A random sample of 120 adults' patient with acute stroke was selected and divided into two equal groups of 60 patients in each group as follows:

**Study group:** They had received the initial emergency care bundle developed by the researchers.

**Control group:** They had received their routine care which includes initial treatment decisions, usually occurring in the ED, after those patients with acute ischemic stroke are admitted to the NCCU depending on the severity of the acute ischemic stroke for supportive management to ensure airway, adequate oxygen saturation, hemodynamic stability, glycaemic control with insulin, and temperature control with antipyretic. Also, the NCCU team performs physiologic monitoring and management of neurological status, during the patient's hospital stay.

**Inclusion Criteria;** it included patients aged 21- 60 years, both gender, expected to stay 7 days in the previously mentioned setting, and the patient and/or attendant give informed consent to participate in the study.

**Exclusion criteria;** included patients unable to communicate because of severe stroke, or aphasia, and patients who had a traumatic brain injury, cerebral hemorrhage, or unknown diagnoses.

### Tools of the study:

**Tool I:** "Stroke Patient Assessment": It included four parts as the following:

**Part A: Patients' demographic characteristics and clinical data:** such as age, gender, education, CT report to distinguish between hemorrhagic and ischemic stroke.

**Part B: Patients' history:** such as associated risk factors, comorbidities, and current medications.

**Part C: Physiological parameters:** it consisted of vital signs and neurological status (Glasgow Coma Scale). As follows:

- Vital signs such as heart rate, blood pressure, body temperature, respiratory rate, and oxygen saturation.
- Glasgow Coma Scale (GCS): it was developed by (**Teasdale & Jennett, 1974)** to assess the disturbance in the level of consciousness in all types of acute patients.

**Scoring system:** The GCS was allocated into three parameters which contain the best eye response, the best verbal response, and the best motor response. The levels of response in the components of the GCS were scored from 1, for no response to normal values of 4 in eye-opening response, 5 in verbal response, and 6 in motor response.

The total GCS values were between 3 and 15, three given to the worst and 15 given to the highest level of consciousness.

**Part D: ABCD2:** This part was developed by (**Australian government National Stroke Foundation Health and Medical Research Council, 2009)** to assess the patients with transient ischemic stroke (TIA) and risk for stroke in less than 24 hours from the onset. The ABCD2 compose of 5 main domains; age, blood pressure, clinical features, duration of symptoms, and history of diabetes.

**ABCD2 is scored as follows:**

- **Age**: ≥60 years: 1 point; <60 years: 0 points
- **Blood pressure:** elevation when first assessed: Systolic 140 mmHg or diastolic 90 mmHg: 1 point; systolic <140 mmHg and diastolic <90 mmHg: 0 points
- **Clinical features**: Unilateral weakness: 2 points; Isolated speech disturbance: 1 point; Other: 0 points
- **Duration of TIA symptoms**: 60 minutes: 2 points; 10 to 59 minutes: 1 point; <10 minutes: 0 points
- **History of diabetes**: Present: 1 point; absent: 0 points

**Scoring system**: The total ABCD2 score was 7 points. The tool interpretation ranging from0-4 low risk and 4-7 high risk.

**Tool II: "Stroke Patients' Outcomes Assessment":** It consisted of two parts as the following:

**Part A: Barthel Index (BI) Scale;** it was adopted by (**Mahoney & Barthel, 1965)** and modified by **(Shah,Vanclay, Cooper,1989)** to assess patients' self-care and physical dependency. It consisted of basic domains; feeding, dressing, grooming, bathing, transfers, mobility, stairs, toilet use, bladder, and bowel.

**Scoring system:** The average score was ranged from 0 to 100. The highest level indicated personal independence. It was categorized as 100 indicated normal BI score, >60 meant assisted independence, and <40 included of the total dependent.

**Part B: Patients' pre-feeding assessment;** it was developed by **(Sitoh, Lee, Phua, Lieu& Chan, 2000)** to assess swallowing in acute stroke patients. It was categorized as normal feeding, mild swallowing impairment, severe swallowing, or significant delay in the initiation of swallowing.

**Part C: Mortality rate within 7 days**

**Method**

All tools of this study were developed by the researchers after a review of the relevant literature

(**Matchar& Nguyen, 2015, Utting, Regan& Lee, 2016)** and used to collect the data.

All tools were tested for content validity by three panels of juries' expertise in the field of critical and emergency care nursing and medical biostatistics and modifications were done accordingly.

All tools of the study were tested for reliability using Cronbach alpha. It was 0.830 for tool I and 0.859 for tool II which represents a highly reliable tool.

**A pilot study:** A pilot study was carried out before starting data collection on 10% of both studied patients to evaluate the clarity, feasibility, and applicability of the tools as well as estimate the time needed to collect data.

An official permission was taken before conducting the current study from the MUH administrator.

**Ethical consideration:**

- The study bundle of care was reviewed and accepted by the Ethical Committee of the Faculty of Nursing at Al Mansoura University.
- Written approval was achieved from the studied subjects or relevant after the researchers clarified the aim of the current study.
- Privacy and data confidentiality were assured to all studied subjects.
- The studied patients had the right to withdraw from the current study at any time of the research process.
- The bundle of care used in the current study is safe for the studied patients.

**Data collection:**

- The studied patient who willing to participate in the current study and fulfilled the inclusion and exclusion criteria had been interviewed and observed by the researchers. Data was collected from the studied patients of both groups three times immediately on admission, 3 days, and 7 days post-admission after implementation of the initial emergency care bundle
- The duration of data collection was extended from the period of the beginning of May 2020 until the end of October 2020.

The initial emergency care bundle for the study group was done including the rapid initial assessment, implementation, and evaluation phases.

1. **Patients' rapid initial assessment within 24 hours of admission:** It was performed for all studied patients of both groups to assess patients' demographic characteristics and clinical data, history, and physiological parameters such as vital signs which include heart rate, blood pressure, body temperature, respiratory rate, and oxygen saturation ($SPO_2$) were assessed 4-6 hourly or shorter in the case of an abnormal measurement **(Chang et al., 2019). (Grade C; Level II)**

Maintain the airway patent through a proper position of the neck and keep the oxygen saturation more than 90% using pulse oximetry. Also, supplemental oxygen was given through nasal cannula, oxygen mask if the patient unable to maintain the oxygen saturation level **(Chang et al., 2019)**. **(Grade C; Level II).**

Additionally, ABCD2 assessment when a transient ischemic attack was suspected, the studied patients should have a complete assessment containing an assessment of stroke risk using the ABCD2 assessment at the initial phase of acute stroke patient contact **(Wardlaw, Brazzelli, Chappell, Miranda, Shuler, ... & Dennis,2015)**. **(Grade A; Level I)**

**Regarding the study group:**

**2. Regular neurological assessment: (Grade B; Levels III-1)**

The neurological status of patients with acute stroke was assessed and reported every shift by the researcher and the assistance of a highly qualified and trained nurse to identify changes in patient condition **(Wells-Pittman & Gullicksrud, 2020)**.

**3. Nothing per mouth until bedside swallow screen within the first day of admission (Grade B; Level III).**

Avoid nasogastric tube insertion within 24 hours of both admission and post-thrombolysis unless indicated. Swallow should be assessed within 4 hours of admission using. The pre-feeding assessment was used to assess swallowing deficits before given food, fluid, drink, and oral medications for acute stroke patients. It was categorized as normal feeding, mild swallowing impairment, severe swallowing, or significant delay in initiation of swallowing **(Arnold, Liesirova, Broeg-Morvay, Meisterernst, Schlager,...& Sarikaya, 2016).**

Swallowing deficit was associated with a higher risk of complications included aspiration pneumonia and malnutrition. Early bedside assessment is required to prevent swallowing deficit complications. Severe swallowing or significant delay in initiation of swallowing should be followed by a complete assessment from a speech pathologist before starting fluid, drink, and oral medications **(Knight,Pillay, Linde, &Krüger,2020).**

Therefore, food, fluid, drink, and oral medications were not allowed, until a bedside swallow assessment was done within the first day of admission. Parenteral fluids or medications could be given on admission and regularly before swallowing assessment. Enteral feeding through nasal gastric tube insertion was suggested for acute stroke patients' to receive regular, modified, or blended nutrition mixed with a fluid to maintain the hydration status **(Trapl et al., 2007)**.

**National Clinical Guidelines for Stroke in 2012** recommend that patients with acute stroke who are unable to receive adequate oral fluids and nutrition should be:

- Insertion of a nasogastric tube for feeding of acute stroke patients' within the first 24 hours of admission
- Insertion of nasal bridle tube or gastrostomy if the acute stroke patient is unable to tolerate a nasogastric tube insertion **(Royal College of Physicians, 2012)**.

**4. Thrombolytic therapy:(Grade A; Level I )**

Fibrinolytic therapy in acute ischemic stroke is used to dissolve blood clots to restore blood flow to the brain and prevent infarction. Additionally, all

acute ischemic stroke patients who were admitted to the hospital within three hours of symptom onset and without any absolute contraindication should receive treatment with intravenous alteplase (tPA). **(Çetiner et al., 2020)**.

The patients' computed tomography should be done before the thrombolytic therapy was given. During thrombolytic therapy, the acute ischemic stroke patient should be assessed regarding the neurological status and vital signs from 7 to 15 minutes intervals during the infusion. Also, cardiac monitoring parameters especially $SPO_2$, calculation of the infusion rate through the perfusion pump. Calculation chart for thrombolysis dosage, Store the second syringe in the fridge if indicated, seek immediate attention if there were any changes in the patient condition during observations **(Hou, Chen, Xu, Zhu, Xu, & Chen, 2019**).

The nurse should stop tPA infusion if there is one of the following; neurological disturbances especially decrease in GCS score 2 points eye or motor score responses, anaphylactic shock, marked hypotension, Increase in blood pressure at least single reading > 230/120mgHg, Increase in blood pressure to > 185/110 mmHg for two readings with 5 minutes interval **(Powers, Derdeyn, Biller, Coffey, Hoh, …&Yavagal, 2015).**

**5. Early mobilization: (Grade A; Level I )**

Early mobilization for acute stroke patients was associated with better functional outcomes and should be done whenever indicated. Tolerated and feasible, resulting in improvement in acute stroke patients' outcomes in the neurocritical care unit. Implementation of early mobilization undergoing many challenging and need cultural changes attached in a nurses' attitude and integrated into a patient care bundle. Scoring systems such as the Barthel index scale should be integrated to define daily expected outcomes, identify obstacles immediately and confirm patients' achievements regarding feeding, dressing, grooming, bathing, transfers, mobility, stairs, toilet use, bladder, and bowel **(Aquim, Bernardo, Buzzini, de Azeredo, da Cunha, ... &Nemer 2019).**

**Regarding the control group**

The control group was exposed to routine care in the emergency department and neurocritical care unit as prescribed by the resident physician. The hospital routine of care was composed of maintaining airway patency, maintaining adequate oxygen saturation, hemodynamic stability, glycemic control with insulin, temperature control with antipyretic. Also, the NCCU team performs physiologic monitoring and management of neurological status, during the patient's hospital stay.

**Evaluation:**

Evaluation was done for all studied patients of both groups three times immediately on admission,3 days, and 7 days post-admission after implementation of initial emergency care bundle provided by the researcher to evaluate patient's physiological parameters, dependency, pre-feeding assessment, and mortality rate using tool I and II.

Comparisons were done between both groups to evaluate the effect of

implementing the initial emergency care bundle on early outcomes among acute ischemic stroke patients.

**Statistical analysis:** Collected data were coded, computed, and statistically analyzed using SPSS (statistical package of social sciences), version 16. Data were presented as frequency and percentages (qualitative variables) and mean ± SD (quantitative continuous variables). Chi-square ($\chi^2$) was used for comparison of categorical variables and was replaced by Monte Carlo Exact test if the expected value of any cell was less than 5. The difference was considered significant at $P \leq 0.05$.

## Results

**Table (1) shows the percentage distribution of patients of both groups according to personal characteristics.** It was found that more than half of acute stroke patients of both control and study group (65.0% and 58.3%) were in the age group of 55-60 years old and female (58.3% and66.7%) respectively.

Regarding patients' education; the most common type of education (48.3% and 53.3%) among patients of both the control and study group were secondary education respectively.

**Table (2) illustrates the percentage distribution of patients of both groups according to risk medical history.** The results revealed that the most common symptoms (73.3% and 75.0%) among patients of both the control and study group was numbness feeling on one side of the body. On the other hand, the least common symptoms (6.7% and 8.3%) among patients of both the control and study group were loss of vision in one or both eyes respectively.

Regarding patients' comorbidities; it can be seen that more than half of patients in both the control and study group suffered from hypertension (56.7% and56.7%) and diabetes mellitus (58.3% and 53.3%) respectively.

**Figure (1) reveals the percentage distribution of patients of both groups according to current medications.** It can be seen that a higher percentage (66.7%) among patients of the control group was given to antihypertensive drugs and a lower percentage (30.0%) was given to anticoagulants. While a higher percentage (51.7%) among patients of the study group was given to antihypertensive and hypoglycemic drugs and a lower percentage (20.0%) was given to anticoagulant and antiplatelet respectively.

**Figure (2) shows the percentage distribution of patients of both groups according to the ABCD2 assessment on admission.** It was found that a higher percentage (66.7% and 61.7%) of the patients of both control and study groups were at high risk for stroke development. While a lower percentage (33.3% and 38.3%) of the patients of both the control and study groups were at low risk for stroke development

**Table (3) shows the percentage distribution of patients of both groups regarding vital signs measured on admission, 3 days, and 7 days post-admission.** The findings indicated that highly statistically significant differences were observed between the control and study group regarding heart rate, systolic blood pressure, diastolic blood pressure, respiratory rate, temperature, level of consciousness, oxygen saturation, and central venous pressure on admission, 3 days, and 7 days post-admission $p \leq 0.001$.

**Table (4) illustrates the percentage distribution of the Barthel Index scale and pre-feeding assessment among the studied patients of both groups on admission, 3 days, and 7 days post-admission.** The findings indicated that highly statistically significant differences were observed between the control and study group regarding the Barthel Index scale and pre-feeding assessment on admission, 3 days, and 7 days post-admission $p \leq 0.005$.

**Figure (4): Percentage distribution of patients of both groups according to death during 7 days post-admission to the ICU.** It was noticed that nearly one-third (30.0%) of patients of the control group were died compared to only 11.7% of the study group during 7 days post-admission to the ICU.

**Table (5) shows the relationship between ABCD2 risk level and death rate among the studied patients of both groups during 7 days post-admission.** The findings revealed that there was a statistically significant difference between ABCD2 risk level and death rate among patients of both the control and study group $p=0.025$.

**Table (1):** Percentage distribution of patients of both groups according to personal characteristics

| Characteristics | Items | Control group (60) | | Study group (60) | | $\chi^2$ P |
|---|---|---|---|---|---|---|
| | | N | % | n | % | |
| **Age (years)** | < 55 | 21 | 35.0 | 25 | 41.7 | **0.261** |
| | 55- 60 | 39 | 65.0 | 35 | 58.3 | **0.452** |
| **Gender** | Male | 25 | 41.7 | 20 | 33.3 | **0.891** |
| | Female | 35 | 58.3 | 40 | 66.7 | **0.346** |
| **Education** | Basic and less | 16 | 26.7 | 15 | 25.0 | **0.321** |
| | Secondary | 19 | 48.3 | 32 | 53.3 | **0.852** |
| | University | 15 | 25.0 | 13 | 21.7 | |

**Table (2):** Percentage distribution of patients of both groups according to risk medical history

| Risk of medical history | Control group (60) | | Study group (60) | | $\chi^2$ P |
|---|---|---|---|---|---|
| | n | % | n | % | |
| **Did a physician ever tell you that you had a stroke?** | | | | | **0.261** |
| **Yes** | 37 | 61.7 | 40 | 66.7 | **0.452** |
| **No** | 23 | 38.3 | 20 | 33.3 | |
| **Patients' symptom of stroke:** | | | | | **0.951** |
| a- Weakness in one side of the body | 38 | 63.3 | 43 | 71.7 | **0.329** |
| b- Numbness feeling on one side of the body | 44 | 73.3 | 45 | 75.0 | **0.041** **0.835** |
| c- Loss of vision in one or both eyes | 4 | 6.7 | 5 | 8.3 | **FET** **1.00** |
| **Time of disappearance of symptoms:** | | | | | |
| **≤24h** | 60 | 100. | 60 | 100. | ----- |
| **Patients' comorbidities:** | | | | | **0.301** |
| - Hypertension | 34 | 56.7 | 31 | 51.7 | **0.583** |
| - Diabetes mellitus | 35 | 58.3 | 32 | 53.3 | **0.301** **0.583** |
| - Heart diseases | 33 | 55.0 | 28 | 46.7 | **0.831** **0.361** |
| - Gastrointestinal diseases | 15 | 25.0 | 13 | 21.7 | **0.191** **0.667** |
| - Respiratory diseases | 10 | 16.7 | 12 | 30.0 | **0.221** **0.637** |

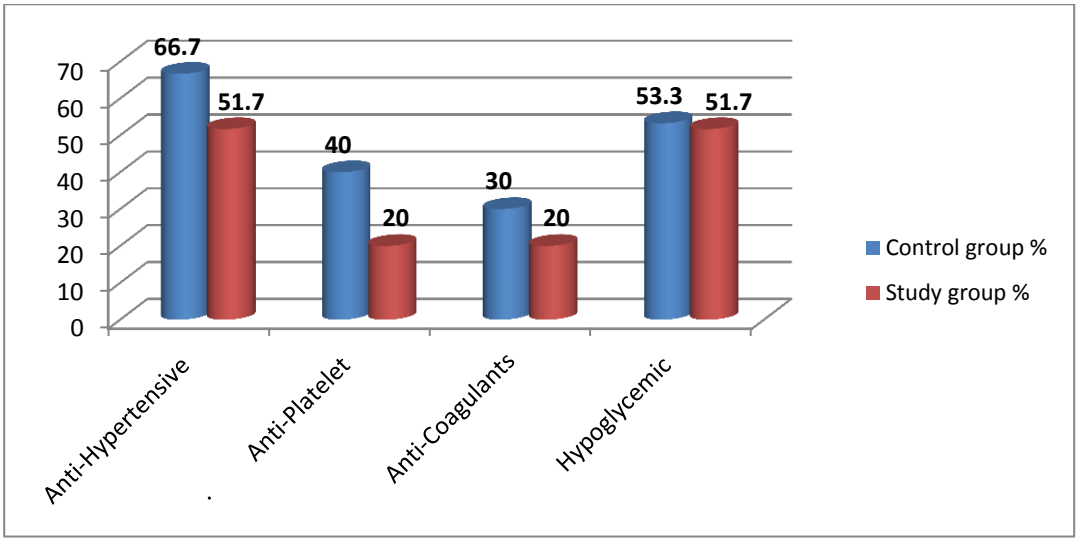


**Figure (1):** Reveals the percentage distribution of patients of both groups according to current medications.

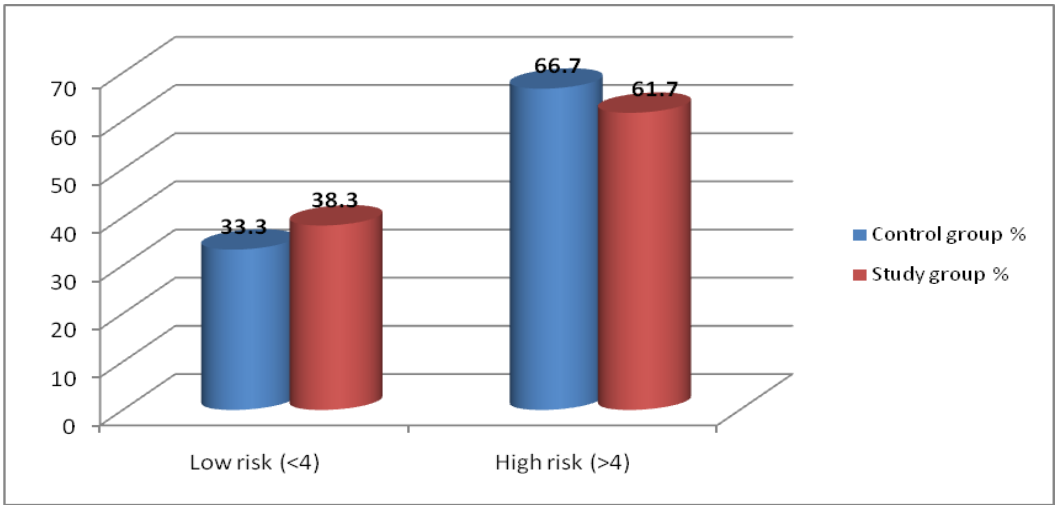


**Figure (2):** shows the percentage distribution of patients of both groups according to the ABCD2 assessment on admission.

**Table (3):** Percentage distribution of patients of both groups regarding vital signs measured on admission, 3 days, and 7 days post-admission

| Vital signs | Control group | | | | | | $\chi^2$ P | Study group | | | | | | $\chi^2$ P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | On admission (n=60) | | 3 days post-admission (n=60) | | 7 days post-admission (n=42) | | | On admission (n=60) | | 3 days post-admission (n=60) | | 7 days post admission (n=53) | | |
| | n | % | n | % | n | % | | n | % | n | % | n | % | |
| **Heart rate (b/m)** | 14 | 23.3 | 16 | 26.7 | 11 | 26.2 | **26.50** | 6 | 10.0 | 34 | 56.7 | 38 | 71.7 | **72.51** |
| - 60 – 80 | 16 | 26.7 | 35 | 58.3 | 27 | 64.3 | **0.90** | 27 | 45.0 | 24 | 40.0 | 15 | 28.3 | **0.001*** |
| - 81 – 100 | 30 | 50.0 | 9 | 15.0 | 4 | 9.5 | | 27 | 45.0 | 2 | 3.3 | 0 | 0.0 | |
| - >100 | | | | | | | | | | | | | | |
| **Traditional care vs Care Bundle ($\chi^2$, P)** | | | | | | | | **29.07, 0.001*** | | | | | | |
| **Respiratory rate** /min | 28 | 46.7 | 28 | 46.7 | 30 | 71.4 | **13.12** | 27 | 45.0 | 53 | 88.3 | 50 | 94.3 | **54.23** |
| - 14 – 20 | 32 | 53.3 | 32 | 53.3 | 12 | 28.6 | **0.95** | 33 | 55.0 | 7 | 11.7 | 3 | 5.7 | **0.001*** |
| - 21 - 30 | | | | | | | | | | | | | | |
| **Traditional care vs Care Bundle ($\chi^2$, P)** | | | | | | | | **36.70, 0.001*** | | | | | | |
| **Systolic Bl P (mmHg)** | 1 | 1.7 | 0 | 0.0 | 12 | 28.6 | **35.47** | 2 | 3.3 | 14 | 23.3 | 45 | 84.9 | **50.89** |
| - 90 – 120 | 8 | 13.3 | 43 | 71.7 | 18 | 42.9 | **0.02*** | 13 | 21.7 | 42 | 75.0 | 6 | 11.3 | **0.001*** |
| - 130 – 140 | 51 | 85.0 | 17 | 28.3 | 12 | 28.6 | | 45 | 75.0 | 4 | 6.7 | 2 | 3.8 | |
| - >140 | | | | | | | | | | | | | | |
| **Traditional care vs Care Bundle ($\chi^2$, P)** | | | | | | | | **16.81, 0.001*** | | | | | | |
| **Diastolic Bl P (mmHg)** | 0 | 0.0 | 14 | 23.3 | 10 | 23.8 | **28.47** | 2 | 3.3 | 12 | 20.0 | 8 | 15.09 | **37.96** |
| - 50 - 70 | 23 | 38.3 | 33 | 55.0 | 17 | 40.5 | **0.001*** | 26 | 43.3 | 38 | 63.4 | 41 | 77.4 | **0.001*** |
| - 71- 90 | 37 | 61.7 | 13 | 21.7 | 15 | 35.7 | | 32 | 53.3 | 10 | 16.6 | 4 | 7.5 | |
| - >90 | | | | | | | | | | | | | | |
| **Traditional care vs Care Bundle ($\chi^2$, P)** | | | | | | | | **19.62, 0.012*** | | | | | | |
| **Temperature** | | | | | | | | | | | | | | |
| - 36.0 – 37.0 | 7 | 11.7 | 8 | 13.3 | 8 | 19.04 | **23.47** | 9 | 15.0 | 16 | 26.7 | 20 | 37.7 | **62.62** |
| - 37.1 – 37.5 | 16 | 26.7 | 37 | 61.7 | 24 | 57.1 | **0.001*** | 15 | 25.0 | 39 | 65.0 | 31 | 58.5 | **0.001*** |
| - >37.5 | 37 | 61.7 | 15 | 25.0 | 10 | 23.9 | | 36 | 60.0 | 5 | 8.3 | 2 | 3.8 | |
| **Traditional care vs Care Bundle ($\chi^2$, P)** | | | | | | | | **19.04, 0.015*** | | | | | | |
| **Level of consciousness** | 36 | 60.0 | 22 | 36.7 | 11 | 26.1 | **18.71** | 38 | 63.3 | 28 | 46.7 | 5 | 9.4 | **74.14** |
| - <10 | 22 | 36.7 | 30 | 50.0 | 20 | 47.7 | **0.90** | 21 | 35.0 | 19 | 31.7 | 9 | 17.0 | **0.001*** |
| - 10 – 13 | 2 | 3.3 | 8 | 13.3 | 11 | 26.1 | | 1 | 1.7 | 13 | 21.7 | 39 | 73.6 | |
| - >13 | | | | | | | | | | | | | | |
| **Traditional care vs Care Bundle ($\chi^2$, P)** | | | | | | | | **26.56, 0.001**** | | | | | | |
| **Oxygen saturation (%)** | 21 | 35.0 | 5 | 8.4 | 0 | 0.0 | **42.55** | 18 | 30.0 | 0 | 0.0 | 0 | 0.0 | **66.76** |
| - <90 | 26 | 43.3 | 2 | 3.3 | 3 | 7.2 | **0.05*** | 31 | 30.6 | 0 | 0.0 | 0 | 0.0 | **0.001*** |
| - 90 – | 13 | 21.7 | 53 | 88.3 | 39 | 92.8 | | 11 | 18.3 | 60 | 100.0 | 53 | 100.0 | |
| - 96-100 | | | | | | | | | | | | | | |
| **Traditional care vs Care Bundle ($\chi^2$, P)** | | | | | | | | **21.02, 0.05*** | | | | | | |
| **CVP** | | | | | | | | | | | | | | |
| - Not present | 60 | 100. | 30 | 50.0 | 30 | 50.0 | **58.98** | 60 | 100.0 | 32 | 53.3 | 32 | 53.3 | **63.55** |
| - < 10 | 0 | 0.0 | 28 | 46.7 | 18 | 30.0 | **<0.001** | 0 | 0.0 | 12 | 20.0 | 0 | 0.0 | **<0.001*** |
| - 10 - 15 | 0 | 0.0 | 2 | 3.3 | 12 | 20.0 | | 0 | 0.0 | 16 | 26.7 | 28 | 46.7 | |
| **Traditional care vs Care Bundle ($\chi^2$, P)** | | | | | | | | **41.82 ,< 0.001*** | | | | | | |

* Association is significant at P<0.05.

**Table (4):** Percentage distribution of the Barthel Index scale and pre-feeding assessment among the studied patients of both groups on admission, 3 days, and7 days post-admission

| Patients' clinical outcomes | Control group | | | | | | $\chi^2$ P | Study group | | | | | | $\chi^2$ P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | On admission (n=60) | | 3 days post-admission (n=60) | | 7 days post-admission (n=42) | | | On admission (n=60) | | 3 days post-admission (n=60) | | 7 days post-admission (n=53) | | |
| | n | % | n | % | n | % | | n | % | n | % | n | % | |
| **Barthel scale** | | | | | | | | | | | | | | |
| - Normal | 5 | 8.3 | 8 | 13.3 | 11 | 26.2 | | 4 | 6.7 | 14 | 23.3 | 26 | 49.1 | **18.71** |
| - Assisted independence | 27 | 45.0 | 30 | 50.0 | 25 | 59.5 | **9.42** | 24 | 40.0 | 29 | 48.3 | 19 | 35.8 | **0.001**** |
| - Totally dependent | 28 | 46.6 | 22 | 36.7 | 6 | 14.3 | **0.100** | 32 | 53.3 | 17 | 28.3 | 8 | 15.1 | |
| **Traditional care vs Care Bundle ($\chi^2$, P)10.83, 0.001**** | | | | | | | | | | | | | | |
| **Pre- feeding assessment** | | | | | | | | | | | | | | |
| - Normal feeding | 4 | 6.7 | 10 | 16.3 | 12 | 28.6 | | 3 | 5.0 | 18 | 30.0 | 34 | 64.1 | **15.31** |
| - Mild swallowing impairment | 20 | 33.3 | 28 | 46.6 | 26 | 61.9 | **5.32** | 21 | 35.0 | 24 | 40.0 | 14 | 26.5 | **0.004*** |
| - Delay in the initiation of swallowing | 36 | 60.0 | 22 | 36.7 | 4 | 9.5 | **0. 15** | 36 | 60.0 | 18 | 30.0 | 5 | 9.4 | |
| **Traditional care vs Care Bundle ($\chi^2$, P)7.38, 0.022*** | | | | | | | | | | | | | | |

* Correlation is significant at P<0.05.

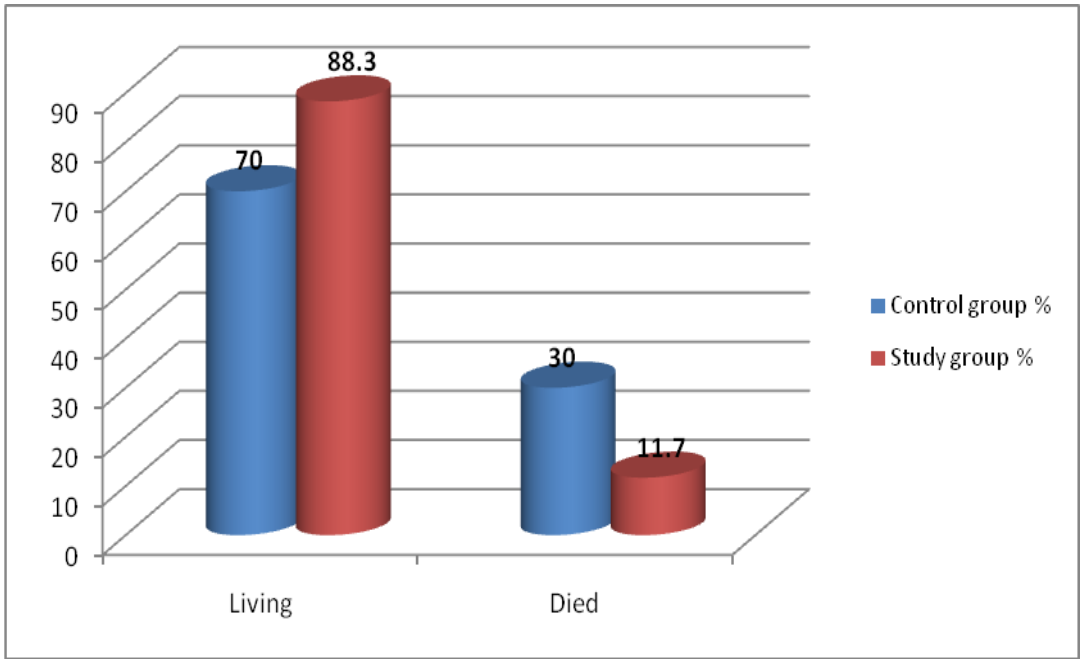


**Figure (4):** Percentage distribution of patients of both groups according to death during 7 days post-admission to the ICU.

**Table (5):** Relationship between ABCD2 risk level and death rate among the studied patients of both groups during 7 days post-admission

| Outcome | ABCD2 | | | | | | | | $\chi^2$ p |
|---|---|---|---|---|---|---|---|---|---|
| | Control group (60) | | | | Study group (60) | | | | |
| | Low risk (20) | | High risk (40) | | Low risk (23) | | High risk (37) | | |
| | n | % | n | % | n | % | n | % | |
| Death rate | 4 | 20.0 | 14 | 35.0 | 2 | 8.7 | 5 | 13.5 | 23.34 0.025* |

* Association is significant at P<0.05.

## Discussion

Stroke care bundles are evidence-informed practices that need to be provided constantly to promote positive outcomes in stroke patients. Applying a stroke care bundle is a way to overwhelm the gap between clinical practice and research **(Shahin, Abdelsalam, & Aly, 2019, Resar, Griffin, Haraden& Nolan, 2012).** This interested us to conduct this study, which intended to evaluate the effect of implementing initial emergency care bundle on early outcomes among acute ischemic stroke patients.

Based on the results of the current study, the current study illustrated that more than half of acute stroke patients of both control and study group were females and the majority of them were between 55-60 years old. These results may be attributed to female-specific characteristics such as late menopause, preterm delivery, and gestational hypertension may increase the risk for stroke. Also, ischemic stroke mainly affecting elderly people than young. This result was consistent with **(Shahin, et al., 2019)** who reported that the majority of acute stroke patients' were between 55 and 60 years old and more than half of these patients were females.

Regarding patients' education, the most common type of education among patients of both the control and study group was secondary education. It may be due to a lack of awareness regarding a healthy lifestyle which makes the patients' higher risk of acute stroke. This finding was agreed with**(Shahin, et al., 2019)** who reported that the majority of acute stroke patients' had secondary school education.

Concerning patients' risk medical history, it was found that the most common symptoms among patients of both control and study group were numbness feeling in one side of the body and the least common symptoms were loss of vision in one or both eyes. It may be due to temporary interruption of the blood flow at one side of the brain before causing permanent injury. This result was consisted with **(Saengsuwan, Suangpho, & Tiamkao, 2017, Almasi, Hodjati Firoozabadi, Ghasemi, & Chardoli, 2016)** they revealed that the most commonly predictable and initial symptoms among acute stroke patients on admission were sudden numbness of the face, arm, or leg and the least recognized symptoms were a sudden visual problem.

Regarding patients' comorbidities; the current study showed that more than half of patients in both the control and study group suffered from diabetes mellitus and hypertension. This may be attributed to acute ischemic stroke includes small vessel disease which is associated with hypertension and diabetes mellitus. This finding was in harmony with **(Shahin, Abdelsalam, &Aly, 2019)** who revealed that more than half of patients with acute ischemic stroke had diabetes mellitus and hypertension. Also, **(Habibi- koolaee, Shahmoradi, Niakan Kalhori, Ghannadan, & Younesi, 2018, Shaheen, Wahed & Hasaneen, 2019)** found that hypertension and diabetes mellitus are the major risk factors of stroke.

Concerning patients' current medications, it can be seen that a higher percentage of the control and study groups were received antihypertensive drugs and a lower percentage were received anticoagulant drugs. This result may be attributed to continuous vasoconstriction in the first 24 hours of acute ischemic stroke had a negative effect on patients' outcomes. Also, These results were supported by **(Bansal, Sangha, & Khatri,2013, Fekadu, Chelkeba, & Kebede, 2019)** they stated that the majority of the stroke patients were on antihypertensive during hospital arrival and the majority of the stroke patients do not receive anticoagulant therapy. Similarly **(Negm, & Abd El-Razek, 2019)** stated that a higher percentage of stroke patients who were not given anticoagulant therapy can increase the risk of recurrent ischemic stroke in patients with high-risk factors.

Regarding ABCD2 assessment on admission; there was a higher percentage of the patients of both control and study groups were at higher risk for stroke development. It may be due to the identification of patients with a higher risk of ischemic stroke after a transient ischemic attack may be helpful to enhance patient outcomes and decline complications and declining the occurrence of subsequent stroke. This result was consistent with **(Ildstad, Ellekjær, Wethal, Lydersen, Sund, ...& Morsund, 2019, Yamani & Gheini, 2016)** they showed that the ABCD2 risk score is still useful in predicting patients at the highest stroke risk development even high risk and low-risk patients.

Regarding vital signs, It can be revealed that highly statistically significant difference between control and study groups regarding heart rate, systolic blood pressure, diastolic blood pressure, respiratory rate, temperature, level of consciousness, and oxygen saturation, Barthel index scale, central venous pressure and pre-feeding assessment on admission, 3 days, and 7 days post-admission. This could be likely due to the initial emergency care bundle contains systematically developed evidence-based practice which improves patients' clinical outcomes.

These findings were aligned with **(Nakibuuka, Sajatovic, Nankabirwa, Ssendikadiwa, Kalema, ...& Katabira 2016, Regu, &Koul, 2019)** they illustrated that there were statistically significant differences regarding physiological parameters, level of consciousness, hydration status, and activity level as measured by Barthel Index among patients of study group compared to control group which reflected the effectiveness of stroke care bundle for stroke patients.

Regarding the death rate, among the studied patients of both groups during 7 days post-admission. This finding revealed that there was a statistically significant difference between the death rate among patients of both the control and study group 7 days post-admission. This finding was agreed with **(Nakibuuka, et al., 2016)** who suggested that the stroke care bundle might reduce the mortality rate among some patients with severe strokes in the study group compared to the control group. Similarly, **(Turner, et al., 2015)** found that implementation of a stroke

bundle for ischemic stroke patients can reduce the death rate and improve patient outcomes.

## Conclusion

Based on the findings of the study, it can be concluded that there were highly statistically significant differences between the control and study groups regarding improving vital signs, neurological status, and hydration status on admission, 3 days, and 7 days post-admission. Also, acute stroke patients who received the initial emergency care bundle had a statistically significant reduction in mortality rate, higher independency, and normal pre-feeding assessment compared to those who receive routine care on admission, 3 days, and 7 days post-admission.

## Recommendations

Based on the current study findings, it is recommended that recent EBP should be integrated into the management of acute stroke patients to improve the patients' outcomes. Also, Implementing a bundle of care in healthcare settings is essential in improving the quality of care for acute ischemic stroke patients.

## References

**Abd-Allah, F. &Moustafa, R.R. (2014).** The burden of stroke in Egypt: current status and opportunities. International Journal of Stroke, 9(8), 1105-1108. Retrieved from https:// www. researchgate. net/ publication

**Almasi, M., HodjatiFiroozabadi, N., Ghasemi, F., &Chardoli, M. (2016).** The value of ABCD2F scoring system (ABCD2 combined with atrial fibrillation) to predict 90-day recurrent brain stroke. Neurology research international. doi: 10.1155/2016/8191659

**Alrabghi, L., Alnemari, R., Aloteebi, R., Alshammari, H., Ayyad, M., Al Ibrahim, M., ...&Aljuwayd, H. (2018).** Stroke types and management. International Journal of Community Medicine and Public Health, 5(9), 3715. DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20183439

**Aquim, E. E., Bernardo, W. M., Buzzini, R. F., de Azeredo, N. S. G., da Cunha, L. S., Damasceno, M. C. P., ... &Nemer, S. N. (2019).** Brazilian guidelines for early mobilization in intensive care unit. RevistaBrasileira de terapiaintensiva, 31(4), 434.

**Arnold, M., Liesirova, K., Broeg-Morvay, A., Meisterernst, J., Schlager, M., Mono, M. L., ... & Sarikaya, H. (2016).** Dysphagia in acute stroke: incidence, burden, and impact on clinical outcome. PloS one, 11(2), e0148424.

**Australian government National Stroke Foundation Health and Medical Research Council.** National stroke audit - acute services organizational survey report 2009. Melbourne: National Stroke Foundation; 2009.

**Bansal, S., Sangha, K. S., &Khatri, P. (2013).** Drug treatment of acute ischemic stroke. American Journal of Cardiovascular Drugs, 13(1), 57-69. DOI: 10.1007/s40256-013-0007-6.

**Bhatt, A., & Jani, V. (2011).** The ABCD and ABCD2 scores and the risk of stroke following a TIA: a narrative review. International Scholarly Research Notices. doi: 10. 5402/ 2011/ 518621

**Boehme, A. K., Esenwa, C., &Elkind, M. S. (2017).** Stroke risk factors, genetics, and prevention. Circulation Research, 120(3), 472-495.

**Çetiner, M., Arsava, E. M., &Topçuoğlu, M. A. (2020).** Thrombolytic Therapy for Stroke in Turkey: Meta-analysis of Published Case Series. Turk J Neurol, 26, 138-141.

**Chang, B. P., Rostanski, S., Willey, J., Miller, E. C., Shapiro, S., Mehendale, R., ... & Elkind, M. S. (2019).** Safety and Feasibility of a Rapid Outpatient Management Strategy for Transient Ischemic Attack and Minor Stroke: The Rapid Access Vascular Evaluation–Neurology (RAVEN) Approach. Annals of Emergency Medicine, 74(4), 562-571.

**Fekadu, G., Chelkeba, L., &Kebede, A. (2019).** Risk factors, clinical presentations and predictors of stroke among adult patients admitted to stroke unit of Jimma university medical center, southwest Ethiopia: a prospective observational study. BMC neurology, 19(1), 1-11. https:// doi. org/ 10. 1186/ s12883- 019-1409-0

**Habibi- koolaee, M., Shahmoradi, L., NiakanKalhori, S. R., Ghannadan, H., &Younesi, E. (2018).** Prevalence of Stroke Risk Factors and Their Distribution Based on Stroke Subtypes in Gorgan: A Retrospective Hospital - Based Study- 2015-2016. Neurology research international. https:// doi. org/ 10. 1155/ 2018/ 2709654

**Hou, X., Chen, W., Xu, H., Zhu, Z., Xu, Y., & Chen, H. (2019).** The rate of early neurological deterioration occurring after thrombolytic therapy: A meta analysis. Brain and Behavior, 9(2), e01210.

**Ildstad, F., Ellekjær, H., Wethal, T., Lydersen, S., Sund, J. K., Fjærtoft, H., ... &Morsund, Å. H. (2019).** Stroke risk after transient ischemic attack in a Norwegian prospective cohort. BMC neurology, 19(1), 1-7. https:// doi. org/ 10. 1186/s12883-018-1225-y.

**Johnson, W., Onuma, O., Owolabi, M., &Sachdev, S. (2016).** Stroke: a global response is needed. Bulletin of the World Health Organization, 94(9), 634.http: //dx. doi. org/ 10. 2471/ BLT. 16. 181636.

**Katzan, I. L., Spertus, J., Bettger, J. P., Bravata, D. M., Reeves, M. J., Smith, E. E., ... & Howard, G. (2014).** American Heart Association Stroke Council: A statement for healthcare professionals from the American Heart Association/ American Stroke Association. Stroke, 45(3), 918-944.

**Knight, K., Pillay, B., Linde, J. V. D., &Krüger, E. (2020).** Nurses' knowledge of stroke-related oropharyngeal dysphagia in the Eastern Cape, South Africa. South African Journal of Communication Disorders, 67(1), 1-7.

**Kummarg, U., Sindhu, S., & Muengtaweepongsa, S. (2018).** The early outcomes of nurse case management in patients with acute ischemic stroke treated with intravenous recombinant tissue plasminogen activator: a prospective randomized controlled trial. Neurology research international, 2018.

**Langhorne, P. (2014).** Organized inpatient (stroke unit) care for stroke. Stroke, 45(2), e14-e15. Doi: 10.1161/ Strokeaha. 113. 003740.

**Mahoney, F.I., &Barthel, D. (1965).** Functional evaluation: The Barthel Index. Maryland State Medical Journal, 14, 56-61. Used with permission.

**Matchar, D., Nguyen, H. (2015).** Bundled payment and care of acute stroke what does it take to make it work? American Heart Association. 46: 1414-1421. DOI: 10.1161/ strokeaha.115.009089.

**Muengtaweepongsa, S. (2015).** Risk factors of stroke in Pathumthani Province, Thailand. J Med Assoc Thai, 98(7), 649-55.

**Nakibuuka, J., Sajatovic, M., Nankabirwa, J., Ssendikadiwa, C., Kalema, N., Kwizera, A., ... & Katabira, E. (2016).** Effect of a 72-hour stroke care bundle on early outcomes after acute stroke: a non randomized controlled study. PloS one, 11(5), e0154333. DOI:10.1371/journal.pone.0154333.

**Negm, M., &Abd El-Razek, R. (2019).** Role of aspirin discontinuation in recurrence of ischemic cerebrovascular stroke. The Egyptian Journal of Neurology, Psychiatry, and Neurosurgery, 55(1), 14. https:// doi. org/ 10. 1186/ s41983- 019-0066-y

**NHMR, C. (2005).** NHMRC additional levels of evidence 8 and grades for recommendations for developers of guidelines PILOT PROGRAM 2005-2007.

**Ojaghihaghighi, S., Vahdati, S. S., Mikaeilpour, A., &Ramouz, A. (2017).** Comparison of neurological clinical manifestation in patients with hemorrhagic and ischemic stroke. World journal of emergency medicine, 8(1), 34.

**Powers, W.J., Derdeyn, C.P., Biller, J., Coffey, C.S., Hoh, B.L., Jauch, E.C…&Yavagal, D.R. (2015).** American Heart Association/ American Stroke Association focused update of the 2013 guidelines for the early management of patients with acute ischemic stroke regarding endovascular treatment: A guideline for healthcare professionals from the AHA/ASA. Stroke, 46 (12), 3020–3035.

**Regu, M., &Koul, P. (2019).** Effect of Comprehensive Nursing Care Strategies in Patients with Stroke

on Physiological Parameters. International Journal of Nursing & Midwifery Research (E-ISSN: 2455- 9318), 6(4),44-51.DOI: https:// doi. org/ 10. 24321/ 2455. 9318. 201932

**Resar, R., Griffin, F. A., Haraden, C., & Nolan, T. W. (2012).** Using care bundles to improve health care quality. IHI innovation series white paper. Cambridge, Massachusetts: Institute for Healthcare Improvement. http:// www.IHI.org.

**Royal College of Physicians (2012).** National clinical guideline for stroke. Assessed online: http://www. rcplondon. ac.uk/ resources/ stroke- guidelines. Accessed 10/ 24/2020

**Saengsuwan, J., Suangpho, P., &Tiamkao, S. (2017).** Knowledge of stroke risk factors and warning signs in patients with recurrent stroke or recurrent transient ischaemic attack in Thailand. Neurology research international, 2017. https:// doi. org/ 10. 1155/2017/8215726.

**Shah S, Vanclay F, Cooper B (1989).** Improving the sensitivity of the Barthel Index for stroke rehabilitation. J ClinEpidemiol, 42:703–709.

**Shaheen, H. A., Wahed, W. Y. A., &Hasaneen, S. T. (2019).** Prevalence of Stroke in Fayoum Governorate, Egypt: A Community-Based Study. Journal of Stroke and Cerebrovascular Diseases, 28(9), 2414-2420. https: //doi. org/ 10. 1016/ j. jstroke cerebrovasdis.2019.06.031

**Shahin, E. S., Abdelsalam, N. A., &Aly, A. A. (2019).** Effect of a Care Bundle for Hypertension Control on the Health Outcomes of Hypertensive Patients with Stroke Risk. American Journal of Nursing, 7(6), 942-946. DOI: 10.12691/ ajnr-7-6-5.

**Sitoh, Y. Y., Lee, A., Phua, S. Y., Lieu, P. K., & Chan, S. P. (2000).** Bedside assessment of swallowing: a useful screening tool for dysphagia in an acute geriatric ward. Singapore medical journal, 41(8), 376-381.

**Teale, E. A., Forster, A., Munyombwe, T., & Young, J. B. (2012).** A systematic review of case-mix adjustment models for stroke. Clinical rehabilitation, 26 (9), 771- 786. Doi: 10. 1177/ 02 69 215511433068.

**Teasdale, G., &Jennett, B. (1974).** Assessment of coma and impaired consciousness: a practical scale. The Lancet, 304(7872), 81-84.

**Trapl, M., Enderle, P., Nowotny, M., Teuschl, Y., Matz, K., Dachenhausen, A., &Brainin, M. (2007).** Dysphagia bedside screening for acute-stroke patients: the Gugging Swallowing Screen. Stroke, 38(11), 2948-2952.

**Turner, M., Barber, M., Dodds, H., Murphy, D., Dennis, M., Langhorne, P., & Macleod, M. J. (2015).** Implementing a simple care bundle is associated with improved outcomes in a national

cohort of patients with ischemic stroke. Stroke, 46(4), 1065-1070.DOI: 10.1161/ Strokeaha. 114. 007608.

**Utting, S., Regan, E., Lee V. (2016).** High ABCD2 Scores and in-hospital interventions following transient ischemic attack. Cerebrovasc Dis Extra. 6(3):76–83. 10.1159/000450692

**Wardlaw, J. M., Brazzelli, M., Chappell, F. M., Miranda, H., Shuler, K., Sandercock, P. A., & Dennis, M. S. (2015).** ABCD2 score and secondary stroke prevention: meta-analysis and effect per 1,000 patients triaged. Neurology, 85(4), 373-380.

**Wells-Pittman, J., &Gullicksrud, A. (2020).** Standardizing the Frequency of Neurologic Assessment after Acute Stroke. AJN The American Journal of Nursing, 120(3), 48-54.

**World Health Organization. (2015).** Egypt WHO statistical profile. Retrieved from http:// www. who. int/gho/en.

World Health Organization. (2017). Heart and Stroke Statistics Retrieved from http:// www. who. int/gho/en.

**Yamani, N., &Gheini, M. (2016).** A Survey on the amount of positive result of DWI in the patients suffering from TIA and the correlation of this patient with ABCD scoring. Biomedical and Pharmacology Journal, 9(1), 259-267. DOI: 10.13005/bpj/934.