



Aim of the study



AIM OF THE STUDY

The aim of this study was to assess emergency nurses' knowledge about evidence-based nursing practice of ischemic stroke patients.

Research questions

Q1: What is the level of knowledge that emergency nurses had about evidence-based nursing practice of ischemic stroke patient?

Q2: Is there is relation between emergency nurses' knowledge about evidence-based nursing practice of ischemic stroke patients and their Socio-demographic characteristics?

Review of literature



REVIEW OF LITERATURE

Emergency Nursing

Emergency nursing has become one of the fast growing specialties in the nursing profession. Emergency nursing is the care of individuals of all ages with perceived or actual physical or emotional alterations of health that are undiagnosed or that require further interventions. The scope of emergency nursing practice encompasses assessment, diagnosis, treatment, and evaluation. Emergency nursing simply requires good assessment, communication skills and emergency care training programs. Emergency nursing requires a firm respect for human life, and a sense of awareness. (Mayer et al., 2010; Gilboy et al., 2011)

Emergency nursing presents an additional challenge in the care of emergency patients. Emergency patients and their families are often in a crisis situation, and the emergency nurse must have the ability to manage, educate, and listen to patients and families in a caring and nonjudgmental manner. Other important attributes for success in the emergency nursing role are compassion, humor, good organizational skills, and having a team spirit. (Summers et al., 2009; Tan et al., 2012)

Emergency department has become the major diagnostic and resuscitation site of the health care system. Emergency nurses must have good assessment skills, both in obtaining a health history as well as in physical assessment. Emergency nurses are seen as the backbone to health service delivery and they are often the first health professional available to manage a client and help to stabilize them before the medical practitioner arrives. Recognition of abnormal findings is the core responsibility of ENs to understand the significance of those deviations

from the normal in order to determine the emergency level. **(Janice et al ., 2007; Chen et al ., 2011)**

Emergency department provides medical treatment for a broad spectrum of illnesses and injuries to patients. Emergency nurses can improve patients' recovery rates by recognizing the signs of stroke, initiating appropriate and timely treatment, and referring patients for direct admission to stroke units. In order to improve the emergency nursing management of stroke patients, ENs should have adequate knowledge and practice concerning delivering an evidence-based stroke care to optimize patient outcomes. Guidelines and decision support tools for use in emergency nursing must be practical and have high levels of clinical utility for maximum uptake in ED. **(Joanne et al., 2007; Gocan et al., 2009)**

Emergency nurses need a strong knowledge base in every area of nursing; from pathophysiology to psychology, pharmacology, policies and procedures, and everything in between. Also it is important to know limitations, and how and when to use resources appropriately. So there are many workshops that equip ENs with an overview of all essential aspects of initial care for emergency patients. **(Gerber et al., 2003)**

The availability of information and the growth of science have led to significant improvements in health outcomes throughout the world. However differences in outcomes, health inequalities and lack of equipment and supplies continue to present a real challenge to all nurses. About half of the world's deaths could be prevented with simple cost effective interventions. The nurse should have the skills that put knowledge into use and develop the methods that close the gap between evidence and action. The ENs need to understand the role that they play

in the evidence to action continuum. When ENs use an evidence-based approach into their practice they are more able to ask good questions about how and when they should change their practice and evaluate it. (Lukovits et al., 2011)

Evidence-Based Practice (EBP)

During the 1980s, the term “evidence-based medicine” emerged to describe the approach that used scientific evidence to determine the best practice. Later, the term shifted to become “evidence-based practice” as clinicians other than physicians recognized the importance of scientific evidence in clinical decision-making. Evidence-based practice is a problem-solving approach to clinical decision making within a health-care organization that integrates the best available scientific evidence with the best available experiential evidence. Evidence-based practice encourages critical thinking in the judicious application of evidence. (Robin et al., 2007)

Evidence-based practice is clinical decision making based on the best available scientific evidence, combined with clinical expertise, and considering patients' preferences and values. It also defined as a systematic approach for problem solving for health care providers, characterized by the use of the best currently available for clinical decision-making in order to provide consistent and best possible care to the patient. (Melnyk et al. , 2005; Sole et al., 2013).

Emergency nurses serve instrumental roles in ensuring and providing evidence-based practice. They must continually ask the following questions, “What is the evidence for this intervention?” or “How do we provide best practice?” and “Are these the highest achievable outcomes for the patient, family, and nurse?” ENs are also

well positioned to work with other members of the healthcare team to identify clinical problems and use existing evidence to improve practice. **(Mantzoukas et al., 2008)**

Evidence-based practice helps nurses to provide high-quality care based on research and knowledge that lead to better patient's outcomes, contributes to the development of the science of nursing, keeps practice current and relevant and increases confidence in decision-making. Evidence-based practice provides a critical strategy to ensure that care is up to date so, it reflects the latest research evidence. **(Newhouse et al. , 2005)**

Evidence-based practice is the integration of one's own clinical expertise, with the best relevant research evidence from literature, and patient preferences and values into the decision making process for patient care to answer the clinical question. Clinical expertise refers to the clinician's cumulated experience, education and clinical skills. The patient brings to the encounter his or her own personal and unique concerns, expectations, and values. Evidence-Based Practice requires new skills of the clinician, including efficient literature searching, and the application of formal rules of evidence in evaluating the clinical literature. The full integration of these three components into clinical decisions enhances the opportunity for optimal clinical outcomes and quality of care. **(Mantzoukas et al. , 2008).**

The barriers that prevent nurses from using research in everyday practice have been cited in numerous studies such as lack of value to apply research in practice, lack of administrative support, lack of knowledgeable mentors, insufficient time to conduct research, lack of education about the research process. Moreover lack of awareness about

research or evidence-based practice, difficulty accessing research reports and articles, no enough time to read research, complexity of research reports, and lack of knowledge about EBP. **(Clarke et al. 2002).**

The Stroke Council of the AHA/ASA has published guidelines for the management of acute ischemic stroke. In writing these guidelines, the AHA/ASA applied the levels of evidence and the formulation of strength of recommendations. The detailed explanation of these levels and recommendations mentioned in figure 1 **(AHA/ASA, 2013)**

ESTIMATE OF CERTAINTY (PRECISION) OF TREATMENT EFFECT	SIZE OF TREATMENT EFFECT					
	CLASS I <i>Benefit >>> Risk</i> Procedure/Treatment SHOULD be performed/administered	CLASS IIa <i>Benefit >> Risk</i> <i>Additional studies with focused objectives needed</i> IT IS REASONABLE to perform procedure/administer treatment	CLASS IIb <i>Benefit ≥ Risk</i> <i>Additional studies with broad objectives needed; additional registry data would be helpful</i> Procedure/Treatment MAY BE CONSIDERED	CLASS III <i>No Benefit</i> or CLASS III <i>Harm</i>		
					Procedure/Test	Treatment
					COR III: No benefit	No Proven Benefit
					COR III: Harm	Excess Cost w/o Benefit or Harmful to Patients
LEVEL A Multiple populations evaluated* Data derived from multiple randomized clinical trials or meta-analyses	- Recommendation that procedure or treatment is useful/effective - Sufficient evidence from multiple randomized trials or meta-analyses	- Recommendation in favor of treatment or procedure being useful/effective - Some conflicting evidence from multiple randomized trials or meta-analyses	- Recommendation's usefulness/efficacy less well established - Greater conflicting evidence from multiple randomized trials or meta-analyses	- Recommendation that procedure or treatment is not useful/effective and may be harmful - Sufficient evidence from multiple randomized trials or meta-analyses		
LEVEL B Limited populations evaluated* Data derived from a single randomized trial or nonrandomized studies	- Recommendation that procedure or treatment is useful/effective - Evidence from single randomized trial or nonrandomized studies	- Recommendation in favor of treatment or procedure being useful/effective - Some conflicting evidence from single randomized trial or nonrandomized studies	- Recommendation's usefulness/efficacy less well established - Greater conflicting evidence from single randomized trial or nonrandomized studies	- Recommendation that procedure or treatment is not useful/effective and may be harmful - Evidence from single randomized trial or nonrandomized studies		
LEVEL C Very limited populations evaluated* Only consensus opinion of experts, case studies, or standard of care	- Recommendation that procedure or treatment is useful/effective - Only expert opinion, case studies, or standard of care	- Recommendation in favor of treatment or procedure being useful/effective - Only diverging expert opinion, case studies, or standard of care	- Recommendation's usefulness/efficacy less well established - Only diverging expert opinion, case studies, or standard of care	- Recommendation that procedure or treatment is not useful/effective and may be harmful - Only expert opinion, case studies, or standard of care		
Suggested phrases for writing recommendations	should is recommended is indicated is useful/effective/beneficial	is reasonable can be useful/effective/beneficial is probably recommended or indicated	may/might be considered may/might be reasonable usefulness/effectiveness is unknown/unclear/uncertain or not well established	COR III: No Benefit is not recommended is not indicated should not be performed/administered/other is not useful/beneficial/effective	COR III: Harm potentially harmful causes harm associated with excess morbidity/mortality should not be performed/administered/other	
Comparative effectiveness phrases†	treatment/strategy A is recommended/indicated in preference to treatment B treatment A should be chosen over treatment B	treatment/strategy A is probably recommended/indicated in preference to treatment B it is reasonable to choose treatment A over treatment B				

Figure 1: Classifications and levels of evidence based practice
(Quoted after American stroke association 2013)

These stroke guidelines aim to guide triage decision making and improve the emergency nursing management. This management includes initial assessment, ongoing nursing care and specialist referrals. Once an ischemic stroke has been expected in a patient, response time of both paramedics and ENs is paramount to minimize brain tissue damage. Emergency nurses must be able to recognize the presentation of an ischemic stroke and have knowledge about the appropriate intervention. (Adams et al., 2010; ASA, 2013)

Stroke

The World Health Organization (WHO) defined stroke as “rapidly developed clinical signs of focal or global disturbance of cerebral function, lasting more than 24 hours or until death, with no apparent non-vascular cause”.

Stroke is a common multifactorial neurological disorder, which arises as a result of a severe reduction in cerebral blood flow. The brain accounts for around 2-3% of body weight that receives approximately 17% of the total cardiac output. Furthermore, it has high metabolic requirements; accounting for around 20% of total body oxygen consumption and 25% of total body glucose consumption. The brain receives its blood through four main arteries: Two large arteries; the right and left internal carotid arteries which supply blood to about 80% of the brain, including most of the frontal, parietal, temporal hemispheres and the basal ganglia. Also two smaller arteries; the right and left vertebral arteries, ascend via the posterior portion of the neck which supply blood to the remaining 20% of the brain, including the brainstem, cerebellum, and most of the posterior cerebral hemisphere. (Millin et al., 2007; Mokinet al., 2012)

The brain has a very limited capacity to store energy and therefore requires a constant supply of substrates for normal metabolic function. This great demand for substrates helps to illustrate how damaging even a transient reduction in blood flow could potentially be to brain tissue. (Brenner et al., 2010)

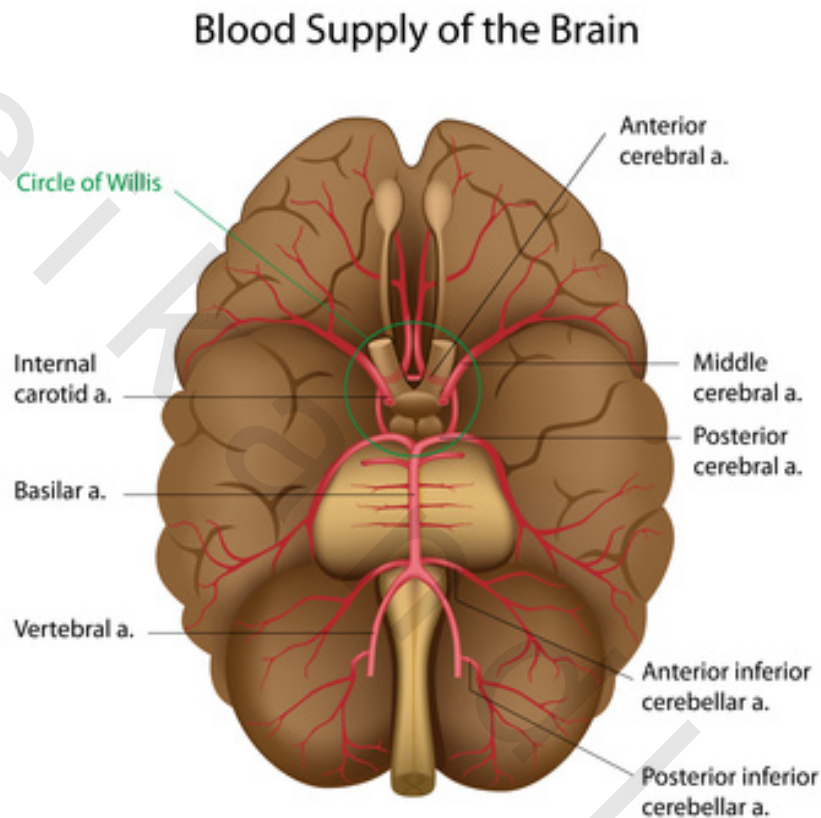


Figure 2: Inferior view of the brain's blood supply (Quoted after National Stroke Foundation, 2010)

The reduction in cerebral blood flow observed in stroke can arise from occlusion of a cerebral blood vessel or from hemorrhage. These are termed ischemic (occlusive strokes) or hemorrhagic, respectively. Hemorrhagic strokes are less common than ischemic strokes that account for approximately 13% of all strokes (Alli et al., 2013).

Occlusive or ischemic stroke is the most common type of stroke that accounts nearly 87% of all strokes. Cerebral artery occlusion most often arises from the production of an atherosclerotic plaque, thrombus or an embolism, which has traveled through the circulation from its origin in the heart. The reduction in blood flow can be transient or permanent. The location of the occluded cerebral artery determines the brain area affected by the stroke and the symptoms exhibited by the patient as shown in Figure 3. (Ching et al., 2010; Crary et al., 2013).

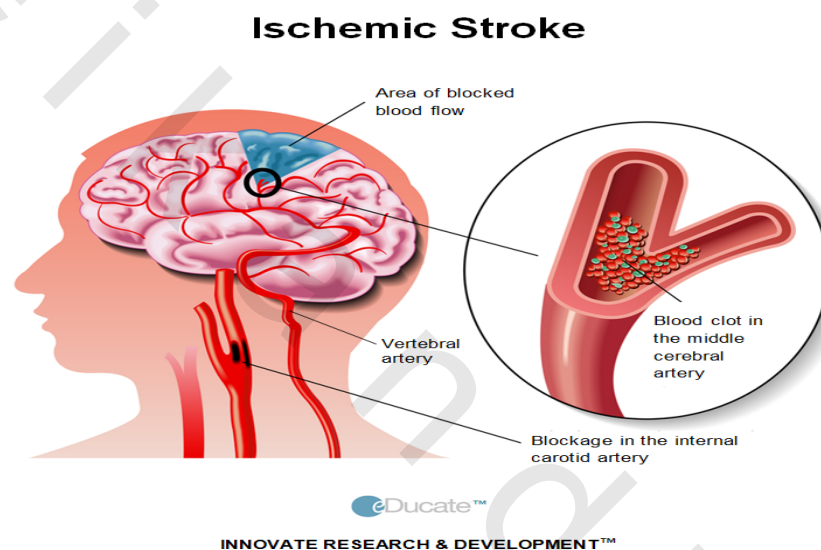


Figure 3: ischemic stroke (Quoted after Yeo, 2013)

The most widely used **ischemic stroke sub classification** as shown in Figure 4 includes (1) large-vessel atherothrombosis (12.9 % of ischemic strokes), (2) cardioembolism (36.5 %), (3) small-vessel disease (18.4 %), (4) other determined causes (6 %), and (5) undetermined causes , which includes cases invoking more than one primary mechanism (26.4–42.3 %). (Joao et al., 2013)

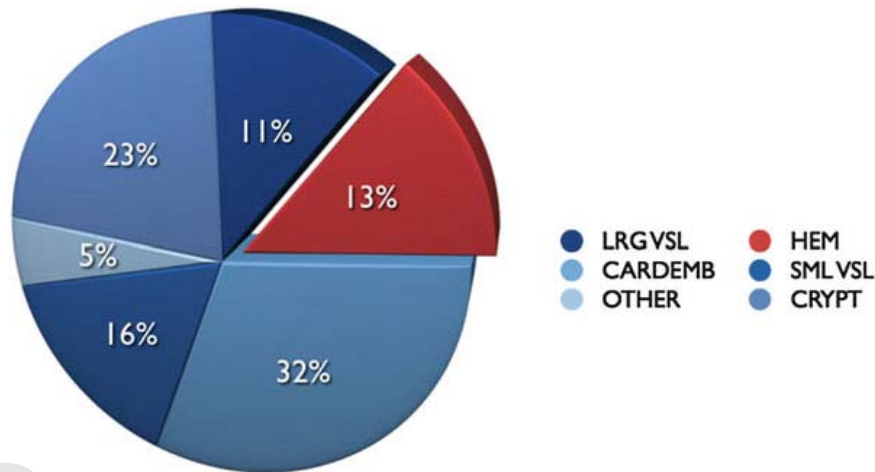


Figure 4:. Ischemic stroke sub classification (Quoted after Joao, 2013)

Emolic stroke caused by an emboli which arise from the heart and then travel to the brain. (National Stroke Association, 2013).

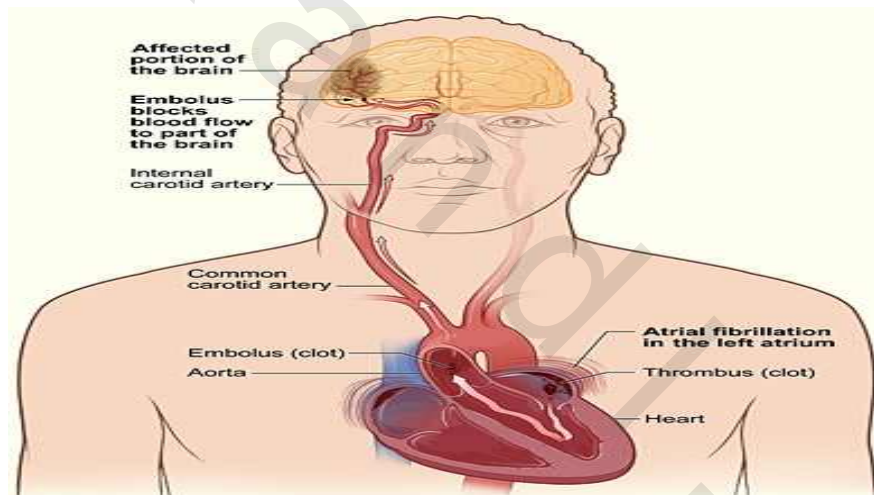


Figure 5: Ischemic stroke arising from a cardiac embolus (Quoted after Jonasson et al., 2012)

Thrombotic stroke may arise from extra or intracranial vessels, blood flow is impaired because of a blockage to one or more of the arteries supplying blood to the brain. The process leading to this blockage is known as thrombosis that cause a thrombotic stroke (figure 6). Blood-clot strokes can also happen as the result of unhealthy blood vessels clogged with a buildup of fatty deposits and cholesterol. Although the

large intracranial vessels are less commonly the source of the thrombus. The site of the occlusion is often at bifurcation points of the arterial system due to a combination of turbulent flow and weakened vessel walls at these regions.(**Joao et al., 2013**).

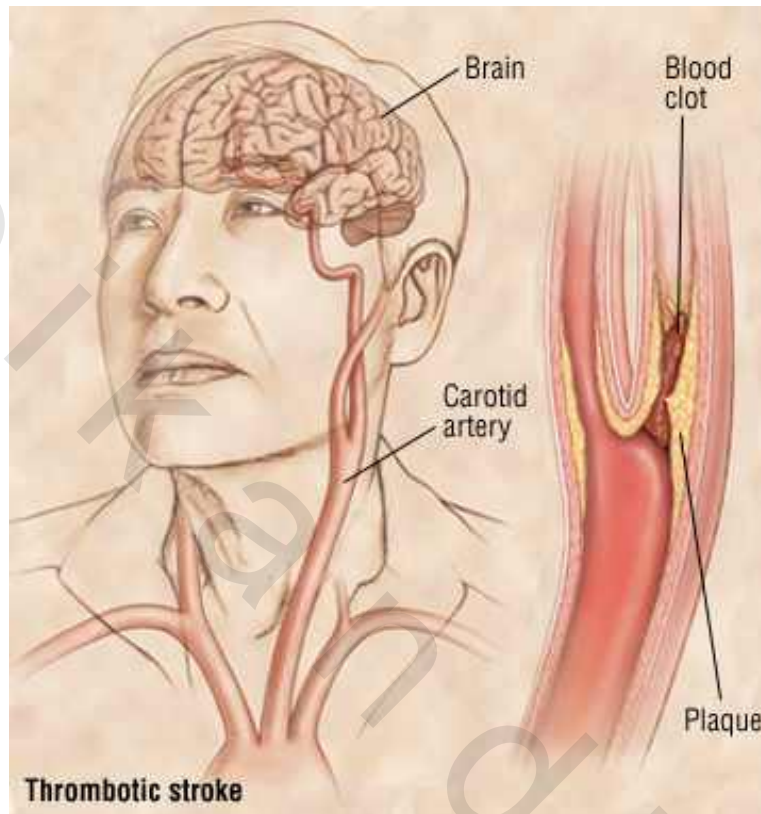


Figure 6: Thrombotic stroke (Quoted after Joao et al., 2013)

According to WHO, 15 million people worldwide are diagnosed with stroke annually, about 4.5 million patient die from stroke every year and five million remain permanently disabled. Stroke is the fourth most common cause of death in the United States accounting for 10% to 12% of all deaths and in USA annually. On average, every 40 seconds, someone in the USA has a stroke. In Europe, the prevalence of stroke has been estimated to be 9.6 million. Stroke incidence rates in developing countries have increased by more than 10 % during the last four decades, while they have decreased by 42 % in developed countries over the same

time a rising incidence is suspected in developing countries as these countries struggle with increasing prevalence of risk factors, especially diabetes. Although stroke is more common among men, women become more severely ill, in addition, approximately one in four men and one in five women aged over 45 will have a stroke if they survive to 85 years .
(American Stroke Association, 2013).

Fortunately, modern medical interventions, mostly risk factor modification and improved treatment in developed countries has led to a reduction in the risk of death as a result of a stroke, and decrease stroke mortality by approximately 7% per year in industrialized nations. Furthermore stroke is the major public health issue and the leading cause of immobility and long term disability in developed countries. **(American Heart Association (AHA). 2010; Go et al. , 2013)**

In Arab countries, the annual incidence of stroke ranged between 27 to 63/100,000 populations. In Egypt, prevalence of stroke has been found to be 4.6/1000 in urban areas, 5.6/1000 in rural areas with a mean of 4.5/1000. The annual incidence was 2.1/1000/year, with higher incidence of stroke in Upper Egypt than in Lower Egypt, prevalence rate is high in older adults, men and illiterate individuals. Also a higher prevalence of ischemic than hemorrhagic stroke was recorded, with hypertension and diabetes mellitus being the commonest risk factors in our community. **(Hani et al., 2009)**

As a consequence, the impact of stroke on society is enormous, the direct and indirect economic impact of acute stroke costs about 43 billion\$ per year. This burden is likely to increase in the future, as incidence increases with age and the population ages. Approximately 8% of those suffering an acute stroke die within 30 days, where as

approximately 29% of stroke patients are dead at 1 year. From those who survive, nearly 16% of stroke patients require institutional care; another 31% require assistance caring for themselves, and 20% of stroke survivors need walking assistance. Up to one third of stroke survivors suffer from major depression. **(Centers for Disease Control and Prevention (CDC). 2012).**

Pathophysiology of Ischemic Stroke

Ischemia occurs when the blood supply to a part of the brain is interrupted or totally occluded. Survival depends on the length of time that the brain is deprived of oxygen and metabolites and on the amount of altered brain metabolism. Infarction occurs when the brain tissue suffers irreversible changes. The extent of infarction depends on the size and location of the occluded artery and on the adequacy of collateral circulation to the area. Occlusion produces ischemia in the brain tissue supplied by the affected artery and edema in the surrounding tissue. Ischemia alters cerebral metabolism. Cells in the center of the infarcted tissue, or the core, die almost immediately after stroke onset; this often called the site of primary neuronal injury. A zone of hypoperfused tissue exists around the core (Figure 7). This is referred to as the ischemic penumbra. The penumbra is the area of reduced blood flow which centers around the ischemic area. If blood flow is properly restored within three hours and ischemia stopped, there is decreased chance of neurological damage. **(Rasmussen, 2009).**

A cascade of biochemical processes develop within minutes of the cerebral ischemic event. Release of neurotoxins such as oxygen free radicals, nitric oxide, and glutamate often occurs, prompting the development of local acidosis and membrane depolarization with influx

of sodium and calcium. This influx results in cytotoxic edema and cell death, and secondary neuronal injury occur. (Rasmussen, 2009).

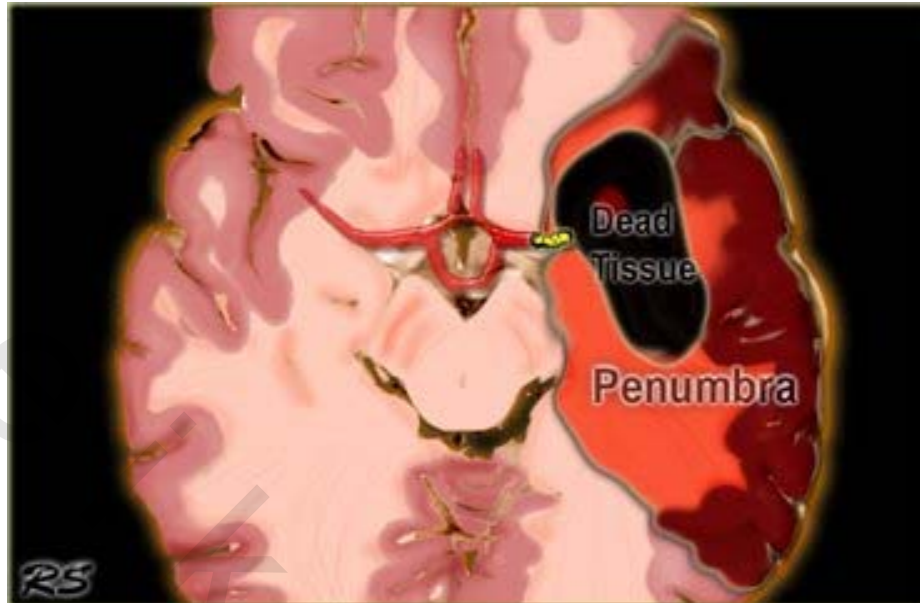


Figure 7: Ischemic core and penumbra after ischemic stroke (Quoted after Beal, 2010)

Risk factors for ischemic stroke

Both ‘modifiable’ and ‘non-modifiable’ risk factors have been linked to stroke in observational studies. Age is one of the strongest ‘non-modifiable’ risk factors. Males have a higher risk, although women tend to live longer than men, they are more likely to die from stroke. Other non modifiable risk factors of stroke are race, family history of stroke and previous stroke or transient ischemic attack (TIA). Elevated blood pressure (BP) is the strongest of the ‘modifiable’ risk factors. Other ‘modifiable’ factors that have been linked to stroke include; smoking, diabetes, atrial fibrillation (AF), alcohol consumption, high salt intake, low social status, obesity, elevated white blood cell count, elevated fibrinogen levels and hematocrit. (Beal et al., 2010; Feng et al., 2010; Aoki et al., 2011)

Whereas the risk factors for first stroke are well established, less is known of the predictors of recurrent stroke. Some of these predictors are age and elevated blood pressure, diabetes, atrial fibrillation, tobacco smoking, transient ischemic attack (TIA) and a high intake of alcohol have been associated with an increased risk of recurrence. On the other hand age, stroke severity and cardiovascular events are strong predictors of death after stroke. (**Brenner et al., 2010; Bergman et al. , 2011**)

Prehospital management of ischemic stroke

Emergency medical service (EMS) personnel should begin the initial management of stroke in the field, (Class I; Level of Evidence B). The prehospital evaluation and management of potential ischemic stroke patients includes : assessment and management of air way ,breathing and circulation (ABCs), initiate cardiac monitoring, provide supplemental oxygen, establish intravenous access, determine blood glucose level and manage accordingly, determine time of symptom onset or last known normal, and obtain family contact information . EMS personnel should provide prehospital notification to the receiving hospital before arrival of a potential stroke patient, so that the appropriate hospital resources may be prepared. (Class I; Level of Evidence B). Several studies have shown that prehospital notification leads to significant reductions in several stroke time benchmarks, including time from arrival to physician assessment, CT performance and interpretation, and is associated with higher rates of recombinant intravenous tissue plasminogen activator (rtPA) administration. (**Alspach, 2013;Cameron, 2013**)

Before 2008, the 5 “Suddens” of stroke warning signs (sudden weakness, sudden speech difficulty; sudden visual loss; sudden dizziness; and sudden severe headache) were used widely. Since last decade the

FAST (**Face**: ask person to smile, Does one side of the face drooped? & **Arm**: ask the person to raise both arms, Does one arm drift downward? & **Speech**: ask the person to repeat simple sentence, Are the words slurred? Can he or she repeat the sentence correctly? and finally **Time**: Is the person shows any of these symptoms? Time is important, call 123 or go to the hospital fast, brain cells are dying) message is being reintroduced in public education efforts. One or more of face weakness, arm weakness, and speech difficulty symptoms are present in 88% of all strokes. (Edward et al., 2013)

Signs and symptoms of stroke varies according to different cerebral areas: **Left dominant hemisphere**: left gaze preference, right visual field deficit, right hemiparesis, and right hemisensory loss. **Right nondominant hemisphere**: right gaze preference, left visual field deficit, left hemiparesis, left hemisensory loss neglect (left hemi-inattention). **Brainstem**: nausea and/or vomiting diplopia, dysconjugate gaze, gaze palsy, dysarthria, dysphagia, vertigo, tinnitus, hemiparesis or quadriplegia, Sensory loss in hemibody or all 4 limbs, decreased consciousness, hiccups, abnormal respirations. **Cerebellum**: Truncal/gait ataxia, limb ataxia, neck stiffness, hemorrhage: focal neurological deficits as in AIS, headache (especially in sub arachnoid hemorrhage), neck pain, light intolerance .nausea, vomiting, decreased level of consciousness. (Summers et al., 2009)

Prehospital assessment tools have been developed to enhance recognition of stroke symptoms and improve the ability to identify stroke patients in the field. The most common and well-investigated tool is the National Institute of Health Stroke Assessment Scale (NIHSS) (Class I; Level of Evidence B) .Other assessment tools are Cincinnati Prehospital

Stroke Scale and the Los Angeles Prehospital Stroke Screen .(Govindarajan et al. , 2012; Edward et al, 2013).

To achieve further improvement in reducing the burden of stroke, healthcare providers and hospitals should develop systems to increase the efficiency of stroke care. The **“D’s of Stroke Care”** remain the major steps in diagnosis and treatment of stroke .The critical links to the process of caring with a patient with stroke pass through **Detection** (Patient or bystander recognition of stroke signs and symptoms) & **Dispatch** (Immediate activation of 123 and priority EMS dispatch) & **Delivery** (Prompt triage and transport to most appropriate stroke hospital and prehospital notification) & **Door** (Immediate ED triage to high-acuity area) & **Data** (Prompt ED evaluation, stroke team activation, laboratory studies, and brain imaging) & **Decision** (Diagnosis and determination of most appropriate therapy; discussion with patient and family) & **Drug** (Administration of appropriate drugs or other interventions), finally **Disposition** (Timely admission to stroke unit, intensive care unit, or Transfer). (Hornik et al., 2013)

Emergency Management and Nursing Care of Acute Ischemic Stroke

a) Assessment

Patients with suspected acute stroke should be triaged with the same priority as patients with acute myocardial infarction or serious trauma, regardless of the severity of neurological deficits. The National Institute of Neurological Disorders and Stroke (NINDS) established goals for time frames in the evaluation of stroke patients in the ED as follows: door to physician time should be ≤ 10 minutes, door to stroke team should

be ≤ 15 minutes, door to computed tomography (CT) initiation should be ≤ 25 minutes, door to CT interpretation should be ≤ 45 minutes, door to drug should be ≤ 60 minutes finally door to stroke unit admission should be ≤ 3 hours. (**American Stroke Association 2013**)

The initial evaluation of a potential stroke patient is similar to that of other critically ill patients: immediate stabilization of the airway, breathing, and circulation (ABCs). This is quickly followed by an assessment of neurological deficits and possible comorbidities. The diagnosis of stroke is based on clinical symptoms and signs, other medical conditions can mimic stroke. Around one fifth of patients presenting to hospital with stroke like symptoms turn out not to have had a stroke but another diagnosis such as seizure, sepsis, toxic or metabolic causes (e.g. hypoglycemia) migraine can also mimic stroke. (**Magauran et al., 2012**)

b) Physical Examination

After the airway, breathing, and circulation have been assessed and specific vital signs determined, such as blood pressure, heart rate, oxygen saturation, and temperature, a more detailed physical examination is performed. The detailed physical examination may be conducted by the emergency physician, the stroke expert, or emergency nurse. The general examination is important to identify other potential causes of the patients' symptoms, potential causes of an ischemic stroke, coexisting comorbidities and signs of trauma or seizure activity or issues that may impact the management of an ischemic stroke. (**Lederle et al., 2011; Lukovits et al., 2011**)

Use of a standardized assessment and stroke scale helps to quantify the degree of neurological deficits such as The Cincinnati Prehospital Stroke Scale or NIH stroke scale (Class I; Level of Evidence B). Also they facilitate communication, identify the location of vessel occlusion, provide early prognosis, help in selection of various interventions, and identify the risk for complications. (Edward et al., 2013)

c) Diagnostic Studies

Several tests should be emergently performed as indicated in patients with suspected ischemic stroke. Laboratory tests to consider in all patients include blood glucose, electrolytes with renal function studies, complete blood count with platelet count, cardiac markers, prothrombin time (PT), international normalized ratio (INR), and activated partial thromboplastin time (APTT). (Koga et al., 2012)

Hypoglycemia may cause focal signs and symptoms that mimic stroke, and hyperglycemia is associated with unfavorable outcomes. Cardiac markers are frequently elevated in acute ischemic stroke, with elevations occurring in 5% to 34% of patients, and these elevations have prognostic significance. Elevation of cardiac troponin T is associated with increased stroke severity and mortality risk, as well as worse clinical outcomes. (Laird et al., 2013)

Ischemic stroke can also cause electrocardiogram (ECG) abnormalities. Because of the close association between stroke and cardiac abnormalities, Baseline electrocardiogram assessment is recommended in patients presenting with acute ischemic stroke but should not delay initiation of intravenous rtPA (Class I; Level of Evidence B). Baseline ECG and cardiac biomarkers may identify concurrent myocardial ischemia or cardiac arrhythmias. AF may be seen

on an admission ECG. Thus, ongoing monitoring of cardiac rhythm may detect AF or other serious arrhythmias. Baseline troponin assessment is recommended in patients presenting with acute ischemic stroke but should not delay initiation of intravenous rtPA (Class I; Level of Evidence C). Repeated ECG and serial cardiac enzymes may identify developing silent ischemia or paroxysmal arrhythmias not detected on initial studies.(**Panagos et al., 2012; Jonathan et al., 2013; Nyström et al., 2013**)

Emergency imaging of the brain is recommended before initiating any specific therapy to treat acute ischemic stroke (Class I; Level of Evidence A). Timely brain imaging and interpretation remains critical to the rapid evaluation and diagnosis of patients with potential ischemic strokes. Brain imaging findings, including the size, location, and vascular distribution of the infarction, severity of ischemic stroke, and/or presence of large-vessel occlusion. Brain and Vascular Imaging include: Magnetic Resonance Image (MRI) of the Brain, Perfusion CT and MRI, Intracranial Vascular Imaging which includes CT Angiography, MR Angiography, and Doppler Ultrasound. The nurse needs to educate the patient and family regarding each test and what to expect. (**Latchaw, 2009; Cruz et al., 2012; Dani et al., 2012**)

d) Medication therapy

1- Intravenous Fibrinolysis or Intravenous rtPA

Consent Issues

As with any medical therapy that carries more than minimal risk, explicit informed patient consent for fibrinolytic therapy is indicated. In

some institutions, the patient or representative must sign a written consent form conveying the risks and benefits of therapy.(**Bruce et al., 2011**)

Intravenous fibrinolytic therapy is recommended during early ischemic changes on CT, regardless of their extent (Class I; Level of Evidence A). Also In intravenous fibrinolysis candidates, the brain imaging study should be interpreted within 45 minutes of patient arrival in the ED by a physician with expertise in reading CT and MRI studies of the brain(Class I; Level of Evidence C). Benefit of therapy is time dependent, and treatment should be initiated as quickly as possible. The door-to-needle time (time of bolus administration) should be within 60 minutes from hospital arrival (Class I; Level of Evidence A). The treating physician should review the inclusion and exclusion criteria for IV fibrinolytic therapy and perform a repeated neurologic examination. (**Lederle et al., 2011; National Stroke Association, 2013**)

There are various inclusion and exclusion criteria for patients with ischemic stroke who could be treated with IV rtPA Within 3 Hours from symptom onset. Inclusion criteria includes: Diagnosis of ischemic stroke causing measurable neurological deficit, onset of symptoms <3 hours before beginning treatment and aged ≥ 18 years. Moreover exclusion criteria includes: Significant head trauma or prior stroke in previous 3 months ,symptoms suggest subarachnoid hemorrhage, history of previous intracranial hemorrhage , arteriovenous malformation, recent intracranial or intraspinal surgery, elevated blood pressure (BP) (systolic >185 mm Hg or diastolic >110 mm Hg), active internal bleeding, platelet count $<100\,000/\text{mm}^3$, heparin received within 48 hours, resulting in abnormally elevated APTT, current use of anticoagulant with INR >1.7 or PT >15 seconds, blood glucose concentration <50 mg/dL (2.7 mmol/L), CT demonstrates multilobar

infarction. Additionally there are other Relative exclusion criteria which includes major surgery or serious trauma within previous 14 days, recent gastrointestinal or urinary tract hemorrhage (within previous 21 days) and recent acute myocardial infarction (within previous 3 months) (**Jonathan etal., 2013**)

As with all medications, fibrinolytics have potential adverse effects that require immediate medical and nursing actions. In patients undergoing fibrinolytic therapy, physicians should be aware of and prepared to emergently treat potential side effects, including bleeding complications and angioedema that may cause partial airway obstruction (Class I; Level of Evidence B). Physician should discuss the risks and potential benefits of the therapy with the patient or family if available. (**Jonathan etal., 2013**)

Typically neither anticoagulant nor antiplatelet treatment can be administered for 24 hours after administration of rtPA until a repeat CT scan at 24 hours shows no hemorrhagic transformation. A standardized guideline for managing fibrinolytic-associated hemorrhages does not exist. Clinical protocols call for an emergent non contrast CT scan, complete blood count, coagulation parameters (PT, PTT, and INR), type and screen, and fibrinogen levels. (**Mink etal., 2011; Mokin etal., 2012**)

N.B

In patients without recent use of oral anticoagulants or heparin, treatment with IV rtPA can be initiated before availability of coagulation test results but should be discontinued if INR is >1.7 or PT is abnormally elevated. In patients without history of thrombocytopenia, treatment with IV rtPA can be initiated before availability of platelet count but should be discontinued if platelet count is $<100\ 000/\text{mm}^3$. BP should be maintained

below 185/110 mm Hg before administration of intravenous rtPA (Class I; Level of Evidence B). Once IV rtPA is given, the BP must be maintained below 180/105 mm Hg to limit the risk of ICH. Higher blood pressures during the initial 24 hours (Class I; Level of Evidence B). (Joao et al., 2013; Jonathan et al., 2013)

Nursing Care during Administration of rtPA

- Infuse 0.9 mg/kg (maximum dose 90 mg) over 60 minutes, with 10% of the dose given as a bolus over 1 minute. (Class I; Level of Evidence A).
- Admit the patient to an intensive care or stroke unit for monitoring.
- If the patient develops severe headache, acute hypertension, nausea, or vomiting or has a worsening neurological examination, discontinue the infusion (if IV rtPA is being administered) and obtain emergent CT scan.
- Measure blood pressure and perform neurological assessments every 15 minutes during and after IV rtPA infusion for 2 hours, then every 30 minutes for 6 hours, then hourly until 24 hours after IV rtPA treatment.
- Increase the frequency of BP measurements if systolic blood pressure is > 180 mm Hg or if diastolic blood pressure is >105 mm Hg.
- Administer antihypertensive medications to maintain blood pressure at or below these levels as doctor order.

- Delay placement of nasogastric tubes, indwelling bladder catheters, or intra arterial pressure catheters if the patient can be safely managed without them for about 24 h.
 - Obtain a follow-up CT or MRI scan at 24 hours after IV rtPA before starting anticoagulants or antiplatelet agents as doctor order.
- (Lindsay et al., 2013)**

2- Combination Intravenous Therapies

Combinations of fibrinolytic (s) plus anticoagulant and/or antiplatelet agents may offer considerable potential to achieve and maintain arterial patency. **(Yeguiayan et al., 2011)**

3- Intra-arterial Fibrinolysis

Intra-arterial fibrinolysis is a consideration for patients ineligible for intravenous rtPA may be applicable to patients eligible for treatment within 6 hours. **(Williams et al. ,2010)**

4- Anticoagulants

Anticoagulants often were prescribed to patients with recent stroke in an effort to prevent early recurrent cardio embolic stroke, including those with AF. The cited reasons for emergency use of these medications to treat stroke include: to halt neurological worsening, to prevent early recurrent embolization, and to improve neurological outcomes. The administration of either antiplatelet agents or anticoagulants is currently contraindicated during the first 24 hours after treatment with intravenous rtPA. **(Wang et al. ,2012)**

5- Thrombin Inhibitors

Direct thrombin inhibitors may be useful in acute ischemic stroke because of their actions that limit thrombosis. These medications could be considered as an alternative to anticoagulants, and they could be administered to those people who develop heparin-associated thrombocytopenia. **(Vergouwen et al., 2012)**

6- Antiplatelet Agents

Aspirin is the antiplatelet agent that has been tested the most extensively. The initial dose is 325 mg within 24 to 48 hours after stroke onset is recommended for treatment of most patients (Class I; Level of Evidence A). Aspirin is not recommended as a substitute for other acute interventions for treatment of ischemic stroke, including intravenous rtPA (Class III; Level of Evidence B). **(Williams et al., 2010; Wang et al., 2012)**

7- Albumin for Treatment of Acute Ischemic Stroke

Albumin reduces ischemic brain swelling, improves regional cerebral blood flow, improves microvascular flow, and supplies free fatty acids to the post ischemic brain. The administration of high-dose albumin is not well established as a treatment for most patients with acute ischemic stroke until further definitive evidence regarding efficacy becomes available (Class IIb; Level of Evidence B). **(Edward et al., 2013)**

Specific emergency nursing care for patient with ischemic stroke

Stroke is a primary failure of focal tissue oxygenation and energy supply. Thus, it is intuitive that systemic hypoxemia and hypotension be avoided. Initial assessment of the airway, breathing, and circulation occurs in the prehospital setting and again on arrival in the ED. Constant reassessment of the airway, breathing, and circulation is required to identify oxygen desaturation, respiratory compromise, and hypotension. (Tan et al., 2012)

1) Intravenous Access

Ideally, 2 to 3 IV sites should be established if the acute stroke patient will receive thrombolytic therapy. One site is used for administration of IV fluids, another for administration of thrombolytic therapy, and the third for administration of intravenous medications. Diagnostic laboratory blood specimens should be drawn before intravenous fluids are started. Collection of specimens before the patient undergoes imaging allows simultaneous processing of both laboratory and imaging data and facilitates rapid turnaround. (Shulkin et al., 2011; Sidney et al., 2013)

2) Intravenous Fluids

Patients presenting with acute ischemic stroke are predominantly either euvolemic or hypovolemic. Hypovolemia may predispose to hypoperfusion and exacerbate the ischemic brain injury, cause renal impairment, and potentiate thrombosis. Hypervolemia may exacerbate ischemic brain edema and increase stress on the myocardium. Thus, euvoolemia is desirable. (Summers et al., 2009; Judd et al., 2013)

For patients who are hypovolemic at presentation, rapid replacement of the depleted intravascular volume followed by maintenance IV fluids is reasonable. A substantial proportion of hypotonic solutions, such as 5% dextrose (after the glucose is metabolized) or 0.45% saline, is distributed into the intracellular spaces and may exacerbate ischemic brain edema. Isotonic solutions such as 0.9% saline are more evenly distributed into the extracellular spaces (interstitial and intravascular) and may be better for patients with acute ischemic stroke (Class I; Level of Evidence C). An infusion rate that maintains normovolemia (75 to 100 mL/h) can help facilitate normal circulating blood volume. (**MacKay et al., 2013**)

3) Supplemental Oxygen

It is not apparent that routine supplemental oxygen is required acutely in non hypoxic patients with mild or moderate strokes (Class III; Level of Evidence B). Supplemental oxygen may be beneficial in patients with severe strokes, recent AHA/ASA guidelines for emergency cardiovascular care for stroke and resuscitated cardiac arrest patients recommend administration of oxygen to hypoxemic patients to maintain oxygen saturation >94% (Class I; Level of Evidence C). Airway support and ventilatory assistance are recommended for the treatment of patients with acute stroke who have decreased consciousness or who have bulbar dysfunction that causes compromise of the airway (Class I; Level of Evidence C). Endotracheal intubation and mechanical ventilation may also assist in the management of elevated ICP or malignant brain edema after stroke. (**Ching et al., 2010; ASA, 2013**)

Hypoxia appears frequently after stroke. Common causes of hypoxia include partial airway obstruction, hypoventilation, aspiration, atelectasis, and pneumonia. Patients with decreased consciousness or brain stem

dysfunction are at increased risk of airway compromise because of impaired oropharyngeal mobility and loss of protective reflexes. Central periodic breathing (Cheyne-Stokes respirations) Given the frequency of hypoxia, careful observation and prevention are essential.(**Berglund et al.,2012;Catangui et al., 2012**)

4) Patient Positioning and Monitoring

In patients who are able to maintain oxygenation while lying flat, the supine position may offer advantages in cerebral perfusion. Patients at risk for airway obstruction or aspiration and those with suspected elevated ICP should have the head of the bed elevated 15° to 30°. When patient position is altered, close monitoring of the airway, oxygenation, and neurological status is recommended. (**Alberts et al., 2011; Alspach, 2013**)

5) Dysphagia Screening

All patients with stroke should be screened for dysphagia before they are given anything by mouth. A simple bed side screening evaluation involves asking the patient to sip water from a cup. If the patient can sip and swallow without difficulty, the patient is asked to take a large gulp of water and swallow. If there are no signs of coughing or aspiration after 30 seconds, then it is safe for the patient to have a thickened diet until formally assessed by a speech pathologist. (**Edmiaston et al., 2010; Hughes, 2011**)

6) Temperature

Hyperthermia

Approximately one third of patients admitted with ischemic stroke will be hyperthermic (temperature $>37.6^{\circ}\text{C}$) within the first hours after stroke onset. In the setting of acute ischemic stroke, hyperthermia is associated with poor neurological outcome. Hyperthermia may be secondary to a cause of stroke, such as infective endocarditis, or may represent a complication, such as pneumonia, urinary tract infection (UTI), or sepsis. Measures to achieve normothermia or prevent hyperthermia include both pharmacological and mechanical interventions. (**Baldwin et al., 2010; Lukovits et al., 2011**)

Hypothermia

Experimental and clinical evidence indicates that induced hypothermia can protect the brain in the presence of global hypoxia or ischemia even after cardiac arrest, (Class IIb; Level of Evidence B). (**Berglund et al., 2012**)

7) Cardiac Monitoring

Cardiac monitoring is recommended to screen for atrial fibrillation and other potentially serious cardiac arrhythmias that would necessitate emergency cardiac interventions. Cardiac monitoring should be performed for at least the first 24 hours (Class I; Level of Evidence B). (**Gocan et al., 2008; Grise et al., 2012**)

8) **Blood Pressure**

Arterial Hypertension

Elevated blood pressure is common during acute ischemic stroke. The blood pressure is often higher in acute stroke patients with a history of hypertension than in those without pre morbid hypertension. Extreme arterial hypertension is clearly detrimental, because it leads to encephalopathy, cardiac complications, and renal insufficiency. Evidence from one clinical trial indicates that initiation of antihypertensive therapy within 24 hours of stroke is relatively safe. (Class IIa; Level of Evidence B). Extreme arterial hypotension is clearly detrimental, because it decreases perfusion to multiple organs, especially the ischemic brain, exacerbating the ischemic injury. Some conditions, such as myocardial ischemia, aortic dissection, and heart failure, may accompany acute ischemic stroke and may be exacerbated by arterial hypertension. (Shulkin et al., 2011; Koga et al., 2012).

Arterial Hypotension

Arterial hypotension is rare during acute ischemic stroke. The brain is vulnerable to arterial hypotension during acute ischemic stroke because of impaired cerebral auto regulation. Arterial hypotension on admission in acute ischemic stroke patients has been associated with poor outcomes in multiple studies. Urgent evaluation, diagnosis, and correction of the cause of arterial hypotension are needed to minimize the extent of brain damage. (Grise et al., 2012; Koga et al., 2012)

9) Blood Glucose

Hypoglycemia

Hypoglycemia during acute ischemic stroke is rare and likely related to antidiabetic medications .hypoglycemia is known to cause neurological symptoms, including stroke mimics and seizures. if untreated, severe or prolonged hypoglycemia can result in permanent brain damage. Thus, blood glucose should be measured as soon as possible in patients with acute ischemic stroke. Hypoglycemia (blood glucose level <60 mg/dL) can be corrected rapidly(Class I; Level of Evidence C). In most patients hypoglycemia can be corrected with a slow intravenous push of 25 mL of 50% dextrose. (Staszewski et al .,2011; Laird et al., 2013)

Hyperglycemia

Hyperglycemia is common during acute ischemic stroke Most commonly among patients with a history of diabetes mellitus and associated with poor clinical outcomes. The nurse should monitor the blood glucose level based on the patient's glucose level at admission. If blood glucose more than 140 mg/dL and the patient has received thrombolytic therapy, it may be prudent to monitor glucose every 1 to 2 hours, because there is evidence that these patients are more prone to ICH. It is reasonable to maintain the blood glucose in a range of 140 to 180 mg/dL in all hospitalized patients Class IIa; Level of Evidence C. (Larid et al., 2013).

Materials & Methods



MATERIAL AND METHODS

Materials

Design:

Descriptive, cross sectional research design was used in this study.

Setting:

This study was carried out in Emergency Department, Emergency Hospital, Mansoura University.

Subjects:

All nurses (50) working in Emergency Department of the Emergency Hospital at Mansoura University, who had an experience two years and more, involved in providing direct care for ischemic stroke patients, accepted to participate voluntarily and gave a consent were included in the study.

Tools of data collection

One tool was used in the study for data collection: **"Nurses' Knowledge about Evidence-Based Nursing Practice of Ischemic Stroke Patients"**. It was constructed and developed by the researcher to assess emergency nurse's knowledge about evidence-based nursing practice of ischemic stroke patients. This tool consists of three main parts and included 40 multiple choice questions in addition to socio-demographic data of the studied nurses.

Part I : "Nurses' general knowledge about ischemic stroke" this part involved 16 questions for example definition, incidence, risk factors,

causes of stroke, pathophysiology, clinical manifestation, assessment and diagnostic studies.

Part II: " Nurses' knowledge about emergency nursing care of ischemic stroke patients" this part involved 21 questions for example priority of nursing care for ischemic stroke patient in emergency, types of intravenous fluid for patients with ischemic stroke, level of head of the bed for patients with ischemic stroke and nursing care during tissue plasminogen activator administration.

Part III: "Nurses' knowledge about complications of ischemic stroke" this part involved 3 questions for example acute complications ,sub-acute complications and the most serious complications of tissue plasminogen activator .

Nurses' socio-demographic data

It included nurses' age, educational level, job title, years of experience in the emergency department and attending training programs conferences, or workshops about nursing care of ischemic stroke patients.

Scoring system: The total score was 40 marks each true answer was given (1) mark and false or unknown answer was given (0). Total scoring was classified into three categories as follows:

Total Grades	Score	Level of knowledge
24 and less than 26	60 %-< 65%	Unsatisfactory knowledge
26 and less than 28	65 %-< 70%	Satisfactory knowledge
≥28	≥70%	Very satisfactory knowledge

Methods

- Approval to conduct the study was obtained from the Research Ethical Committee of the Faculty of Nursing, Mansoura University.
- Tool was constructed and developed by the researcher after reviewing recent relevant literatures (American Stroke Association Council (2009); Edward et al, (2010); National Stroke Foundation, (2010); Traynelis, (2012); American Stroke Association Council (2013)). Face and content validity of the tool were ascertained by a panel of experts in critical care nursing, medical-surgical nursing, neurology and emergency department who revised the tool for clarity, relevance, applicability, comprehensiveness, and ease for implementation. According to their opinions, minor modifications were applied (appendix1).
- The tool was translated into simple Arabic language by the researcher before data collection then it was translated back into English to check the accuracy of translation.
- The overall reliability of the tool was tested using (α) Cronbach test on a sample of 20 subjects and found to be 0.87% .
- Permission to conduct the study was obtained from the hospital administrative authority after explanation of the aim and nature of the study.
- A pilot study was carried out on 5 nurses (nearly 10% of the total sample) who were excluded from the study. The aim of the pilot study was to test the clarity and the applicability of the tool. Necessary modifications were carried out based on the findings.

- At the initial interview, the researcher introduced herself to nurses; each potential nurse was informed about the nature, purpose of the study. The researcher ensured that their participation is voluntarily. Confidentiality and anonymity of the subjects were assured through coding of all data. The researcher assured that the data collected and information would be used only for the purpose of the study.
- The nurses took about 30 - 45 minutes to answer the questionnaire completely. The participants were asked to complete the survey without resources or help from colleagues.

Ethical considerations

The ethical research considerations in this study were as follows

- o The researcher explained the aim and nature of the study to nurses before data collection.
- o The researcher assured privacy and confidentiality for nurses included in the study. Participants were not given the questionnaire results or scores.
- o Nurses were allowed to withdraw from the study at any time without any responsibility.
- o Informed consents were obtained from the nurses before the beginning of the study (appendix 2). Completion of the survey was considered consent to participate

Statistical analysis

Data entry and analysis was performed using the Statistical Package for Social Sciences version 16 (SPSS). The quantitative data were presented as numbers and percentage. The chi-square (χ^2) was used to find the correlation between variables of qualitative data.

Levels of significance:

For all above mentioned statistical tests done, the threshold of significance is fixed at 5% level (p-value).

The results were considered:

- o Significant when the probability of error is less than 5% ($p < 0.05$).
- o Non-significant when the probability of error is more than 5% ($p > 0.05$).

Limitation of the Study

This study was conducted on few numbers of emergency nurses of Mansoura University and short duration; therefore findings may not be representative of the general population of emergency nurses in Egypt. This may threaten the external validity of the findings hence another research with large sample size is required.



Results



RESULTS

This chapter presents the study findings regarding assessment of nurses' knowledge about evidence-based nursing practice of ischemic stroke patients.

The results of the present study will be presented in three main parts:

Part I: Study of socio-demographic data of the nurses (table 1).

Part II: Study of nurses' level of knowledge about evidence-based nursing practice of ischemic stroke patients. (table 2-6).

1. Nurses' general knowledge about ischemic stroke.
2. Nurses' knowledge about emergency nursing care of ischemic stroke patients .
3. Nurses' knowledge about complications of ischemic stroke .
4. Nurses' total knowledge about evidence-based nursing practice of ischemic stroke patients.

Part III: Study of relation between nurses' knowledge about evidence-based nursing practice of ischemic stroke patients and their socio-demographic data (table 7-11).

1. Relation between mean of nurses' general knowledge about ischemic stroke and their socio-demographic data.

2. Relation between mean knowledge of nurses about emergency nursing care of ischemic stroke patients and their socio-demographic data.
3. Relation between mean knowledge of nurses about complications of ischemic stroke and their socio-demographic data.
4. Relation between total mean knowledge of nurses about evidence based nursing practice of ischemic stroke patients and their socio-demographic data

Part I: Study of nurses' socio-demographic data.

Table (1): reveals that the total number of nurses participated in the study was 50 nurses. It is clear that nearly two thirds of nurses (60%) were in the age of 31-40 years, while small percentage (8%) of them were 41 years old and more.

Concerning their level of education, the majority of nurses (90%) were graduated from technical nursing school while the minority of them 10% graduated from faculty of nursing.

Regarding their job title the table shows that more than three quarters of nurses (90%) were technical nurses compared with 6% were specialist nurses.

In relation to their years of experience it was found that about three quarters (74%) of the nurses had 10 years or more of experience and 8% of them had from 6 to 10 years of experience.

Moreover the table shows that most of them (92%) didn't receive any training programs conferences, or workshops regarding care of ischemic stroke patients.

Table (1): Percentage distribution of socio-demographic data of the nurses (n=50)

Demographic data	n=50	%
Age		
20-30	16	32%
31-40	30	60%
≥41	4	8%
Mean ± SD=33.7±6.3		
Level of education		
Beachelor of nursing	5	10%
Technical Nursing Institute	0	0%
Technical Nursing School	45	90%
Job title		
Head nurse	2	4%
Specialist nurse	3	6%
Technical nurse	45	90%
Years of experience in emergency		
2-5 years	9	18%
6-10 years	4	8%
> 10 years	37	74%
Attending training programs conferences, or workshops about nursing care of ischemic stroke patients		
No	46	92%
Yes	4	8%

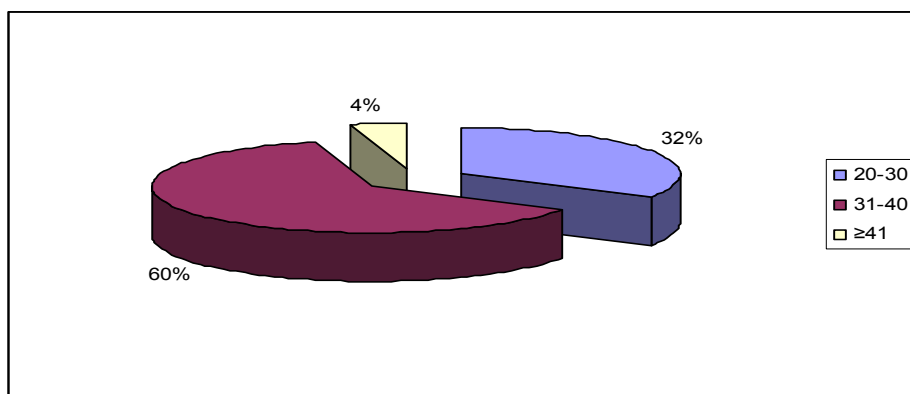


Figure (9): Frequency distribution of nurses by age

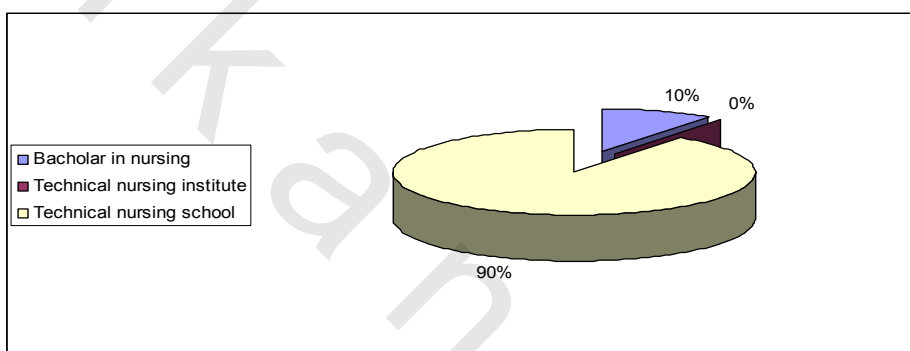


Figure (10): Frequency distribution of nurses by educational level

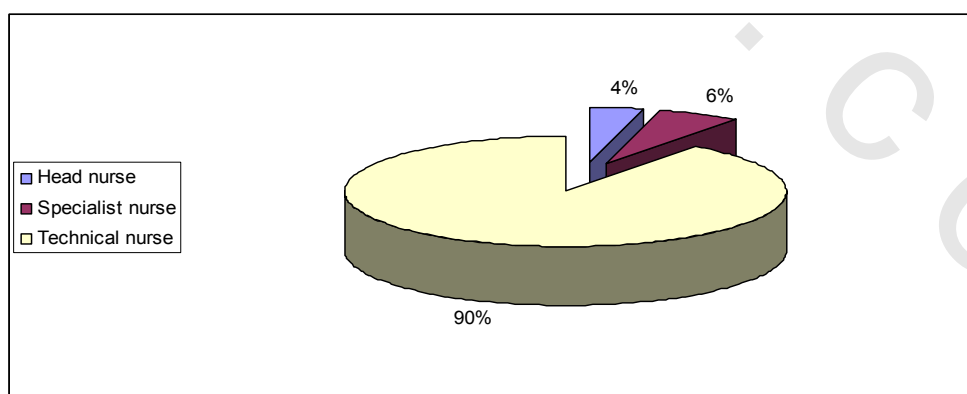


Figure (11): Frequency distribution of nurses by job title

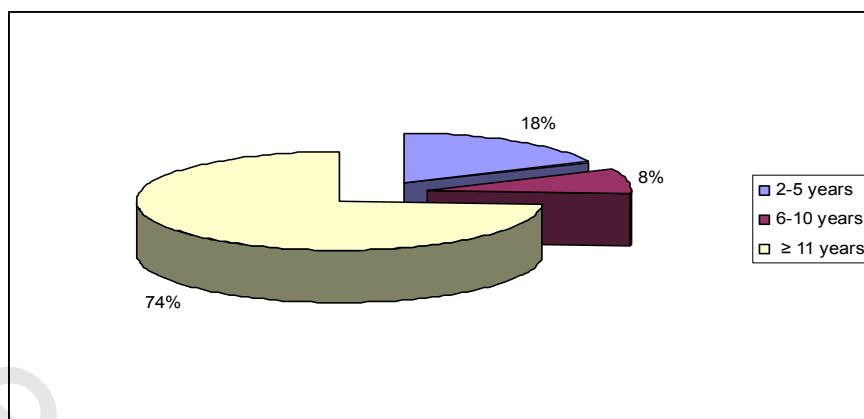


Figure (12): Frequency distribution of nurses regarding their years of experience

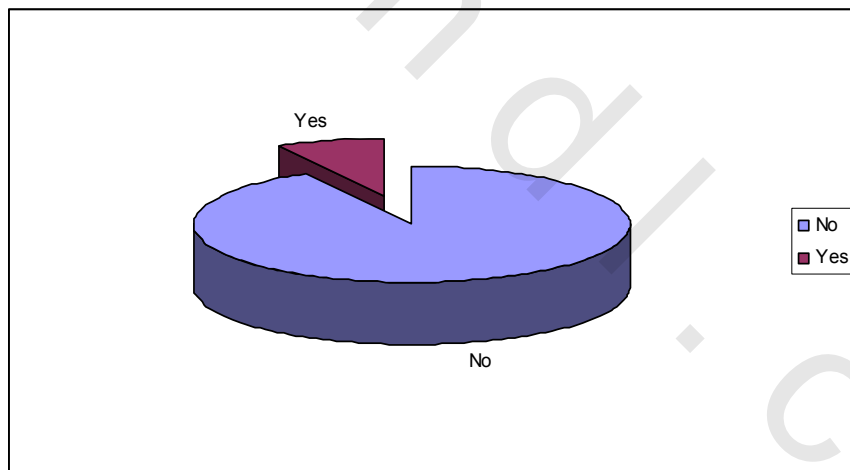


Figure (13): Frequency distribution of nurses regarding attending training programs conferences, or workshops regarding care of ischemic stroke patients.

Part II: Study of nurses' level of knowledge about evidence-based nursing practice of ischemic stroke patients.

1. Nurses' general knowledge about ischemic stroke.

Table (2): illustrates that about three quarters of nurses' had unsatisfactory knowledge in relation to risk factors and diagnostic studies that constitutes (70%, 70%) respectively. In addition most of nurses (84%) had unsatisfactory knowledge regarding assessment of ischemic stroke patient. Moreover more than half of nurses had unsatisfactory knowledge concerning definition & incidence and clinical manifestation (54%, 56%). While nurses' very satisfactory knowledge regarding causes & pathophysiology constitutes only (16%).

Table (2): Nurses' general knowledge about ischemic stroke

Item	No of items	Nurses' knowledge n=50					
		Unsatisfactory knowledge		Satisfactory knowledge		Very satisfactory knowledge	
		No	%	No	%	No	%
Definition & incidence	2	27	54	23	46	0	0
Risk factors	2	35	70	15	30	0	0
Causes & Pathophysiology	3	38	76	4	8	8	16
Clinical manifestation	2	28	56	22	44	0	0
Assessment	5	42	84	8	16	0	0
Diagnostic studies	2	35	70	15	30	0	0

2. Nurses' knowledge about emergency nursing care of ischemic stroke patients..

Table (3): shows that the majority of nurses had unsatisfactory knowledge regarding emergency nursing care for ischemic stroke and nursing Care during rtPA administration (86% , 98%) respectively.

Table (3): Nurses' knowledge about emergency nursing care of ischemic stroke patients

Item	No of items	Nurses' knowledge n=50					
		Unsatisfactory knowledge		Satisfactory knowledge		Very satisfactory knowledge	
		No	%	No	%	No	%
Emergency nursing care for ischemic stroke	10	43	86	5	10	2	4
Nursing Care during rtPA administration	11	49	98	1	2	0	0

3. Nurses' knowledge about complications of ischemic stroke..

Table (4): reveals that about three quarters of nurses (72%) had unsatisfactory knowledge in relation to complications of ischemic stroke in comparing to small percentage of them (4%) had very satisfactory knowledge.

Table (4): Nurses' knowledge about complications of ischemic stroke

Item	No of items	Nurses' knowledge n=50					
		Unsatisfactory knowledge		Satisfactory knowledge		Very satisfactory knowledge	
		No	%	No	%	No	%
Complications of ischemic stroke	3	36	72	12	24	2	4

4. Nurses' total knowledge about evidence-based nursing practice of ischemic stroke patients

Table (5): illustrates that more than two thirds (68%) of nurses had unsatisfactory knowledge regarding general knowledge about ischemic stroke comparing to only 4% of them had very satisfactory knowledge.

On the other hand almost all of nurses (92%) had unsatisfactory knowledge about emergency nursing care of ischemic stroke patients.

Regarding complications of ischemic stroke, the table shows that about three quarters of nurses (72%) had unsatisfactory knowledge comparing to (4%) had very satisfactory knowledge.

In relation to total knowledge about evidence-based nursing practice of ischemic stroke patients, the table reveals that more than three quarters of nurses (78%) of nurses had unsatisfactory knowledge in comparing to 2% of them had very satisfactory knowledge.

Table (5): Nurses' total knowledge about evidence-based nursing practice of ischemic stroke patients

Item	No	%
General knowledge about ischemic stroke		
Un satisfactory knowledge	34	68%
Satisfactory knowledge	14	28%
Very satisfactory knowledge	2	4%
Emergency nursing care of ischemic stroke patients		
Un satisfactory knowledge	46	92%
Satisfactory knowledge	3	6%
Very satisfactory knowledge	1	2%
Complications of ischemic stroke		
Un satisfactory knowledge	36	72%
Satisfactory knowledge	12	24%
Very satisfactory knowledge	2	4%
Total level of knowledge		
Un satisfactory knowledge	39	78%
Satisfactory knowledge	10	20%
Very satisfactory knowledge	1	2%

Table (6): reveals that the mean scores was more higher pertaining to total knowledge about evidence-based nursing practice of ischemic stroke patients than emergency nursing care of ischemic stroke patients and general knowledge about ischemic stroke (12.8 ± 7.3 & 6.04 ± 3.04 & 5.8 ± 4 respectively). While the least mean score was for complications of ischemic stroke (1.02 ± 0.8).

Table (6): Mean scores of nurses' knowledge about evidence-based nursing practice of ischemic stroke patients

Item	Mean $\pm$ SD	Range
General knowledge about ischemic stroke	5.8 ± 4	1-14
Emergency nursing care of ischemic stroke patients	6.04 ± 3.04	1-13
Complications of ischemic stroke	1.02 ± 0.8	0-3
Total knowledge score	12.8 ± 7.3	3-28

Part III: Study of relation between nurses' knowledge about evidence-based nursing practice of ischemic stroke patients and their socio-demographic data.

1. Relation between mean of nurses' general knowledge about ischemic stroke and their socio-demographic data.

Table (7): represents that there were statistically significant relations between nurses' general knowledge about ischemic stroke and their level of education and job title ($\chi^2 = 1.99$ & 3.7 at $p < 0.05$). While there were no statistically significant relations between nurses' general knowledge about ischemic stroke and their age, years of experience and attending training programs conferences, or workshops about nursing are of ischemic stroke patients ($\chi^2 = 7.01$ & 0.9 & 0.5 at $p > 0.05$)

Table (7): Relation between mean of nurses' general knowledge about ischemic stroke and their socio-demographic data.

Item	Mean	±SD	Range	χ^2 Test	P
Age					
20-30	5.5	±3.02	1-13	7.01	0.2
31-40	5.2	±3.9	1-14		
≥41	12.3	±1.5	10-13		
Level of education					
Beachelor of nursing	9.2	±3.8	4-13	1.99	0.047*
Technical nursing secondary school	5.5	±3.9	1-14		
Job title					
Head nurse	13	±0	13-13	3.7	0.03*
Specialist nurse	5.3	±3.4	1-8		
Technical nurse	5.6	±3.9	1-14		
Years of experience in emergency					
2-5 years	4.6	±2.7	1-8	0.9	0.4
6-10 years	7.8	±3.8	4-13		
≥11 years	5.9	±4.3	1-14		
Attending training programs conferences, or workshops about nursing care of ischemic stroke patients					
No	5.8	±4.04	1-14	0.5	0.6
Yes	6.5	±3.8	4-12		

P value is considered significant if ≤ 0.05

2. Relation between mean knowledge of nurses about emergency nursing care of ischemic stroke patients and their socio-demographic data.

Table (8): reveals that there were statistically significant relations between nurses' knowledge about emergency nursing care of ischemic stroke patients and their age, years of experience and attending training programs conferences, or workshops about nursing care of ischemic stroke patients ($\chi^2 = 7.2$ & 3.8 & 3.6 at $p < 0.05$). However there were no statistically significant relation between nurses' knowledge about emergency nursing care of ischemic stroke patients and their job title and level of education ($\chi^2 = 0.2$ & 5.9 at $p > 0.05$).

Table (8): Relation between mean knowledge of nurses about emergency nursing care of ischemic stroke patients and their socio-demographic data.

Item	Mean	±SD	Range	χ^2	P
Age					
20-30	4.5	±2.9	1-12	7.2	0.002**
31-40	6.2	±2.7	3-13		
≥41	10.3	±2.2	7-12		
Level of education					
Beachelor of nursing	6.6	±4.6	2-12	0.2	0.8
Technical Nursing Institute	0	0	0		
Technical Nursing School	5.98	±2.9	1-13		
Job title					
Head nurse	11.5	±0.7	11-12	5.9	0.5
Specialist nurse	3.3	±0.96	2-4		
Technical nurse	6.1	±2.9	1-13		
Years of experience in emergency					
2-5 years	3.7	±2.5	1-9	3.8	0.03*
6-10 years	7	±3.4	5-12		
≥11 years	6.5	±2.9	3-13		
Attending training programs conferences, or workshops about nursing care of ischemic stroke patients					
No	3.9	±2.99	1-12	3.6	0.01*
Yes	4	±1.5	5-13		

P value is considered significant if ≤ 0.05

3. Relation between mean knowledge of nurses about complications of ischemic stroke and their socio-demographic data.

Table (9): illustrates that there were statistically significant relations between nurses' knowledge about complications of ischemic stroke and their level of education and job title ($\chi^2 = 2.8$ & 5.4 at $p < 0.05$). However there were no statistically significant relations between nurses' knowledge about complications of ischemic stroke and their age, years of experience and attending training programs conferences, or workshops about nursing care of ischemic stroke patients ($\chi^2 = 3.3$ & 1.02 & 0.7 at $p > 0.05$)

Table (9): Relation between mean knowledge of nurses about complications of ischemic stroke and their socio-demographic data.

Item	Mean	±SD	Range	χ^2 Test	P
Age					
20-30	1	±1.07	0-3	3.3	0.4
31-40	0.9	±0.7	0-2		
≥41	2	±0	2		
Level of education					
Beachelor of nursing	2.2	±0.8	1-3	2.8	0.005**
Technical Nursing Institute	0	0	0		
Technical Nursing School	0.9	±0.7	0-2		
Job title					
Head nurse	2	±0	2-2	5.4	0.008**
Specialist nurse	2	±1.15	1-3		
Technical nurse	0.9	±0.75	0-2		
Years of experience in emergency					
2-5 years	1.2	±1.2	0-3	1.02	0.4
6-10 years	0.5	±1	0-2		
≥11 years	1.03	±0.7	0-2		
Attending training programs conferences, or workshops about nursing care of ischemic stroke patients					
No	1	±0.9	0-3	0.7	0.5
Yes	1.3	±0.5	1-2		

P value is considered significant if ≤ 0.05

4. Relation between total mean knowledge of nurses about evidence-based nursing practice of ischemic stroke patients and their socio-demographic data.

Table (10): shows that there were statistically significant relations between total mean knowledge of nurses about evidence-based nursing practice of ischemic stroke patients and all their socio- demographic data ($\chi^2=7.5$ & 1.0 & 4.7 & 1.3 & 2.8 at $p<0.05$).

Table (10): Relation between total mean knowledge of nurses about evidence-based nursing practice of ischemic stroke patients and their socio-demographic data

Item	Mean	±SD	Range	χ^2	P
Age					
20-30	11.8	±6.9	3-27	7.5	0.002**
31-40	11.7	±6.4	4-28		
≥40	24.8	±3.9	19-27		
Level of education					
Bachelor of nursing	11.2	±8.7	7-27	1.0	0.04*
Technical Nursing Institute	0	0	0		
Technical Nursing School	10.2	±6.9	3-28		
Job title					
Head nurse	27	±0	27	4.7	0.013**
Specialist nurse	10.5	±5.3	5-15		
Technical nurse	12.4	±6.9	3-28		
Years of experience in emergency					
2-5 years	9.3	±5.2	3-17	1.3	0.03*
6-10 years	10.8	±7.6	9-26		
≥11 years	8.4	±7.5	4-28		
Attending training programs conferences, or workshops about nursing care of ischemic stroke patients					
No	9.5	±7.2	3-28	2.8	0.013**
yes	11.8	±8.4	9-28		

P value is considered significant if ≤ 0.05

Table (11): Shows that there was statistically significant relation between scores of nurses' total knowledge about evidence-based nursing practice of ischemic stroke patients and age ($r=0.3$ at $p=0.047$)

Table (11): Correlation between scores of nurses' total knowledge about evidence-based nursing practice of ischemic stroke patients and age

Item	r	p
Total Knowledge score	0.3	0.047*