Tampere University of Applied Sciences

Acute Phase Treatment for Patients with a Stroke

Jenna Kajander

Maija Saarivirta

Pinja Setälä

BACHELOR'S THESIS
October 2023

Degree Programme in Nursing
Medical Surgical

ABSTRACT

Tampereen ammattikorkeakoulu
Tampere University of Applied Sciences
Degree Programme in Nursing
Medical Surgical

JENNA KAJANDER, MAIJA SAARIVIRTA & PINJA SETÄLÄ
Acute Phase Treatment for Patients with a Stroke

Bachelor's thesis 42 pages, appendices 5 pages
October 2023

The purpose of the study was to collect information about how an acute phase of stroke is managed. The aim was to provide reliable information to health care workers who work with stroke patients. The thesis was based on information about acute care, pharmacological treatment, and early rehabilitation.

The data was gathered by a descriptive literature review. The data was acquired from EBSCO CINAHL by using four different searches and combining the results, of all the searches. Ten articles were included in the final review. The research of the chosen articles was conducted in the Europe and the United States of America. The timeline of the publications was between 2017 to 2023 and the language used within these articles was English.

The findings indicate that the acute phase care for stroke patients is extremely important. It can improve the quality of life and it determines the recovery and care path of the stroke victim. The acute phase involves important pharmacological treatment and rehabilitation, these begin in the early phase. A stroke can also be treated through mechanical means.

As the data for the study was gathered using information from high-income countries, there is no promise that the recommended care can be provided in high- or low-income countries.

Key words: acute care, holistic care, acute phase, acute, early rehabilitation, ICU, stroke, medication, nursing care

CONTENTS

GLOSSARY

A nascent infection	Infection of the nervous system.
Aneurysmal subarachnoid haemorrhage	A burst blood vessel in the brain.
Aphasia	Impaired speech.
Cerebral infarction	Damage to brain tissue due to loss of oxygen.
Cerebral oedema	Swelling of the brain.
Deep vein thrombosis (DVT)	A blood clot forms in a deep vein.
Dysarthria	A speech sound disorder.
Dysphagia	Difficulty of swallowing.
Haemorrhagic transformation	The reperfusion of blood into ischemic tissue following an embolic event
Hyperglycaemia	High glucose level in blood plasma.
Hypertension	High blood pressure.
Hypotension	Low blood pressure.
Hypoxia	Low oxygen levels in the tissues.
Intracerebral haemorrhage	Bleeding into the brain tissue.
Intercranial pressure	The pressure exerted by fluids inside the skull and on the brain tissue.
LVO Stroke	Large vessel occlusion.
Neurotrauma	A head or a spine injury.
Normothermia	Normal human body temperature.
Oral Candidiasis	Fungal infection in the mouth.
Pulmonary embolism (PE)	A blood clot in an artery of the lung.

Pyrexia	Fever.
The Mallampati Classification	Bedside screening technique to help spot probable airway issues.
Urine retention	Bladder doesn't empty completely.
Xerostomia	Dry mouth.

1 INTRODUCTION

Every year, 15,000 people in Finland suffers from strokes. This makes strokes the third most common cause of death in Finland. (Tays 2021.) Strokes are common disease in other countries as well. In the United States, more than 795 000 people have stroke every year. (CDC 2023.) Globally, one in four people over 25, will be diagnosed with a stroke in their lifetime. Each year 53% of strokes occurs in women, and 47 % of strokes occurs in men. (WSO 2022.)

This thesis will investigate the issue of immediate or acute treatment for stroke patients, which is an important area of focus considering the potentially fatal nature of this medical condition. Since a stroke happens when a region of the brain is deprived of blood, it means that when the blood supply is limited or interrupted, brain cells start to die. In the worst case, this might lead to death or severe brain damage. Therefore, the earlier a victim is detected and treated, the less damage there is to the brain and the quality of life. (CDC 2022; NHS 2022.)

There are two different kinds of stroke: ischemic stroke, which happens when a blood clot blocks an artery that supplies blood to the brain, and haemorrhagic stroke, which happens when a blood vessel in the brain leaks or bursts. While stroke treatments are available, they are most effective when delivered within three hours of the beginning of symptoms. This time limit emphasizes the significance of quick response and the importance of healthcare workers having a good awareness of acute care techniques for stroke patients. (CDC 2022.)

This thesis will describe the significance of quick reaction and early intervention in stroke care, as well as treatment possibilities. It will also explore at the most recent pharmacological and non-pharmacological stroke treatments, such as thrombolysis, antiplatelet agents, and anticoagulants. Additionally, it will delve into haemorrhagic stroke care, since its different from ischemic stroke care. The thesis will further investigate the ongoing treatment of acute stroke care, pharmacological care, and early stroke rehabilitation.

2 THEORETICAL STARTING POINT

The framework of the thesis relies on existing literature that describes the treatment methods in use in acute phase of stroke and real-life experiences from nurses working with stroke patients.

2.1 How Stroke Manifests

Depending on how long the brain remains without blood flow and which portion of the brain is affected, a stroke can result in either temporary or permanent disability. Speaking and comprehending difficulties, confusion, slurred words, weakness on one side, or paralysis or numbness of the face, arm, or leg are all indications of a stroke. Vision problems, headaches with vomiting, dizziness or an altered consciousness, trouble with physical function are signs which indicate stroke. (MayoClinic 2020.)

A stroke can cause paralysis or loss of muscle movement. Usually, the permanent paralysis or lost muscle movement is one sided, such being on the face, leg, or arm. A stroke may damage the muscles in the mouth and throat, making it challenging for the victim to speak, swallow, or eat. With the mouth and throat affected, the patient may not be able to produce coherent speech and their speech may not be understandable. Stroke victims may suffer from memory loss or have issues understanding concepts, making judgements, thinking, and reasoning. Controlling emotions could be harder after stroke, and some stroke victims develop depression. Victims can also have changes in their behaviour and lose the ability of selfcare. Pain is one of the complications after stroke. The pain can be continuous tingling sensations. (MayoClinic 2022.)

Numerous conditions that affect the heart and blood vessels, such as coronary heart disease, atrial fibrillation, heart valve disease, and carotid artery disease, increase the risk of a stroke. These conditions include diabetes, hypertension, malformations of the arteriovenous system (AVMs), and high LDL cholesterol levels. Additionally, conditions raising the risk are viral infections, inflammatory conditions like lupus or rheumatoid arthritis, and COVID-19's possible effects. Additional variables impacting the risk of a stroke includes gender, blood type AB,

pregnancy/postpartum, hormone/contraceptive usage, ethnicity (African Americans, Alaska Natives, American Indians, and Hispanics), family history, genetics, and age. (National heart, lung, and blood institute 2022.)

2.2 Acute Care

Acute care is a form of care in which patients get active treatment for a condition for a brief period of time. Acute care includes treatment for a critical injury, urgent diseases, period of illness, or surgery recovery. (The Health foundation 2023.) The goal for acute care is to enhance health straight away (Open Caregiving 2022).

Intensive care units or ICUs are specific wards found in hospitals which provides more intense monitoring and treatment for people who are sick (NHS 2019). Patients who need more monitoring, therapy, and nursing care than a typical ward can provide, but not as much as critical care, are placed in high dependency units. The nurse-to-patient ratio in high dependency wards may be lower, yet it is higher than in most typical wards. (Healthtalk 2018.) Then there are more specialist units, such as the stroke unit, which is a structured in-hospital facility that is exclusively dedicated to the care of stroke victims. It is manned by a multidisciplinary team with expertise in stroke care. (RIKSSTROKE 2023.)

Blood pressure monitoring, and neurological examinations should be performed every 15 minutes for the first two hours, every 30 minutes for the next six hours, and every 60 minutes for the final 24 hours of treatment. Furthermore, it is recommended using an antihypertensive medication both during and after IV-alteplase treatment for blood pressure readings of greater than 180 mm Hg or 105 mm Hg, respectively. (Gorelick, Whelton, Sorond & Carey 2020.)

Only if the patient's oxygen saturation decreases below 95% should supplemental oxygen be provided after a stroke. In acute stroke patients who are not hypoxic, routine use of additional oxygen is not advised. (NICE Guideline 2022.)

In patients with an acute stroke, the blood glucose level should be kept between 4 and 11 mmol/l. Any individual with type 1 diabetes who is at risk of or have experienced a stroke should get optimal insulin therapy, which can be accomplished by the administration of intravenous insulin and glucose. There should be a protocol in place for such management in critical care and emergency departments. (NICE Guideline 2022.)

Patients with acute stroke should have a standardized hydration evaluation within four hours of arriving at the hospital. This should be repeated on a frequent basis to ensure that normal hydration is maintained. Within four hours of being admitted to the hospital, patients who have experienced an acute stroke should have their swallowing issues evaluated by a qualified healthcare provider using a validated screening method. Food, liquids, or medications should only be consumed orally once a safe swallowing technique has been established. Patients who experience dysphagia following an acute stroke should be evaluated for alternate fluids at once and have a thorough evaluation of their swallowing by a professional. Within 24 hours, nasogastric tube feeding could be required; in that case, a dietician should be consulted for specialized nutritional assessment, guidance, and supervision. Oral medicine, proper nourishment, and adequate water should be given by other ways. The arrangement and administration of medication should be reviewed by a pharmacist. (SIGN Guideline 2023.)

2.2.1 Ischemic stroke treatment

Direct treatment of ischemic strokes inside the obstructed blood artery is frequently accomplished by endovascular techniques. Endovascular treatment has been shown to considerably improve outcomes and reduce long-term disability following an ischemic stroke. The following processes must be completed as quickly as possible: TPA is directly injected into the brain, and/or a stent retriever is used to clear the obstruction. Medical professionals can instantly remove the clot from the blocked blood vessel in the brain by utilizing a tool attached to a catheter. The people who can most benefit from this therapy are those who have large clots that tissue plasminogen activator can't completely

dissolve. Injection of TPA is frequently combined with this therapy. (MayoClinic 2022.)

Procedures such as carotid endarterectomy, where carotid artery that has been blocked by the plaque is removed, and angioplasty, where surgeon inflates a balloon via catheter to widen the constricted artery and may be supported by a stent after being inserted into the carotid arteries through a groin artery. These treatments reduce the possibility of experiencing another stroke or transient ischemic attack. (MayoClinic 2022.)

2.2.2 Haemorrhagic stroke treatment

Surgery can be used to treat haemorrhagic stroke, with the aim of draining the blood and releasing pressure on the brain. The procedure might be performed to fix the blood vessel issues linked to haemorrhagic strokes. If an aneurysm or arteriovenous malformation caused the haemorrhagic stroke, this surgery may also be advised. (MayoClinic 2022.)

Surgical coiling involves placing a catheter into an artery in the groin and guiding it to the brain. Clipping is when a small clamp is inserted at the base of the aneurysm to limit the blood flow to it and prevent the aneurysm from bursting. This treatment creates a blood clot by blocking the flow of blood to the aneurysm. To reduce the risk of haemorrhagic stroke and eliminate the chance of rupture, arteriovenous malformations are surgically removed, and the blood vessel anomalies are fixed with stereotactic radiosurgery. The previously mentioned treatments can be the options for treating haemorrhagic stroke. (MayoClinic 2022.)

2.3 Pharmacological Treatment

Pharmacological treatment is defined as the use of drugs to treat a problem or disease. It can be used to alleviate pain and other symptoms brought on by a

particular ailment as well as to cure or prevent the development of disease. (TGH 2023.) Due to progress in medicine, pharmaceutical treatment is now utilized to address numerous health issues and/or their associated indications. Pharmacological treatment has the ability in managing pain, preventing the spread of illness, and is often used alongside surgical or other medical treatments, this is called combination therapy. (TGH 2023.)

Although medicine usually helps patients with different kinds of illnesses, they can cause unwanted side-effects. A side effect refers to undesirable symptom triggered by medical treatment. This could also happen with any form of medication, whether it's a prescription, over the counter, or alternative medicine, including herbal medicines, vitamins, or other medicines given by complementary medicine practitioners. (BetterHealth 2021.)

2.3.1 Ischemic stroke – pharmacological treatment

For treating ischemic strokes, the blood flow from the brain must be restored quickly. Intravenous medicines can be used to improve blood flow; however, they must be administered within 4,5 hours of when symptoms initially appeared for the pharmaceuticals to work best at dissolving the clot. (MayoClinic 2022.)

Recombinant tissue plasminogen activator (TPA) IV injection is the most effective treatment for ischemic stroke. In the first three hours after the development of stroke symptoms, this injection, also known as alteplase (Activase) or tenecteplase (TNKase), is commonly given through a vein in the arm. TPA may be given in some circumstances up to 4.5 hours after the onset of symptoms. (MayoClinic 2022.) It has been proven that thrombectomy is more effective if the intravenous thrombolysis has been given within 4.5 hours as a bridge treatment (Käypähoitosuositus 2020).

This medication restores blood flow by eliminating the blood clot that contributed to the stroke. If the underlying cause is promptly treated, it may be feasible to assist patients in recovering from strokes more completely. (MayoClinic 2022.)

Additionally, a direct path to the brain can be created for the delivery of drugs. A long, thin catheter will be inserted into the artery and vein in the groin to deliver tissue plasminogen activators to the part of the brain where the stroke is happening. The window of opportunity for this treatment is still extremely limited, although being noticeably bigger than that for injecting a tissue plasminogen activator (TPA). (MayoClinic 2022.)

2.3.2 Haemorrhagic stroke – pharmacological treatment

Haemorrhagic strokes are treated a bit differently. Controlling the bleeding and lowering the pressure in the brain are the main goals of the emergency care. This can be done via surgery or via drugs. (Mayo Clinic 2022.) Common drugs can be anticonvulsants such as diazepam, that's purpose is to lower the pressure in the brain. The pressure in the brain is called intracranial pressure. Diazepam can also prevent spasms of the blood vessels and prevent seizures. Antihypertensive agents like labetalol can be used to lower blood pressure. Osmotic diuretics like mannitol are used to lower the intracranial pressure in the subarachnoid space. Even though there are medications to treat haemorrhagic stroke, there is not any effective targeted therapy for it yet. (Liebeskind 2019.)

2.4 Early Rehabilitation

Early rehabilitation is described as beginning active exercise of some kind when a person is receiving critical care (Sanger 2023). In general, rehabilitation entails repeating the same acts - especially targeted and repetitive exercises. The rehabilitation strategy is determined by a multidisciplinary team depending on whatever part of the physique or capacity the stroke affected. (Mayo Clinic 2022.) Critically ill patients are frequently kept immobile for an extended period, which can cause neuromuscular weakness and consequent deficits in physical function that persist for weeks or even years after being discharged from the critical care unit. Early rehabilitative therapies are those that start as soon as physiologic derangements stabilize. (Parker 2013.)

After a stroke, patient rehabilitation involves cognitive and emotional activities such as cognitive and communicative impairment therapy, mental diagnosis and treatment, and medicines (Mayo Clinic 2022). Nevertheless, in the initial few hours following a stroke, the major priority is to stabilize the patient by regulating breathing, heart function, blood pressure, bleeding, swallowing, and other potential symptoms (Heart&Stroke 2023).

Early rehabilitation in the ICU/high dependency unit means that there are potential benefits like enhanced physical function, quality of life, and muscle strength that are all affected when a patient has had a stroke, for patients who participate in the early rehabilitation in the early stages. Early rehabilitation can also be associated with shorter amounts of time spent in the ICU or the hospital in general as well as the hospital costs. (Parker 2013.)

The rehabilitation program for patients will depend on their length of need in addition to their stroke's severity and complications. Everybody recovers differently following a stroke. It can be difficult to anticipate how quickly and how many abilities the patient will regain. Effective stroke rehabilitation typically relies on physical factors, such as the severity of the cognitive and physical side effects of the patient's stroke, emotional aspects, such as the backing of loved ones, therapeutic factors, such as a prompt start to the patient's rehabilitation, and the patient's stroke expert all play a role in the patient's capacity to stay committed to rehabilitation outside of therapy sessions. (MayoClinic 2022.)

Patients with an acute stroke should be able to switch between sitting up and lying flat on their heads during the first twenty-four hours after being admitted to the hospital, based on what is most comfortable for them. An adequately qualified healthcare specialist should assess those suffering from stroke as soon as is practical within the first 24 hours of onset to establish the most suitable and secure means of transfer and mobilization. Typically starting between 24 and 48 hours after stroke onset, frequent, swift daily mobilizations (sitting out of bed, standing, or walking) should be proposed to patients who have challenges moving shortly after stroke and are considered medically stable. Only those individuals who require little to no help should be mobilized within 24 hours of commencement. (SignGuideline2023.)

3 PURPOSE TASK AND OBJETIVES

The purpose of the thesis is to write a descriptive literature review and find and provide information to nurses, nursing students, and any other health care worker about the best ways to treat patient in the acute phase of stroke.

The objective of this thesis is to provide reliable information for health care workers who are working with stroke patients. The information will include the rehabilitation happening in the early days, nursing care, and medicine administration.

The research question of this thesis is: “How to care for patients in the acute phase of a stroke?”

4 METHODOLOGY

The thesis synthesizes from reliable sources and presents them in structured manner following the guidelines made for the thesis. According to TAMK guidelines in Intranet (2023), the information in this thesis will be collected from different research articles that discuss the treatment of stroke patients in the acute phase using descriptive literature review.

There are stages in conducting a descriptive literature review that are planning, conducting, and reporting (Xiao & Watson 2019, 102). After selecting the topic, the first stage in the planning process was to create a research question, which serves as the focal point of the study, and drives the literature evaluation process (Xiao & Watson 2019, 103). The ultimate study topic was then: How to care for patients in the acute phase of stroke? The following stage was to define the study's goal, research question, search techniques, data inclusion and exclusion criteria, and how results were checked for quality and reported. (Xiao & Watson 2019, 103.) The findings were limited to those articles that are published after 2017 in English language, are academic journals and located in Europe. After finding articles, we concluded that we must expand the geographical search range. As a result, the final range is Europe and the United States. The most reliable findings were discovered in the EBSCO CINAHL database. The results were obtained by combining many searches. Table 1 displays the searches and search term combinations.

TABLE 1. Searches

Date	Database	Search phrase	Limitations	Results	Evaluation
7.12.2022	CINAHL (Ebsco)	stroke AND acute care setting OR hospital	Published: 2017-2022 Source type: Academic journals	2539	Mostly relevant

			Geography: Europe Language: English		
		Stroke AND early rehabilitation AND icu OR intensive care unit OR critical care	Published: 2017-2022 Source type: Academic journals Geography: Europe Language: English	9	Relevant
		Stroke OR cerebrovascular accident OR cva AND acute care nursing practioner	Published: 2017-2022 Source type: Academic jounals Geography: Europe Language: English	1	Relevant

The criteria for inclusion and exclusion were determined in the second step of the planning phase. Europe and the United States were chosen as the geographic areas because European countries have strong nursing expertise and are the most similar to one another in terms of patient care resources. While all European healthcare models have issues, the vast majority offer universal healthcare

access. A majority of European countries have attained universal health care. The government generally provides a baseline level of care access and does not utilize individual cost as a tool to limit demand. (Edwards & Greenbaum Sherer 2023.) The United States of America was added to the geographical range since its health-care system resembles that of Europe (Smith 2018). Further search constraints included the fact that they were published between 2017 and 2022, were academic articles, and were written in English.

The steps for conducting phase were searching and finding the articles, evaluating the quality of them, analysing, synthesizing, and drawing out the data that was found. CINAHL was used for three searches. The searches were carried out as planned, and the findings were incorporated into the study. The first search produced 2,539 results, the second gave 9 results, and the last provided 1 result. Adding all three searches together gives 2549 results. Articles were screened one at a time by checking the titles, then the abstract, following which, 2,421 articles were removed, and lastly, the complete text. The data extraction stage, also known as the data draw-out step, can be achieved using a variety of ways. (Xiao and Watson 2019, 103–108). Articles were removed because if the publication date was older than 2017, the written language was not English, the location was not in Europe or the United States of America, as well as if the title or abstract did not address the research question. After starting to write the thesis, we discovered that some of the articles that we had found were not relevant to our topic or the information did not answer our research question. Therefore, we did one more search in CINAHL to find five more articles. We used the same limitations as before, but more specific research words, such as pharmacological treatment AND stroke AND acute care.

The articles that were reviewed for the thesis, were subjected to thematic analysis. This involved using a qualitative descriptive data analysis method to explore the experiences of a specific group. The aim was to summarize the data that was collected and present it in a coherent and logical manner. (Lambert & Lambert 2012, 256.) In the reviewing step sentences and paragraphs were collected from the research articles that considered the treatment in acute phase of a stroke in some way. The focus was to discover how to care for a patient with the acute phase of a stroke. Most of the collected phrases were connected to the

acute phase treatment of a stroke patient including pharmacological treatment and the early rehabilitation process. Once phrases were gathered, they were examined, and resemblances were pinpointed to establish relevant themes for the data.

Following the data extraction phase, information from primary sources is compared to detect similarities. When similar themes or patterns are discovered, they can be combined into a single subtheme that correctly depicts the data. (Whittemore and Knafl, 2005, 551.) The following subtopics were examined from the primary topics: acute care, pharmacological treatment, and the early rehabilitation process.

The last stage of the conducting phase involved analysing and combining the data. After finishing the data extraction process the data will be arranged based on the type of review that's been selected. Typically, this involves creating a blend of charts, tables, and a written account, although the specific reporting guidelines may vary slightly depending on the type of review. (Xiao & Watson 2019, 103–108.) Descriptive themes were identified and condensed into analytical themes, which served as a framework for merging the results of the study (Xiao & Watson 2019). Following the generation of subthemes for the data, the information was re-examined to identify overarching themes that accurately represented the collected data. To establish a structured data management system, the data was examined and successively divided into topics. (Whittemore & Knafl 2005, 550–551.) The following themes used in this thesis were: acute stroke care; patient monitoring; pharmacological treatment in stroke care; and early rehabilitation in stroke care.

5 RESULTS

The purpose of the current study is to locate and analyse relevant articles published between 2017 and 2023 using a descriptive literature review method. A total of 10 articles were gathered after a thorough search and selection processes and selected for inclusion in the review. The major objective and significant results of these articles, which were published in the United States of America; the Netherlands; Ireland; the United Kingdom; Germany; and Serbia, are shown in Table 2 in Appendix 1. This table provides readers with a concise overview of the research done in this topic, as well as its important discoveries and contributions, and serves as a thorough overview of the publications that have been examined.

5.1 Hyperacute And Acute Stroke Care

The phrase "hyperacute stroke care" refers to the initial stabilization, treatment, and high-intensity monitoring following a stroke. Acute care is described as treatment and monitoring after a hyperacute phase. (Catangui 2020; Clare 2020.)

Acute stroke care is a service that is provided by a multidisciplinary team that works in a discrete inpatient unit usually called stroke unit. They set a treatment and rehabilitation goals for each patient. (Clare 2020.) Untreated persistent ischemia can result in the loss of 1.9 million neurons each minute (Alexandro 2022). This emphasizes the critical necessity for prompt stroke therapy, since brain tissue appears to be very vulnerable to ischemia, making time critical in giving acute therapies (Cohen, Anderson, Noah & et all 2022). Acute care services provide hyperacute care; acute care; and rehabilitation. The acute care stage includes the identification of the disease, attaining medical stabilization, and preventing potential early consequences. This occurs within the first 72 hours of therapy but might vary amongst individuals based on their presentation. Significantly, receiving early access to specialist treatment after a stroke result with reduced brain damage and impairment. (Clare 2020.)

Early stroke detection, diagnosis utilizing imaging techniques such as computer tomography scans, start of emergency therapy (thrombolysis or thrombectomy), prescription of stroke medications, and quick transfer to specialized unit are crucial interventions in hyperacute stroke care. In addition to these hyper-acute stroke care techniques, general acute treatment is critical throughout the initial hours and days after a stroke. On admission, an electrocardiogram and supplementary oxygen are provided for respiratory and cardiac care. Fluid and metabolic management include tracking electrolytes and fluid balance, as well as monitoring blood pressure, blood sugar levels, and body temperature. It is also critical to manage neurologic problems linked with stroke, such as delirium. (Catangui 2020.)

5.1.1 Nurses' Role

In acute stroke services, nurses are in charge of keeping track of patients from the time they arrive at the hospital until their post treatment departure (Clare 2020).

Monitoring, documenting, and responding to patients' clinical conditions are all things that nurses are in charge of. They also assist other healthcare professionals in hyperacute and acute care and supporting and encouraging patients' rehabilitation in the early hours and days after a stroke (Clare 2020). Complications such as hemorrhagic transformation, increased intracranial pressure, the progression of an altering stroke and aspiration due to dysphagia can occur in the first hours after a stroke. Nurses, as frontline healthcare providers, are well positioned to detect concerns and keep an eye out for patients' deteriorating signs. (Catangui 2020.)

The cornerstone of stroke care is nursing. The nurse's capacity to identify, mobilize, manage, and keep an eye out for complications in stroke patients will go a long way toward ensuring a successful and quick recovery. (Hill, Baumann and Newcommon 2022.)

5.1.2 Cardiovascular Management

In stroke patients, both hypertension and hypotension are linked to less-than-optimal results. Hypotension can enhance cerebral infarction. Hypertension can cause cerebral oedema and hemorrhagic transformation due to the absence of normal cerebral autoregulation that arises from stroke. However, any alterations in the systemic blood pressure do have significant impact on the blood flow to the brain. (Catangui 2020.) Several parameters must be considered while managing blood pressure in stroke patients; for instance, while higher blood pressure can enhance tissue perfusion, it also raises the possibility of hemorrhage or secondary injury to brain infarcted regions. Consequently, it's essential to manage substantial hypertension throughout an acute stroke carefully. (Catangui 2020.)

In order to escalate the patient to the expert stroke team when blood pressure parameters related to stroke change, the nurse must be familiar with these parameters (Catangui 2020). To identify the occurrence of arrhythmias, a 12-lead electrocardiogram (ECG) should be performed at admission and, if practical, compared with a prior ECG. A nascent infection or deteriorating neurological function may also be indicated by an irregular heart rate or cardiac rhythm. Only when a patient is symptomatic or when the cardiac problem is life-threatening should the patient receive direct treatment. (Clare 2020.)

An essential part of providing stroke care is keeping track of the patient's body temperature. Every four hours, nurses are required to monitor the patient's temperature. (Catangui 2020.) A forming infection may be indicated by pyrexia and hypothermia, and a stroke's effects on the brain may cause problems with self-thermoregulation. Temperature increases have been observed in certain individuals within the first 48 hours of the onset of symptoms and have been linked to less-than-ideal results, indicating that cooling to normothermia may be neuroprotective. (Clare 2020.)

Close glycemic control has not been proven to improve results of patients' recovery from the stroke (Rodger & Price 2017). Hyperglycemia may have negative effects on the neuronal function of the patients after a stroke. In two

different guidelines the range for acceptable blood sugar level was between 4-15mmol/l. (Rodgers & Price 2017; Clare 2020.)

5.1.3 Deep Vein Thrombosis and Pulmonary Embolism Management

Following a stroke, deep vein thrombosis (DVT) and pulmonary embolism (PE) are frequent consequences. Prophylactic low-dose heparin shouldn't be administered right away after a stroke since, despite lowering the risk of PE and DVT, it raises the risk of a brain infarct hemorrhagic metamorphosis. Graduated pressure stockings can cause limb ischemia and are ineffective at preventing DVT and PE after stroke. The preferred method of treatment is intermittent pneumatic compression since it lowers the risk of DVT and post-stroke mortality. (Rodgers & Price 2017.)

5.1.4 Breathing

Patients who are having a stroke should only get supplemental oxygen if their oxygen saturation plummets below 95%. In the management of acute stroke patients who are not hypoxic, the nurse should refrain from using supplementary oxygen on a frequent basis. (Catangui 2020.)

5.1.5 Swallowing and Oral Management

Dysphagia is a common side effect of strokes that, if untreated, can have detrimental effects. New patients should be screened using standardized screening instruments for the risk of dysphagia and the possibility of malnutrition after four hours of arrival and before being provided any food, drink, or medicine. As a substitute feeding method, enteral feeding through a nasogastric tube should begin within 24 hours if swallowing is dangerous. It is also extremely important to check the patients ‘oral status. (Clare 2020.)

It is important to maintain patients’ oral hygiene even though it may be difficult. it is nurses’ responsibility to maintain patients’ oral care when patient is not able to take care of it by themselves. (Rodgers & Price 2017.) Stroke patients are more vulnerable to developing oral candidiasis and xerostomia (Catangui 2020).

5.1.6 Neurological Observations

Neurological evaluations of stroke patients include evaluating their state of consciousness, pupil size and responsiveness, limb function, and vital signs. The Glasgow Coma Scale (GCS) is a tool that nurses must know how to use to assess patients' levels of consciousness. Any brain injury that is developing can be detected by the GCS examination, which is essential for clinical decision-making. The GCS consists of three components: verbal response, physical response, and eye opening. GCS scores are a reliable indicator of the severity of a brain damage and fall into one of three categories: mild as shown by a score of 13 to 15, moderate, denoted by a score between 9 and 12 and a score of 3 to 8 denotes severe. (Catangui 2020.)

Another good testing tool for stroke patients is the FAST test that comes from words Face, Arms, Speech, and Time. Nurses can ask patients to smile and check for any new asymmetries or facial weakening. Can patients maintain both arms at the same height whilst lifting their arms to 90 degrees when seated upright? Is it difficult or drifting to hold one arm up? Does the patient hear the nurse clearly and understand what they are saying? Are there any recent speech changes, such slurred speech, difficulty finding words, or the use of inappropriate or imprecise language? As soon as one or more of the warning signs appear hospitals' emergency team should be noted. (Hill, Baumann & Newcommon 2022.)

5.1.7 Bladder and Bowel Management

Up to 40 to 60 percent of acute stroke patients struggle with urinary incontinence. One should look for the underlying reason of the incontinence, such as pre-existing stress incontinence, a urinary tract infection, or immobility. Patients with mobility, cognitive, or communication issues may experience a considerable reduction in incontinence with regular toileting. Unless the patient has urine retention, a sacral pressure sore, or if precise monitoring of fluid balance is required, urinary catheters should be avoided. Constipation is typical following a

stroke; thus, bowel charts should be used to track bowel movements and laxatives should be provided as necessary. (Rodgers & Price 2017.)

5.1.8 Skin Integrity

Proper skin care, routine turning, pressure-relieving bedding, and adapted seating can all help prevent pressure sores (Rodgers & Price 2017). The typical pressure points on the body, such as the elbows, heels, and sacrum, must be routinely assessed, and evaluated by nurses. This includes preserving the skin's integrity and preserving the skin's moisture balance. (Catangui 2020.)

5.1.9 Comprehension and Communication

It has been stated that one third of the patients who has suffered a stroke are likely to develop aphasia. Assessment of patients with aphasia or dysarthria is one of the things that nurses need to assess. The assessment for defining if the patient has problems with communication or comprehension should be performed within 72 hours of the patient experiencing a stroke. The assessment includes tasks where the patient needs to describe pictures or repeat simple words. If there are any communication problems recognized, a speech and language therapist needs to be consulted and patient needs to be seen by them. (Catangui 2020.)

5.2 Pharmacological Treatment in Stroke Care

The pharmacological way to treat a stroke is to use an intravenous medication treatment also called thrombolysis therapy, which is the most effective treatment for ischemic stroke. A drug is given to the patient within 4.5 hours when the symptoms have started. An injection of alteplase is the medication used in thrombolysis therapy. Thrombolysis therapy is given as hour-long intravenous drip. For patients to receive thrombolysis their blood pressure must be reduced to ≤185/110mmHg. This is done by giving the patient blood pressure-lowering medicine via IV such as labetalol nitroprusside, nicardipine hydrochloride or sodium nitroprusside. (Catangui 2020.)

Tenecteplase, a different medicine that is a modified version of tissue plasminogen activator (TPA), has a number of pharmacological and practical benefits over alteplase, the only other thrombolytic therapy currently licensed for the treatment of an ischemic stroke. Tenecteplase was shown to have a comparable effectiveness and safety profile to alteplase at a dosage of 0.9 mg/kg in the NOR-TEST study at a level of 0.4 mg/kg. It is crucial to remember that the majority of the trial's patients were those who had just mild strokes. Specifically for patients who experienced a moderate or severe ischemic stroke, the goal of the NOR-TEST 2 research was to determine if Tenecteplase at a dose of 0.4 mg/kg is non-inferior to alteplase at a dosage of 0.9 mg/kg. (Kvistad, Næss, Helleberg et al. 2022.)

By utilizing oral anticoagulants (OAC) with vitamin K antagonists (VKAs) or non-VKA oral anticoagulants (NOAC) dabigatran, rivaroxaban, apixaban, or edoxaban, patients with atrial fibrillations can successfully reduce their risk of a stroke and other thromboembolic events. Regarding lowered incidence of hemorrhagic stroke or other cerebral bleeding, NOACs were as safe as or safer than warfarin. These medications can be used in the future after a patient has had a stroke, to prevent further manifestations. (Ueberham, Dagres & Potpara et all 2017.)

To lessen the risk of thromboembolism, numerous pharmaceutical and non-pharmacological interventions have been tested. For a significant proportion of patients, pharmaceutical therapy is suitable and pleasant. (Ueberham, Dagres & Potpara et all 2017.)

5.3 Mechanical Treatment For Stroke

To restore blood flow, endovascular mechanical thrombectomy may be performed instead of or in addition to IV thrombolysis in patients who are not candidates for the treatment. Based on the identification of a major artery blockage, neuroimaging is used to guide the selection of suitable patients who are most likely to benefit. Stent retrievers, which offer the highest rates of recanalization and success, are the most efficient devices that have been authorized. The endovascular treatment window should be extended to 24 hours

from the onset of symptoms, according to recent stroke research. (Wilson & Ashcraft 2019.)

The ED nurse is in charge of starting an acute stroke patient's therapy right away by giving them thrombolytics. Nurses must be skilled in the preparation and administration of thrombolytic drugs even if a pharmacist may be on hand to offer assistance. A strong emphasis has been made about the necessity of routinely checking the neurological state and blood pressure of the patient after thrombolytic treatment. Although the health care facility may choose a particular approach of neurological examination, uniformity is crucial. It is essential to keep the patient's blood pressure below 180/105 mm Hg when delivering thrombolytics and to prevent any abrupt and major drop in blood pressure. (Hill, Bauman & Newcommon et al 2022.)

Patients may be sedated or given general anesthesia during the surgery. General anesthesia for endovascular therapy (EVT) has been associated with delayed intervention and impaired cerebral blood flow, which can lead to less favorable functional results, according to earlier investigations. Conscious sedation has been shown in recent studies to produce functional outcomes that are comparable to those of general anesthesia, despite having some disadvantages, including the patient's inability to follow instructions, the risk of complications from patient movement, and the requirement that the patient remain flat with an unprotected airway. The interventionist normally decides whether to use general anesthesia or conscious sedation, and it is customary for a treatment to begin with conscious sedation and subsequently switch to general anesthesia if necessary. Because of this, the sedation nurse should be alert for any abnormalities that would make intubation difficult as well as cautious in seeing and resolving any physiological changes that might need advanced airway care. The anesthetic team can then be informed of this information. (Hill, Bauman & Newcommon et al 2022.)

A doctor or advanced practice provider should examine the patient to determine the risk of a challenging intubation before giving anesthesia or performing intubation. To ascertain the procedural and anesthetic risks, clinicians with intubation experience, such as anesthesiologists, nurse anesthetists, or

anesthesiology assistants, would evaluate the patient's physical state and comorbidities. The difficulty of intubation is frequently categorized as level IV by the American Society of Anesthesiologists. Intubation difficulties must be evaluated carefully since a difficult airway increases the chance of complications and death. The Mallampati Classification is a bedside screening technique that might help in spotting probable airway issues. (Hill, Bauman & Newcommon et al 2022.)

5.4 Early Rehabilitation in Stroke Care

Rehabilitation focuses on a patient's unique impairments, activity limitations, restricted social involvement, and general quality of life to maximize their intrinsic and adaptive recovery (Rodgers & Price 2017). While acute neurological traumas include neurotrauma, aneurysmal subarachnoid hemorrhage, intracerebral hemorrhage, and a sudden ischemic stroke have distinct pathological conditions and therapeutic methods, there are differences in the early mobilization of these patients. While inventing an early mobilization plan in the ICU, the following variables should be contemplated: the influence of postural modifications and exercise, the amount of time between the onset of symptoms and the commencement of early mobilization, and the form and ferocity of exercise indicated. (Olkowski & Shah 2017.)

Patients may experience difficulties from immobility, which is typically seen in the critical care unit (ICU). There is evidence that reducing the problems related to critical illnesses can be accomplished by early patient mobilization in the ICU. (Olkowski & Shah 2017.) According to Clare (2020), a stroke patient should start early rehabilitation as soon as they are clinically stable because it is a crucial part of acute stroke therapy. Regardless of the type of stroke, the first 24-48 hours are crucial in stroke patients' rehabilitation (Olkowski & Shah 2017).

The pragmatic recommendations of current guidelines state that people who have had a stroke should receive at least 45 minutes of each relevant therapy every day, as often as is necessary for them to fulfill their rehabilitation objectives, and for as long as they are able to participate, demonstrate verifiable benefit from therapy, and are willing to do so. The time and ferocity of early mobilization need

to be rigorously considered. (Rodgers & Price 2017.) According to Alexandro (2022), the findings of the A Very Early Rehabilitation Trial (AVERT), indicated that aggressive early mobilization is risky and leads to worse outcomes in stroke patients. The AVERT results supported theoretical justification by demonstrating that since large vessel occlusion (LVO) stroke is a condition of vascular insufficiency, it is likely best to treat vasomotor exhausted vascular territories with increased blood flow rather than with strategies that hinder oxygen delivery and raise the oxygen debt in brain tissue (Alexandro 2022).

The patient's preferences, coexisting diseases, and the problems resulting from the stroke should all be considered while providing individualized rehabilitation (Rodgers & Price 2017). Stroke rehabilitation requires the involvement of all members of the multidisciplinary team in acute stroke care, including occupational therapists, physiotherapists, speech and language therapists, dietitians, and psychologists (Clare 2020). Any early mobilizations program's goal is to increase patient engagement in upright activity prior to the development of a critical illness to lessen the issues and disabilities brought on by ICU admission (Olkowski &Shah 2017). The rehabilitation program for stroke recovery typically includes physical activities such as mobilization, optimum alignment, care for incontinence, oral care, and pain management in addition to motor skill exercises, mobility training, constraint-induced therapy, and range motion therapy (Clare 2020).

Early stroke rehabilitation frequently focuses on reduced movement. With foot orthoses, balance and walking have been reported to improve temporarily. (Rodgers & Price 2017.)

6 DISCUSSION

6.1 Ethics And Reliability

To ensure ethically acceptable and trustworthy research, the guidelines of the Finnish Advisory Council on Research Integrity's responsible conduct of research (RCR) (2012, 30) are followed in this work. The research adheres to the research community's values, which include honesty, thoroughness, and reliability throughout the research process. The data collection and analysis procedures employed are ethical, and they have been disclosed in a clear and honest manner. While performing the investigation, as well as documenting, outlining, and analyzing the findings, the study conforms to the principles of integrity, care, and accuracy. These standards are supported by the research community. (Finnish National Board on Research Integrity Tenk, 2021.)

By adhering to the review methodology, the risk of bias during the selection and analysis of data for the study was reduced, enhancing the dependability of the research findings (Xiao & Watson 2019, 103). The writers respect other researchers' effort and achievements by appropriately recognizing their writings and giving their achievements the recognition and significance, they deserve in carrying out the researcher's own study and publishing its findings (Finnish National Board on Research Integrity Tenk, 2021). Other academics' work was recognized and valued by adequately citing and acknowledging their works, both in-text and in the reference list. To ensure that anybody might reproduce the procedure, the literature review was organized, carried out, and the data results were recorded in accordance with the norms of scientific knowledge.

6.2 Conclusion

The present study used a descriptive literature review strategy to find and evaluate relevant papers published between 2017 and 2023. Following a detailed search and selection procedure, ten articles were chosen for inclusion in the review. Table 2 in Appendix 1 summarizes the key objective and relevant findings of these articles, which were published in the United States of America, the

Netherlands, Ireland, the United Kingdom, Germany, and Serbia. This table gives readers a quick summary of the research done on this topic, as well as its significant findings and advancements, and serves as a detailed overview of the articles that have been reviewed.

The studies reviewed focused on acute stroke care and nurses' roles in delivering hyperacute and acute care, monitoring patients, and rehabilitation in the early hours and days following a stroke.

In theoretical starting point the thesis explained what the different specialized units are and those are not further explained in the results section. The result section is more focused on the treatment of stroke in the acute phase. Both sections discuss what are the treatment options and the maintenance of patients' homeostasis.

It was discovered that the faster a patient gets diagnosed and treated the better the outcome is after recovery period. For example, the alteplase treatment should be started within 4,5 hours after the symptom onset, which then ensures better quality of life. (Catangui 2020.) The thesis found out that there is a mechanical treatment option for stroke which is thrombectomy (Käypähoitosuositus 2020; MayoClinic 2022). There are some mentions about it in the theoretical starting point, but we found more accurate and deeper information about it in the results. Thrombectomy is done when the patient is not candidate for alteplase, however it can be still performed after unsuccessful alteplase treatment (Wilson & Ashcraft 2019).

The maintenance of patients' homeostasis covers breathing as one part and it is recommended that only if oxygen saturation drops below 95%, should patient be provided supplemental oxygen (NICE Guideline 2018 ; Catangui 2020). Blood pressure measurement is important parameter as healthcare professionals can intervene when the readings are not optimal as for example hypertension can cause cerebral oedema and hemorrhagic transformation (Catangui 2020). In the first 24 hours of stroke treatment, it is recommended that blood pressure is measured every fifteen minutes for the first two hours and after that the time between measurements gradually increases to once in every hour (Gorelick,

Whelton, Sorond & Carey 2020). Blood glucose recommendation according to NICE guideline (2018) is 4 to 11 mmol/l. In the results the recommendation was 4 to 15mmol/l (Rodgers & Price 2017; Clare 2020). As these guidelines have a tiny difference between each other, it could be said that the blood glucose from 4mmol/l to 15mmol/l is recommended rate.

Evaluating patients' swallowing is crucial after stroke. Dysphagia is a side effect, that can occur after a stroke, and it can cause damaging effects. (Clare 2020.) According to SIGN guidelines (2023) food, liquids and medications should only be taken orally after precise examination and if difficulties are detected then nasogastric tube can be considered.

The first 24 to 48 hours are the most critical for stroke patients' rehabilitation to ensure quick recovery and better quality of life (SIGN guideline 2023; Olkowski & Shah 2017). It is recommended to start early mobilization with brief daily exercises at least for 45 minutes per day. Patients with little to no help should be mobilized within the first 24 hours. However aggressive early rehabilitation is not recommended as it is risky and can lead to more damage. (SIGN guideline 2023; Rodgers & Price 2017; Alexandro 2022.)

Since this literature review primarily focuses on information from high-income countries, we recommend conducting a similar study or review using data from low-income countries. This would allow for future comparisons between the two sets of information.

REFERENCES

Alexandro, A.W. 2022. The Sky's the Limit: Expanding Nursing's Contribution to Acute Stroke Science. CINAHL. Read on 28.9.2022. https://web-p-ebscohostcom.libproxy.tuni.fi/ehost/detail/detail?vid=14&sid=abe14a61-d905-404e-8a91-93d8efd48045%40redis&bdata=JkF1dGhUeXBlPWNvb2tpZSxpcCx1aWQmc2l0ZT1laG9zdC1saXZlJn Njb3BlPXNpdGU%3d#AN=157741058&db=ccm

BetterHealth Channel. 2021. Medicines and side effects. BetterHealth Channel. Read on 21.3.2023. https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/medicines-and-side-effects

Catangui, E.J. 2020. Role of the nurse in the hyperacute care and management of patients following stroke. CINAHL. Read on 28.9.2022. https://web-p-ebscohostcom.libproxy.tuni.fi/ehost/detail/detail?vid=0&sid=9882463f-e2dc-448e-aeddd59e529940d7%40redis&bdata=JkF1dGhUeXBlPWNvb2tpZSxpcCx1aWQmc2l0ZT1laG9zdC1saXZlJn Njb3BlPXNpdGU%3d#AN=147754995&db=ccm

Centers for Disease Control and Prevention. 2022. Stroke Home, About Stroke. CDC. Read on 28.9.2022. https://www.cdc.gov/stroke/about.htm

Centers for Disease Control and Prevention. 2023. Stroke Home, Stroke statistics and maps. CDC. Read on 25.8.2023. https://www.cdc.gov/stroke/facts.htm

Clare, C.S. 2020. Role of the nurse in acute stroke care. CINAHL. Read on 28.9.2022. https://doiorg.libproxy.tuni.fi/10.7748/ns.2020.e11482

Cohen, V., Anderson, A., Noah, P. & Super, J. 2022. A Nursing Approach to Improving Critical Care Compliance with Vital Signs and Neurological Assessments in Post-IV-Alteplase Stroke Patients. CINAHL. Read on 28.9.2022.

https://web.s.ebscohost.com/ehost/detail/detail?vid=0&sid=64c5f76a3473-4e26-a1fd57060bec7141%40redis&bdata=JkF1dGhUeXBlPWNvb2tpZSxpcCx1aWQmc2l0ZT1laG9zdC1saXZlJn Njb3BlPXNpdGU%3d#AN=158599021&db=ccm

Edwards, A. & Greenbaum Sherer, L. 2023. Around the World in Healthcare Systems: Europe. MarshMcLennan. Read on 01.02.2023. https://www.marshmclennan.com/insights/publications/2021/february/around-the-world-in-healthcare-systems-europe.html

Finnish Advisory Board on Research Integrity. 2012. Responsible conduct of research and procedures for handling allegations of misconduct in Finland. PDFfile. Read on 14.03.2023. https://tenk.fi/sites/tenk.fi/files/HTK_ohje_2012.pdf

Finnish National Board on Research Integrity Tenk. 2021. Responsible Conduct of Research (RCR). TENK. Read on 19.1.2023. https://tenk.fi/en/research-misconduct/responsible-conduct-research-rcr

Gorelick, P.B., Whelton, P.K., Sorond, F.& Carey, R.M. 2020. Blood Pressure Management in Stroke. American Heart / Stroke Association. Read on 6.3.2023. https://www.ahajournals.org/doi/10.1161/HYPERTENSIONAHA.120.14653

Healthtalk. 2018. Intensive care: Patients' experiences, high dependency unit (HDUs). Healthtalk. Read on 1.2.2023. https://healthtalk.org/intensive-care-patients-experiences/high-dependency-unit-hdus

Heart&Stroke. 2023. Stroke: First Few Days. Heart and Stroke Foundation of Canada. Read on 6.3.2023. https://www.heartandstroke.ca/stroke/recovery-and-support/stroke-care/first-few-days

Hill, M., Baumann, JJ., Newcommon, N. & Baumann, J J. 2022. Nursing Care of the Acute Ischemic Stroke Endovascular Thrombectomy Patient. CINAHL. Read on 28.9.2022. https://web-p-ebscohost-com.libproxy.tuni.fi/ehost/detail/detail?vid=17&sid=abe14a61-d905- 404e-8a91-93d8efd48045%40redis&bdata=JkF1dGhUeXBlWNvb2tpZSxpcCx1aWQmc2l0ZT1laG9zdC1saXZlJn Njb3BlPXNpdGU%3d#AN=158599066&db=ccm

Intranet of the Tampere universities. 2022. Thesis at TAMK (student's guide). Intranet. Read on 19.1.2023. https://intra.tuni.fi/en/studying/studying-0/thesis/thesis-tamk-students-guide#contract

International Council of Nurses. 2023. Nursing defenitions. ICN. Read on 19.1.2023. https://www.icn.ch/nursing-policy/nursing-definitions

Kvistad, C.E., Naess, H., Helleberg, B.H., Idicula, T., Hagberg, G., Nordby, L.M., Jenssen, K.N., Tobro, H., Rörholt, D.M., Kaur, K., Eltoff, A., Evensen, K., Haasz, J., Singaravel, G., Fromm, A. & Thomassen, L. 2022. Tenecteplase versus alteplase for the management of acute ischaemic stroke in Norway (NOR-TEST 2, part A): a phase 3, randomised, open-label, blinded endpoint, non-inferiority trial. CINAHL. Read on 15.5.2023. https://web-p-ebscohost-com.libproxy.tuni.fi/ehost/detail/detail?vid=15&sid=4d97bf7b-7768-4c15-8a27-5c6efdeacf45%40rdis&bdata=JkF1dGhUeXBlWNvb2tpZSxpcCx1aWQmc2l0ZT1laG9zdC1saXZlJnNjb3BlPXNpdGU%3d#AN=156812196&db=ccm

Käypä hoito -suositus. 2020. Aivoinfarkti ja TIA. Duodemic käypä hoito. Read on 8.8.2023. https://www.kaypahoito.fi/hoi50051#s13

Lambert, V & Lambert, C. 2012. Qualitative Descriptive Research: An Acceptable Design. Pacific rim international journal of nursing research. PDF-file. Read on 21.01.2022. https://he02.tci-thaijo.org/index.php/PRIJNR/article/download/5805/5064

Liebeskind D.S. 2019. Hemorrhagic Stroke Medication. Medscape. Read on 8.2.2023 https://emedicine.medscape.com/article/1916662-medication

Mayo Clinic. 2022. Stroke. Mayo Clinic Read on 8.2.2023. https://www.mayoclinic.org/diseases-conditions/stroke/diagnosis-treatment/drc-20350119

Mayo Clinic. 2022. Stroke Rehabilitation: What to expect as you recover. Mayo Clinic. Read on 6.3.2023. https://www.mayoclinic.org/diseases-conditions/stroke/in-depth/stroke-rehabilitation/art-20045172

National Institute for Health and Care Excellence. 2022. Stroke and transient ischaemic attack in over 16s: diagnosis and initial management. NICE. Read on 8.8.2023. https://www.nice.org.uk/guidance/ng128/chapter/Recommendations

NHS. 2019. Intensive care. NHS. Read on 19.1.2023. https://www.nhs.uk/conditions/intensive-care/

NHS. 2022. Stroke. NHS. Read on 28.9.2022. https://www.nhs.uk/conditions/stroke/

Olkowski, Brian and Shah, Syed Omar. 2017. Early Mobilization in the Neuro-ICU: How Far Can We Go? CINAHL. Read on 19.1.2023. https://link-springer-com.libproxy.tuni.fi/article/10.1007/s12028-016-0338-7

Open Caregiving. 2022. Acute care. Open Caregiving. Read on 14.03.2023. https://www.opencaregiving.com/glossary/acute-care

Parker, A., Sricharoenchai, T. & Needham, D.M. 2013. Early Rehabilitation in the Intensive Care Unit: Preventing Physical and Mental Health Impairments. National library of medicine. Read on 19.1.2023. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3889146/

RIKSSTROKE. 2023. Definition of a stroke unit. The Swedish stroke registration. Read on 1.2.2023. https://www.riksstroke.org/definition-of-a-stroke-unit/

Rodgers, H. & Price, C. 2017. Stroke unit care, inpatient rehabilitation and early supported discharge. CINAHL. Read on 15.5.2023. https://www-doi-org.libproxy.tuni.fi/10.7861/clinmedicine.17-2-173

Sanger Helen. 2023. How Early is Early? When Should Rehabilitation Begin in Critical Illnesses. ACPRC. Read on 23.5.2023 https://www.acprc.org.uk/publications/acprc-journal/2020-journal-vol-52/how-early-is-early-when-should-rehabilitation-begin-in-critical-illness/

SIGN Guidelines. 2023. National Clinical Guideline for Stroke for the UK and Ireland. SIGN. Read on 8.8.2023. https://www.strokeguideline.org/contents/

Smith Zach. 2018. Nursing similarities around the world: Similarities and differences. NurseGrid. Read on 15.2.2023. https://nursegrid.com/blog/nursing-around-the-world-similarities-and-differences/

Stroke Causes and Risks. 2022. National Heart, Lung and Blood Institute. NIH. Read on 23.5.2023. https://www.nhlbi.nih.gov/health/stroke/causes

Tampa General Hospital. 2023. Pharmaceutical Therapy. TGH. Read on 19.1.2023. https://www.tgh.org/institutes-and-services/treatments/pharmaceutical-therapy

Tays. 2018. Aivoinfarktin lioutushoito. Tays. Read on 8.2.2023. https://www.tays.fi/fi-FI/Ohjeet/Hoitoohjeet/Aivoverenkiertohairiopotilaan_ohjaus/Aivoinfarktin_liuotushoito(76611)

Tays. 2021. Aivoverenkiertohäiriöt. Tays. Read on 25.8.2023. https://www.tays.fi/fi-FI/Palvelut/Neuroalat/Neurologia/Aivoverenkiertohairiot#:~:text=Aivoverenkierto h%C3%A4iri%C3%B6%20on%20yhteisnimitys%20erilaisille%20aivoverisuonita pahtumille%20ja%20aivoverenkierron%20h%C3%A4iri%C3%B6ille,niihin%20v uosittain%2C%20ja%20ne%20ovat%20kolmanneksi%20yleisin%20kuolinsyy.

The Health Foundation. 2023. Acute care. The Health Foundation. Read on 19.1.2023. https://www.health.org.uk/topics/acute-care

Whittemore, R. & Knafl, K. 2005. The integrative review: updated methodology. Journal of Advanced Nursing (Wiley-Blackwell), 52 (5), 546–553. Read on 8.1.2023. https://doi.org/10.1111/j.1365-2648.2005.03621.x

Ueberham, Laura; Dagres, Nikolaos; Potpara, Tatjana; Bollman, Andreas; Hindricks, Gerhad: Potpara, Tatjana S. 2017. Pharmacological and Non-pharmacological treatments for stroke prevention in patients with atrial fibrillation. CINAHL. Read on 15.5.2023 https://web-s-ebscohost-com.libproxy.tuni.fi/ehost/detail/detail?vid=3&sid=e3947390-a3b7-49fe-b347-02b8efa93233%40redis&bdata=JkF1dGhUeXBlPWNvb2tpZSxpcCx1aWQmc2l0ZT1laG9zdC1saXZlJnNjb3BlPXNpdGU%3d#AN=125871622&db=ccm

Wilson, S.E., Ashcraft, S. 2019. Ischemic Stroke: Management by the Nurse Practitioner. CINAHL. Read on 28.9.2022. https://web.s.ebscohost.com/ehost/detail/detail?vid=0&sid=a328d791-f582-49dbb287-ff094ec886e7%40redis&bdata=JkF1dGhUeXBlPWNvb2tpZSxpcCx1aWQmc2l0ZT1laG9zdC1saXZlJn Njb3BlPXNpdGU%3d#AN=133780310&db=ccm

World Stroke Organization. 2022. Global Stroke Fact Sheet 2022. WSO. Read on 5.9.2023 PowerPoint Presentation (world-stroke.org)

Xiao, Y. & Watson, M. 2019. Guidance on Conducting a Systematic Literature Review. Journal of Planning Education and Research 39 (1), 93–112. Read on 8.1.2023. https://doi.org/10.1177/0739456X17723971

APPENDICES

Appendix 1. Table 2. Description of eligible strudies

Author, Title, Journal, Publication year, Country	**Purpose of the research**	**Method Study population**	**Main results**
1. Alexandro, Anne W. "The Sky's limit: expanding nursing's contribution to acute stroke science ", 2022, USA.	The primary goal of the main research program is to find ways to prevent or lessen the symptoms of hyper-acute ischemic stroke in patients who have viable but sensitive brain tissue by increasing intracranial blood flow.	Research Article Nursing practitioners	More than any other neurologic diagnosis, ischemic stroke resembles myocardial infarction due to hemodynamic abnormalities brought on by several pathways that lead to renowned heterogeneous blood flow circumstances.
2.Catangui, Elmer Javier. "Role of the nurse in the hyperacute care and management of patients following stroke", 2021, London.	The purpose of the study is to better understand what goes into the treatment and care of stroke patients who require hyperacute care as well as the nursing care that should be given to patients.	Research Article Nursing practitioners	Nurses who provide hyperacute care must keep track of and stabilize patients' physiological indicators, analyze problems including skin integrity and continence status, and identify the effects of stroke. It is crucial that nurses possess the knowledge

3.Clare, Christopher Stephen. "Role of the nurse in acute stroke care", 2020, UK & Ireland.	Promote your knowledge of the symptoms and indications of an acute stroke. Being aware of what stroke care entails, such as patient monitoring and risk factor assessment. To support your needs for local registration renewal and professional development.	Research Article Nursing practitioners	Early access to skilled care following a stroke enhances patient outcomes, especially by reducing damage to the brain and disability. Services for acute strokes include rehabilitation, hyperacute care (rapid stabilization, treatment, and intensive observation after a stroke), and acute care (treatment and monitoring after the hyperacute phase).
4.Cohen, Vicki L.; Andersson Amanda.; Noah, Patty.; Super, Jamie. "A Nursing Approach to Improving Critical Care Compliance with Vital Signs and Neurological Assessments in Post-IV-Alteplase Stroke Patients", 2022, Pennsylvania, USA.	Explains nurse intervention for the use of IV Alteplase as a treatment for acute ischemic stroke, the risks connected with the drug, best practices guidelines, and the nursing role in efforts to ensure safe care.	Research Article Nursing practitioners	The conclusion highlights the significance of health care organizations pursuing new opportunities, encouraging innovation at the bedside, highlighting nursing's crucial role in the treatment of acute stroke, and encouraging the reporting of changes in patient care and the environment in which nurses practice.

5. Rodgers, Helen; Price Chris "Stroke unit care, inpatient rehabilitation and early supported discharge" 2017, UK & Ireland.	Although stroke is a frequent and incapacitating disorder, many people benefit from the treatment provided by a comprehensive specialist stroke program. The patient care route should incorporate the emerging evidence for maximizing recovery with appropriate clinical documentation, protocols, and staff training.	Research Article Nursing practioners	Every stroke victim can benefit from receiving top-notch basic medical care, but others require highly effective, time-sensitive treatments like thrombolysis. Assessments of neurological dysfunction, vascular risk variables, swallowing, fluid balance, nutrition, cognitive ability, communication, mental disorders, continuity, activities of daily living, and rehabilitation objectives should all be part of a regular patient pathway.
6.Hill, Michel.; Bauman, JJ.; Newcommon, Nancy.; Bauman, J J. "Nursing care of the acute ischemic stroke endovascular thrombectomy patient", 2022, USA.	The nurses in the prehospital and emergency departments use stroke severity scores to identify potential candidates for thrombectomy and to speed up intervention.	Journal Article – review Nursing practitioners	Early rehabilitation exercise execution rates increased from 37.1% to 82.8%, and the accuracy of new nursing staff's understanding of these exercises increased from 31.3% to 80%.
7. Kvistad, Christoper Elnan; Naess, Halvor;	Future studies on stroke patients with moderate or severe	Journal Article	Tenecteplase is an altered tissue plasminogen activator

Helleberg, Bernt H; Idicula, Titto; Hagberg, Guri; Nordby, Linn Marie; Jenssen, Kristian N; Tobro, Håkon; Rörholt, Dag M; Kaur, Kamaljit; Eltoff, Agnethe; Evensen, Kristin; Haasz, Judit; Singaravel, Guruparan; Fromm, Annette; Thomassen, Lars. "Tenecteplase versus alteplase for the management of acute ischaemic stroke in Norway (NOR-TEST 2, part A): a phase 3, randomized, open-label blinded endpoint, non-inferiority trial, 2022 Norway.	stroke should compare a lower dose of tenecteplase to alteplase.	Nurses, Pharmacist, Doctors	that, in terms of pharmacology and usability, is more efficient to alteplase, and is the only other thrombolytic drug that is currently licensed for the treatment of ischemic stroke. The NOR-TEST trial showed that, despite being given to individuals in a population with a high prevalence of mild stroke, 04 mg/kg tenecteplase had an effectiveness and safety profile comparable to that of a usual dose (09 mg/kg) of alteplase. Patient enrolment was stopped after a per-protocol safety analysis revealed an imbalance in the incidence of symptomatic cerebral hemorrhage between the therapy groups that surpassed the established threshold for trial termination.
8. Ueberham, Laura; Dagres,	Understanding the current stroke	Journal Article	In patients with atrial fibrillation (AF), oral

Nikolaos; Potpara, Tatjana; Bollman, Andreas; Hindricks, Gerhad: Potpara, Tatjana S. "Pharmacological and Non-pharmacological treatments for stroke prevention in Patients with atrial fibrillation. 2017 Germany/Serbia.	treatment choices and discussing the therapeutic approaches' main benefits and shortcomings in patients with AF.	Nurses	anticoagulation (OAC) using vitamin K antagonists (VKAs) or non-VKA oral anticoagulants (NOACs) dabigatran, rivaroxaban, apixaban, or edoxaban can successfully prevent stroke and other thromboembolic events.
9.Wilson, Susan E.; Ashcraft, Susan "Ischemic Stroke: Management by the Nurse Practitioner, 2019, USA.	In addition to discussing acute stroke treatment while hospitalized, this article gives an overview of stroke management before and after discharge in the primary care context.	Artcile – Case Study Nurse practitioners	The primary objectives of ischem-ic stroke therapy are to improve perfusion and prevent further tissue damage. Recanalization procedures, such as intra-arterial clot retrieval and the injection of synthetic tissue-type plasminogen activator (alteplase), aim to improve patient outcomes.
10. Olkowski, Brian and Shah, Syed Omar. "Early Mobilization in the Neuro-ICU:	In the intensive care unit (ICU), immobility is frequently observed and can cause patient complications. It has	Journal article Nurse practioners	Because acute neurologic injuries such as acute ischemic stroke, aneurysmal subarachnoid hemorrhage,

How Far Can We Go?” 2017, USA.	been demonstrated that early patient mobilization in the intensive care unit reduces the complications related to critical illness.		intracerebral hemorrhage, and neurotrauma have different disease processes and approaches to treatment, there are differences in the early mobilization of patients with these conditions. The following factors should be taken into account while creating an early mobility program in the NICU: the impact of postural adjustments and exercise, the interval between the onset of symptoms and the start of early mobilization, and the recommended type and level of activity.