Activase® Therapy

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Purpose

The purpose of *Activase® Therapy for Acute Ischemic Stroke Management* is to inform the healthcare provider about stroke recognition, complication and treatment, including the use of Activase® for stroke management.

As the public becomes more informed about strokes, people are recognizing the signs and symptoms earlier and arriving to the hospital where they are quickly being evaluated to receive Activase® for acute ischemic stroke.

With an increased use of this drug, nursing professionals need to develop their knowledge of how to properly care for a patient before, during, and after the administration of Activase®.

Learning Objectives

After successful completion of this course, you will be able to:

1. Identify stroke statistics.
2. Define stroke, state risk factors (both modifiable and non-modifiable), and signs and symptoms of acute ischemic stroke.
3. Define the mechanism of action, patient eligibility, dosage, administration, and adverse side effects of Activase®.
4. Identify the nursing issues to consider when taking care of someone before, during, and after administration of Activase®.

Introduction

The use of Activase® may reduce the debilitating effects of an ischemic stroke. As public awareness of stroke increases, so does the use of Activase®. Activase® is currently the only drug approved by the FDA for treatment of ischemic stroke.

Note!
Activase® can be referred as Recombinant Tissue Plasminogen Activator, rt-PA, t-PA, Activase®, or alteplase.

Nurses and Pharmacists in the emergency department, interventional radiology, and intensive care unit are most often involved with the administration of Activase®. However, since a stroke can happen at any time, all clinical staff should familiarize themselves with the purpose and use of Activase®.
This course will focus on the ischemic stroke. For more information on strokes, refer to the RN.com course titled *Stroke Prevention & Recognition*.

Test Your Knowledge

True or False

Activase® can be referred as Recombinant Tissue Plasminogen Activator, rt-PA, t-PA, Activase®, or Activase® . It is the only medication currently approved by the FDA for use with hemorrhagic stroke.

The correct response is: False

Rationale - Activase® is the only medication currently approved by the FDA for use with **ISCHEMIC** stroke.

Incidence of Stroke

According to the Centers for Disease Control and Prevention (CDC), approximately 795,000 strokes occur in the United States annually, with 87% diagnosed as ischemic. In 2017, an estimated 140,000 Americans died from stroke, making stroke the fifth leading cause of death in the United States (CDC, 2017). Globally, in 2013 there were 6.5 million stroke deaths, making stroke the second-leading cause of death behind ischemic heart disease (Benjamin et al., 2017).

From 2001 to 2011, the relative rate of strokes fell by 35.1% and the actual number of stroke deaths declined 21.2%. These vast improvements in outcomes are associated with improved cardiovascular risk factor interventions (Mozaffarian et al., 2015).

What is Stroke?

A stroke is when "blood flow to an area of the brain is cut off" (National Stroke Association, 2018). Two main types of strokes have been identified: ischemic and hemorrhagic. A, transient ischemic attack (TIA) is related to an ischemic stroke but with abbreviated symptoms, it is not considered a true stoke.

Types of Stroke: Ischemic Strokes

An ischemic stroke is caused by a narrowing in an artery or a thrombus occluding a blood vessel to, or within, the brain. The obstruction of blood flow deprives brain tissue of oxygen and nutrients, resulting in ischemia. Ischemia will lead to cell death if blood flow is not re-established timely. When cell death occurs, the patient exhibits certain signs and symptoms dependent upon the area of the brain impacted.

Types of Stroke: Hemorrhagic Strokes

A hemorrhagic stroke develops when a vessel in the brain leaks or ruptures. The bleeding can occur inside the brain tissue or within the protective layers covering the brain. Hemorrhagic strokes typically require surgical intervention or palliative care, and coincide with a higher mortality rate.

Types of Stroke: Transient Ischemic Attack

A transient ischemia attack, or TIA, is when blood flow to part of the brain stops for a short period of time, similar to an ischemic stroke. During this time patients may mimic stroke-like symptoms, however, symptoms last less than 24 hours before disappearing.

Acute Ischemic Stroke

Acute ischemic strokes have devastating effects for both the individual and the healthcare system. Total direct medical stroke-related costs are projected to triple by 2030, from $71.6 billion in 2012 to $184.1 billion (Benjamin et al., 2017).

Like an acute myocardial infarction, stroke is considered a medical emergency. When a patient arrives at a hospital exhibiting the signs and symptoms of a stroke, most facilities initiate a “stroke code” or a “stroke team” that activates a team of specially trained healthcare professionals to commence a detailed plan of care.

After four minutes without blood and oxygen, brain cell damage begins. Two million brain cells die every minute during a stroke, increasing the risk of permanent brain damage, disability or death (National Stroke Association,

Causes of Ischemic Stroke

Brain cells die when blood supply is cut off by a clot. In a major stroke, the area of damage, also known as the infarction, is surrounded by a wider ring of cells that linger in a dysfunctional state for several hours and will either die or recover. The magnitude of stroke damage depends on how large the artery is, and the size and location of the brain matter it supplies.

Causes of blood clots in ischemic stroke:

- Hardening of the arteries; atherosclerosis
- Atrial fibrillation
- Valvular problems
- Infection of the heart muscle, endocarditis
- Congenital heart defects; patent foramen ovale
- Blood clotting disorders
- Inflammation of blood vessels; vasculitis
- Heart attack

Risk Factors

According to the American Stroke Association (n.d.), there are 5 major risk factors of stroke. Some risk factors can be changed or modified, while others are associated with genetic make-up, or the environment. Risk factors include:

- 55 years or older
- African-American or Hispanic race
- Female
- Family History
- Prior Stroke

Modifiable vs. Non-Modifiable Risks

Non-Modifiable Risks	Modifiable Risks
Increasing age	High blood pressure
Race	Smoking
Gender	Diabetes
Family history	High cholesterol
Prior history of stroke or transient ischemic attack (TIA)	Heart conditions, such as atrial fibrillation
	Physical inactivity
	Obesity
	Heavy use of alcohol or street drugs
	Certain medications
	Geographic location
	Socioeconomic factors
	Sleep habits

(National Stroke Association, n.d)

Community Stroke Education

Studies have shown that early stroke recognition is associated with decreased morbidity and mortality. Public awareness of stroke symptoms varies throughout the country (Rademacher et al., 2018). In one survey, 93% of respondents identified sudden numbness on one side as a stroke symptom. However, only 38% were aware of all major symptoms and recognized the need to call 9-1-1 (CDC, 2018). In an attempt to increase public education, creative efforts have been undertaken. The Hip Hop Stroke program, designed by Olajide Williams, M.D., M.S., has been shown to dramatically increase stroke recognition, both acutely and long term, among the public. Click here to view the *Hip Hop Stroke* music video:
https://www.youtube.com/watch?v=lTykAih-USY&feature=youtu.be
(American Heart Association, 2018)

Stroke Symptom Identification

Common stroke symptoms include **SUDDEN**:

- Numbness or weakness of the face, arm or leg – especially on one side of the body
- Confusion, trouble speaking or understanding
- Trouble seeing in one or both eyes
- Trouble walking, dizziness, loss of balance or coordination
- Severe headache with no known cause

BE FAST

In 1998, the FAST mnemonic was developed in the UK to help detect and enhance responsiveness to the needs of a person having a stroke. More recently, studies show that 14% of ischemic stroke patients experienced symptoms that were not captured in the FAST mnemonic (Arror, Singh, Goldstein, 2017). While awaiting validation from prospective studies, the proportion of stroke patients not identified with the revised BE FAST mnemonic was reduced to 2.6%.

Balance – Is there a sudden loss of balance or coordination?
Eyes – Is there sudden blurred or double vision or sudden, persistent vision trouble?
Face – Ask the person to smile. Is one or both sides of the face drooping?
Arms – Ask the person to raise both arms. Does one side drift downward? Is there weakness or numbness on one side?
Speech – Does the person have slurred or garbled speech? Can he/she repeat simple phrases?
Time – Call 911 for immediate medical attention if you notice one or more of these signs. Also, take note of when symptoms began.

Test Your Knowledge

True or False

It is essential that stroke recognition, the causative factor of a stroke be determined, and that treatment begins within a 3 hour time frame.

The correct response is: True

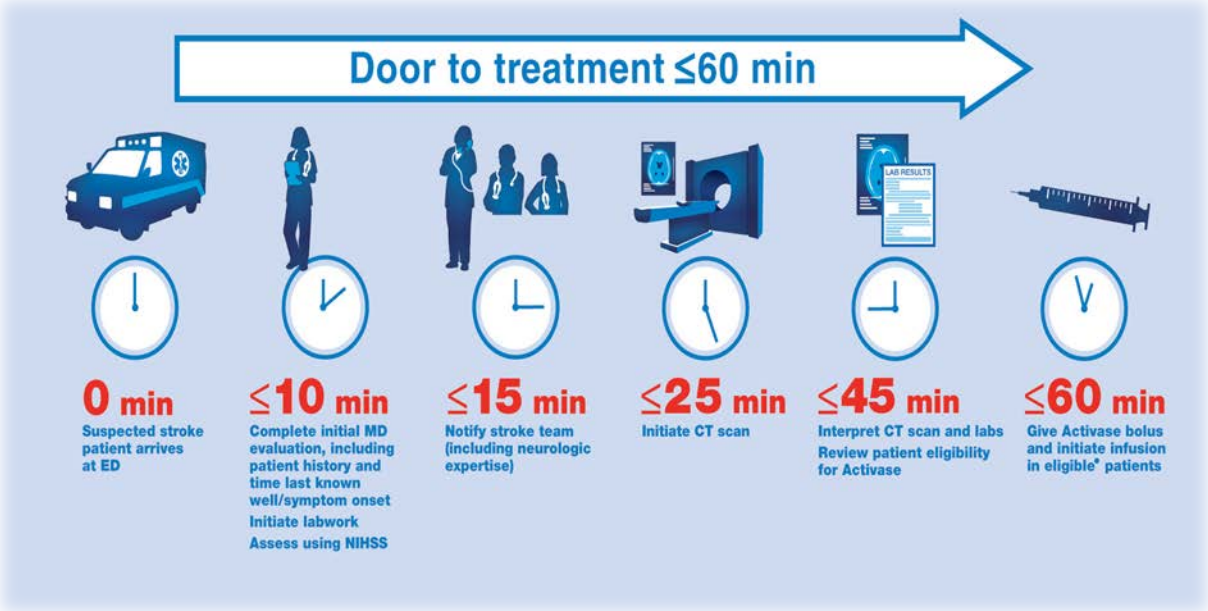
Rationale - Four minutes without blood and oxygen, brain cell damage begins. Two million brain cells die every minute during a stroke, increasing the risk of permanent brain damage, disability or death.

The Golden Hour: Door to Treatment <60 Minutes

The first hour after arriving to the ED and treatment with Activase® is called the Golden Hour, as this is the most critical time for the stroke patient. Since the initiation of the Golden Hour initiative, many organizations have achieved the goal of treating more than 50% of patients with an acute ischemic stroke within 60 minutes. The 2018 Guidelines for the Early Management of Patients with Acute Ischemic Stroke have now included a secondary aim to treat >50% of patients with an acute ischemic stroke within 45 minutes (Powers et al., 2018).

- 0 min: Suspected stroke patient arrives at ED
- <10 min: Complete initial MD evaluation, including patient history and time last known well/symptom onset. Initiate lab work and assess using the National Institute of Health Stroke Scale (NIHSS).
- <15 min: Notify stroke team (including neurologic expertise)
- <25 min: Initiate CT scan
- <45 min: Interpret CT scan and labs, and review patient eligibility for Activase®
- <60 min: Give Activase® bolus and initiate infusion in eligible patients

Linear Timeline



Genentech. *Linear Timeline.* Originally retrieved March 16, 2012, URL validated 6/28/2018, from: http://www.activase.com/iscstroke/golden-hour-acute-ischemic-stroke

History of t-PA/Activase®

On June 18, 1996, the Food and Drug Administration approved the use of recombinant tissue plasminogen activator (t-PA) or Activase® for acute ischemic stroke, after an article published in the New England Journal of Medicine reported that there were improved clinical outcomes following treatment with intravenous Activase® when it was administered within three hours of the onset of ischemic stroke (National Institute of Neurological Disorders and Stroke, 1995).

Prior to Activase®, there was no effective treatment that resulted in more benefit than risk to the patient following an ischemic stroke to dissolve the clot(s) and restore blood flow to the damaged brain tissue.

Activase® acts as a catalyst in the conversion of plasminogen into plasmin. This increased enzymatic activity causes hyperfibrinolysis, which dissolves clots. Tissue plasminogen activator also plays a role in cell migration and tissue remodeling.

Uses of Activase®

According to Genetic (2018), manufacturer of Activase®:

- Intravenous administration within 3 hours of symptom onset is the current FDA-approved thrombolytic therapy for the treatment of patients with acute ischemic stroke.

- Activase® is also approved for treating acute myocardial infarction (AMI), acute pulmonary embolism, and central venous catheter functional restoration (Activase®, 2018).

Indication for Use for Activase®

Activase® is indicated for the management of acute ischemic stroke in adults for improving neurological recovery and reducing the incidence and severity of disability.

Treatment should only be initiated within 3 hours after the onset of stroke symptoms, and after exclusion of intracranial hemorrhage by a cranial computerized tomography (CT) scan or other diagnostic imaging method sensitive for the presence of hemorrhage (Activase®, 2018).

Test Your Knowledge

True or False

Activase® is an antiplatelet medication which will keep future clots from forming.

The correct response is: False

Rationale - Activase® acts as a catalyst in the conversion of plasminogen into plasmin. This increased enzymatic activity causes hyperfibrinolysis, which dissolves clots. Tissue plasminogen activator also plays a role in cell migration and tissue remodeling.

Clinical Presentation in Relation to Stroke Location

Stroke can affect each patient differently, presenting with varying signs and symptoms depending on the location in which the stroke occurs.

If the stroke is located in the left (dominant hemisphere), signs and symptoms may include:

- Left gaze preference
- Right visual field deficit
- Right hemiparesis
- Right hemisensory loss/neglect

If the stroke originates in the right (non-dominant hemisphere), signs and symptoms may include:

- Right gaze preference
- Left visual field deficit
- Left hemiparesis
- Left hemisensory loss/neglect

If the stroke originates in the brainstem, signs and symptoms may include:

- Nausea
- Vomiting
- Diplopia

- Dysconjugate gaze
- Palsy
- Dysarthria and dysphagia
- Vertigo and tinnitus
- Hemiparesis or quadriplegia
- Sensory loss in hemibody or all 4 limbs
- Decreased consciousness
- Hiccups and abnormal respirations

If the Stroke originates in the Cerebellus, signs and symptoms may include:

- Truncal gait ataxia
- Limb ataxia
- Neck stiffness and neck pain
- Hemorrhage
- Focal neurological deficits as in acute ischemic stroke
- Headache especially in subarachnoid hemorrhage
- Light intolerance
- Nausea, vomiting, decreased level of consciousness

Conditions Which Mimic Stroke

There are other conditions that may mimic a stroke in clinical presentation. Common conditions are included in the mnemonic HEMI:

H: Hypoglycemia (and hyperglycemia)
E: Epilepsy
M: Multiple sclerosis (and hemiplegic migraine)
I: Intracranial tumors (or infections, such as meningitis, encephalitis and abscesses)

Patients must be continually reassessed as the patients' clinical presentation may change rapidly (Sibson & Khadjooi, 2018). The 2018 American Stroke Association Guidelines state, "the risk of symptomatic intracranial hemorrhage in the stroke mimic population is quite low; thus, starting IV Activase® is probably recommended in preference over delaying treatment to pursue additional diagnostic studies."

Stroke Assessment Scales

There are several stroke-related assessment scales for measuring level of consciousness, disability, ADL's, mental status, motor function, language, etc. However, the two commonly used stroke-deficit scales include:

- National Institutes of Health Stroke Scale (NIHSS)
- Canadian Neurological Scale

NIHSS

The National Institutes of Health Stroke Scale (NIHSS) is the preferred assessment scale, as recommended by the 2018 American Stroke Association Guidelines. The NIHSS measures several aspects of brain function: consciousness, vision, sensation, movement, speech, and language.

The scale is a serial measure of neurologic deficits on a 42 point scale across 11 categories (see Appendix). The lower the overall score, the better the outcome.

NIHSS Scores

0	**No stroke. Typically normal function without neurologic deficit.**
1 – 4	Minor stroke
5 – 15	Moderate stroke
15 – 20	Moderate/severe stroke
21 – 42	Severe stroke

The NIHSS & Current Guidelines

IV Activase® is recommended for selected patients who may be treated within 3 hours of ischemic stroke symptom onset or patient last known well or at baseline state.

In 2009, the American Stroke Association announced the expansion of the time window for treatment of Activase® from 3 to 4.5 hours. The current 2018 American Stroke Association guidelines state:

> *IV Activase® treatment in the 3- to 4.5-h time window is recommended for those patients ≤80 y of age, without a history of both diabetes mellitus and prior stroke, NIHSS score ≤25, not taking any oral anticoagulation medications, and without imaging evidence of ischemic injury involving more than one third of the middle cerebral artery (MCA) territory. The benefit of IV Activase® between 3 and 4.5 h from symptom onset for patients with very severe stroke symptoms (NIHSS > 25) is uncertain.*

Did You Know?

According to the American Stroke Association, treating patients early with Activase® lengthens the patient's lifespan and reduces disability. A cost-benefit analysis estimates that for every patient treated with Activase®, $25,000 in related treatment costs can be saved (Boudreau, 2014).

Safety Risks of Activase®

The most common complication during Activase® therapy is bleeding. Should serious bleeding in a critical location (intracranial, gastrointestinal, retroperitoneal, or pericardial) occur; Activase® therapy should be discontinued immediately.

Death and permanent disability are not uncommonly reported in patients who have experienced stroke (including intracranial bleeding) and other serious bleeding episodes.

Patients with severe neurological deficit (e.g. NIHSS >22) at presentation, have an increased risk of intracranial hemorrhage.

The risks of Activase® therapy may be increased in patients with major early infarction, and should be carefully weighed against the anticipated benefits. This includes patients with major early infarction confirmed by computerized cranial tomography (CT) scan, showing substantial edema, mass effect, or midline shift.

Treatment of patients with minor neurological deficit or with rapidly improving symptoms is not recommended.

Patients given Activase® for acute ischemic stroke should be monitored during and for several hours after infusion for signs of orolingual angioedema.

(Activase®, 2018)

Test Your Knowledge

True or False

IV Activase® may be administered with a 4.5 hour window of patients last known normal.

The correct response is: True

Rationale – *IV Activase® treatment in the 3- to 4.5-h time window is recommended for those patients ≤80 y of age, without a history of both diabetes mellitus and prior stroke, NIHSS score ≤25, not taking any oral anticoagulation medications, and without imaging evidence of ischemic injury involving more than one third of the middle cerebral artery (MCA) territory. The benefit of IV Activase® between 3 and 4.5 h from symptom onset for patients with very severe stroke symptoms (NIHSS > 25) is uncertain.*

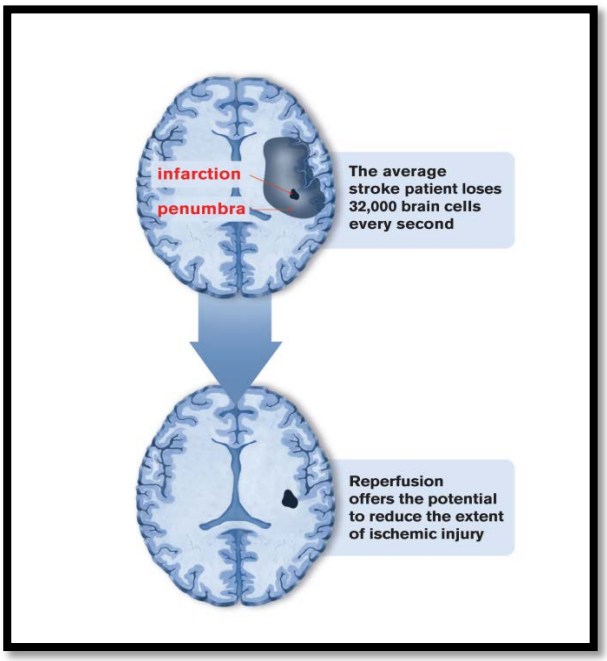
Diagnostic Tests for Suspected Stroke

- Diagnostic tests for suspected stroke may include:
- Non-contrast brain CT or brain magnetic resonance imaging (MRI)
- Blood glucose
- Serum electrolytes/renal function tests
- Electrocardiogram (ECG)
- Cardiac Markers
- Complete CBC
- PT/INR
- aPTT
- Oxygen saturation

(Powers et al., 2018)

Understanding the Importance of Rapid Reperfusion

Rapid reperfusion of the penumbra (the area surrounding the ischemic event) will limit the extent of injury to the brain. Since brain cells are rapidly lost, timing is of the utmost importance in diagnosing and managing strokes.



Genentech. *Penumbra and Reperfusion.*
Retrieved March 16, 2012 from:
http://www.activase.com/content/image-library/activase-img-impenumbra.jpg

Test Your Knowledge

True or False

Rapid reperfusion of the penumbra (the area surrounding the ischemic event) will limit the extent of injury to the brain.

The correct response is: True

Rationale - The average stroke patient loses 32,000 brain cells a second, reperfusions offers the potential to limit the amount of ischemic damage.

Mechanisms of Action of Activase®

Activase® is a "clot-buster" that works by binding to the fibrin in a thrombus (clot), converting plasminogen to plasmin, and initiating local fibrinolysis which results in the lysis of the clot and restoration of cerebral blood flow (Activase®, 2018).

The desired end result of re-establishing blood flow is to rescue the ischemic brain tissues, thereby decreasing morbidity and mortality and improving outcomes.

Mechanisms of Action of Activase®

Activase® produces limited conversion of plasminogen in the absence of fibrin. During circulation, Activase® binds to fibrin in a thrombus and converts the entrapped plasminogen to plasmin. This initiates local fibrinolysis with limited systemic proteolysis. Activase® has a high affinity to the fibrin in a clot, and is less likely to convert circulating plasminogen to plasmin, which reduces the potential for systemic bleeding (Activase®, 2018).

Eligibility for Treatment of Acute Ischemic Stroke with Activase®

In order to be considered for treatment, the patient must have a clinical diagnosis of stroke and:

- Be of age 18 years old or older.
- Have a measureable neurological deficit.

Doses must be given within the first three hours of onset of symptoms. The timeframe for rescuing compromised, but still viable, brain tissue is brief; the sooner Activase® is administered the better.

Exclusion Criteria of Patient Selection

- Evidence of intracranial hemorrhage on pretreatment CT or MRI
- Only minor or rapidly improving stroke symptoms
- Clinical presentation suggestive of subarachnoid hemorrhage, even with normal CT or MRI
- Active internal bleeding
- Known bleeding diathesis, including but not limited to:
    - Platelet count <100,000/mm
    - Patient received heparin within 48 hours and has an elevated aPTT (greater than upper limit of normal for laboratory)
    - Current use of oral anticoagulants (e.g., warfarin sodium) or recent use with an elevated prothrombin time >15 seconds
- Patient has had major surgery or serious trauma (excluding head trauma) in the previous 14 days
- Within 3 months any intracranial surgery, serious head trauma, or previous stroke
- History of gastrointestinal or urinary tract hemorrhage within 21 days
- Recent arterial puncture at a non-compressible site
- Recent lumbar puncture
- On repeated measurements:
    - Systolic blood pressure greater than 185 mm Hg or diastolic blood pressure greater than 105 mm Hg at the time treatment is to begin
    - Patient requires aggressive treatment to reduce blood pressure to within these limits.
- History of intracranial hemorrhage
- Abnormal blood glucose (<50 or >400 mg/dL)
- Post myocardial infarction pericarditis

- Patient was observed to have seizure at the same time the onset of stroke symptoms were observed
- Known arteriovenous malformation, or aneurysm

(Demaerschalk et al., 2015; Activase®, 2018)

Side Effects of Activase® Administration

With an increased risk of developing an intracerebral hemorrhage with the use of Activase®, the best method for reducing the potential of bleeding is the careful selection of eligible patients, followed by detailed observation and thorough monitoring after administration of the therapy.

In patients with a suspected intracerebral hemorrhage, the Activase® infusion should be immediately discontinued.

Internal bleeding in other systems (gastrointestinal, genitourinary, and respiratory) can occur and may require cessation of treatment depending on severity (Activase®, 2018).

Administration Considerations

The considerations discussed below are a summary of common practices for healthcare professionals to follow when administering Activase®. It is imperative for you to check with your hospital policy and procdures manual for specifics to your facility.

- The administration of Activase® is usually in the emergency department.
- Clinicians should be aware that any patient that receives Activase® will be at an increased risk of bleeding after receiving the medication.
- All invasive procedures should be done before Activase® is administered.

Manage the BP Prior to Activase®

The patient's elevated BP must be controlled (SBP ≤185 mmHG and DBP ≤105 mm HG), otherwise Activase® should not be given.

The physician may order an IV Beta Blocker or Nitroglycerin Paste.

Nursing Interventions Prior to Activase® Therapy

Usually facility procedure will indicate that the patient should have two to three large bore (at least an 18 gauge) intravenous catheters and/or a central line. A central line is desirable if the patient has exhibited blood pressure or heart rate problems that may require treatment with IV medications.

If a nasogastric tube will be needed, place the tube before Activase® administration to avoid the potential for bleeding. The emergency room nurse should apply critical thinking and problem solving skills to ensure the patients safety.

Nursing Interventions Prior to Activase® Therapy

The nurse should confirm that the physician has ordered a full work up of blood tests including blood for type and cross-match. Whole blood, packed RBCs, cryoprecipitate, and/or fresh frozen plasma should be available to treat serious bleeding.

The nurse should also insert a urinary catheter. If the catheter is not inserted prior to Activase® administration, it should not be inserted for at least 24 hours, as the risk of hemorrhage is greatest during this time. All invasive procedures should be performed before administering Activase®.

Many facilities require signage at the patient bedside that indicates "*Activase® given*".

Dosage of Activase®

The recommended total adult dose is 0.9 mg/kg infused over 60 minutes.
Maximum doses should not exceed 90 mg.

Recommended administration is to load with 0.09 mg/kg (10% of the 0.9 mg/kg dose) as an I.V. bolus over 1 minute, followed by 0.81 mg/kg (90% of the 0.9 mg/kg dose) as a continuous infusion over 60 minutes.

(Activase®, 2018)

Steps for Administration of Activase®

1. Check Time Frame: The indication for use according to the FDA is that Activase® should only be initiated within 3 hours after the onset of stroke symptoms, and after exclusion of intracranial hemorrhage by a cranial computerized tomography (CT) scan or other diagnostic imaging method sensitive for the presence of hemorrhage.
2. Check Dosage: The FDA-approved dose of Activase® is 0.9 mg/kg (not to exceed 90 mg total dose). 10% of the total dose is administered as an intravenous (IV) bolus dose over 1 minute. The remainder of the dose should be infused over 60 minutes.
3. Follow Manufacturer's Instructions: Follow the manufacturer's instructions when reconstituting the 100 mg vial with 100ml of sterile water for injection. Discard excess medication from the 100 mg/100 ml Activase® vial. Then either remove the bolus from the vial or program pump to deliver the bolus at the infusion initiation.
4. Administer Remaining Dose: Administer bolus over 1 minute. Administer the remaining 90% of dose over 1 hour.
5. Saline Flush: After the completion of medication, a common practice is to spike a 50 ml normal saline bag with the infusion set of the empty Activase® vial. The 50 ml normal saline bag should be infused at the same rate to ensure that the patient received the entire prescribed medication dose.

Patient Care During Administration of Medication

- Infuse 0.9 mg/kg (maximum dose 90 mg) over 60 min, with 10% of the dose given as a bolus over 1 min.
- 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 Activase® is being administered) and obtain emergency head CT scan.
- Measure BP and perform neurological assessments every 15 min during and after IV Activase® infusion for 2 h, then every 30 min for 6 h, then hourly until 24 h after IV Activase® treatment.
- Increase the frequency of BP measurements if SBP is >180 mmHg or if DBP is >105 mmHg; administer antihypertensive medications to maintain appropriate BP.
- Delay placement of nasogastric tubes, indwelling bladder catheters, or intra-arterial pressure catheters if the patient can be safely managed without them.
- Obtain a follow-up CT or MRI scan at 24 h after IV Activase® before starting anticoagulants or antiplatelet agents.

Additional Nursing Interventions During & After Activase®

- Monitor patient for major and minor signs of bleeding
- Continuous cardiac monitoring up to 72 hours or more
- Measure intake & output
- Bed rest, HOB >30 degrees if aspiration risk
- IV Fluids at 75-100ml/hr
- No anticoagulants or antiplatelet medications for 24 hours, then start anticoagulant as ordered
- Brain CT or MRI after Activase® therapy
- NPO until dysphagia screening completed

Alternative Treatment Options for Acute Ischemic Stroke

Two additional options for treating acute ischemic stroke patients are available.

1. In a recent meta-analysis, nine trials were identified where 2,711 patients treated with intra-arterial Activase®. Analysis showed a significant improvement in patient outcomes (Lakhan, Walther, Morganstein, & Nguyen, 2017).
2. Results from a randomized controlled trial show that endovascular treatment (ET) to remove a thrombus in the brain is effective in some patients even when performed within 6 to 24 hours after a stroke (Powers et al., 2018).

Research Update

Research is ongoing, as doctors and scientists try to improve outcomes for stroke survivors. The National Institute of Neurological Disorders and Stroke (NINDS) conducts stroke research and clinical trials at its laboratories and clinics at the National Institutes of Health (NIH).

Currently, NINDS researchers are studying the mechanisms of stroke risk factors and the process of brain damage that results from stroke. Basic research has also focused on the genetics of stroke and stroke risk factors.

Scientists are working to develop new and better ways to help the brain repair itself to restore important functions. New advances in imaging and rehabilitation have shown that the brain can compensate for function lost as a result of stroke.

Case Study One

A 65-year-old woman, Martha, is shopping at Grocery Mart when she starts to feel dizzy. She shouts out for help saying that she is having trouble seeing. EMS is called and they bring her to the nearest hospital while treating her high blood pressure. The hospital activates the stroke team. Upon evaluation from the physician, she finds out that Martha was admitted in the hospital one month ago for head trauma that resulted in the intracranial hemorrhage. The CT of Martha's head is positive for a bleed.

Is Martha eligible for Activase®?

No! The patient did not meet the criteria for Activase® since the patient had a hemorrhagic stroke and not an ischemic stroke. She also had a history of an intracranial hemorrhage one month ago from a head trauma.

Case Study Two

An 85-year-old male, Joshua, arrives in the ER with family members. He has a history of atrial fibrillation and is taking Coumadin. His family states that he is having slurred speech and trouble walking. The stroke team was called. Upon evaluation the stroke team physician found out that the family watched Joshua for a few hours before they brought him into the ER. When asked when symptoms occurred, they had no idea. It was definitely over five hours, but it might have been days ago. The CT of his head showed an ischemic stroke.

Is Joshua eligible for Activase®?

No! The patient does not meet the inclusion criteria as he is older than 80 years of age, taking oral anticoagulation medications and does not have a last known normal time.

Case Study Three

A 55-year-old male, Matthew, was in his executive office when he started having right-sided numbness and weakness. He told his secretary who immediately called EMS. Within twenty minutes, Matthew was in the ER with no movement of his right side. Code stroke was called and within ten minutes, the stroke team physician evaluated him. He had no contraindications for Activase®. Fifteen minutes later he received a CT scan of his head and it was interpreted forty-five minutes later. Head CT was negative for hemorrhagic stroke.

Is Matthew eligible for Activase®?

Yes! Patient has met all the guidelines to receive Activase®. He made it to the emergency room within 3 hours. The patients did not have a hemorrhagic stroke. Matthew was a perfect candidate for Activase®.

Case Study Four

Same patient, Matthew, after being treated with Ativase® was admitted to the Neurosurgical ICU for further treatment. After four hours he states he is feeling fine and asks that he be allowed to sleep uninterrupted though the night.

Can you allow Matthew to sleep uninterrupted?

No! Neurological deterioration may occur up to 24 hours later, monitoring his neuro status and blood pressure is imperative during the first 24 hours. Continuous monitoring of bleeding at IV sites may indicate signs of bleeding internally. Vigilance is essential to decrease the risk of further injury.

Conclusion

Vigorous scientific investigation has demonstrated that intravenous administration of Activase® is an effective interventional therapy for impending ischemic stroke.

The healthcare provider should understand all the implications of stroke. They should know the risk factors and sign and symptoms.

Currently, the only drug used for acute stroke is Activase®. The healthcare provider should understand who is a candidate for Activase® and what tests and procedures are needed before administration of the thrombolytic. They should understand and follow the strict guidelines.

Healthcare providers should also understand how to properly take care of a patient before, during, and after administration of Activase® in the ER, Interventional Radiology, ICU, and medical-surgical floors.

Appendix: The NIHSS

For the full version of the NIH Stroke Scale, please click
https://stroke.nih.gov/documents/NIH_Stroke_Scale.pdf

Resources:

- American Stroke Association: http://www.strokeassociation.org/STROKEORG/#
- Brain Attack Coalition: https://www.brainattackcoalition.org/
- Centers for Disease Control and Prevention: https://www.cdc.gov/stroke/index.htm
- National Institute of Neurological Disorders and Stroke: https://www.ninds.nih.gov/Disorders/All-Disorders/Stroke-Information-Page

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