

Current challenges and strategies in management and prevention of stroke

News

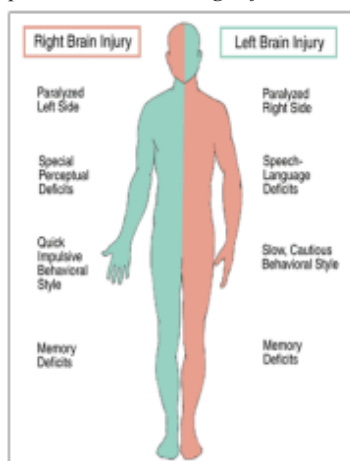
Know stroke! Know the signs! Act in time!

Stroke is Lack of blood flow to the brain caused by a clot or rupture of a blood vessel. Without oxygen, brain cells begin to die and death resulted in permanent disability. It is the public health challenge of the 21st century and also named as Cerebrovascular accident/ disease (CVA), cerebral infarction, cerebral hemorrhage or brain at-tack.

Although stroke is easily preventable, it remains the second leading cause of death and a first leading cause of acquired disability in adults worldwide currently. Over 75% of cases occur after 65years of age and incidence of stroke is rising in many developing countries because of the adoption of less healthy lifestyles. In USA on aver-age, every 53seconds, someone experiences a stroke and every 3.1minutes someone dies of a stroke. In UK it strikes every 3½ minutes, yet many people remain unaware of the most common signs. Studies in Ethiopia reveal that there is an increasing episode and 6.5% of admissions were due to stroke.

Stroke does not discriminate. It affects people of all ages, ethnic groups and backgrounds. The estimated direct and indirect cost of stroke is 73.7billion in 2013. Of all cardiovascular disease clinical entities, none is more strongly linked to hypertension than stroke. Hypertension, previous Transient ischemic attack, smoking, diabetes mellitus, atrial fibrillation, cardiovascular diseases, heart failure, old age, alcohol intake and others were known risk factors for stroke. Recent developments studies indicate that psychological stress, poor thinking skills, longer working hours, alpha-blockers in older increases risk of stroke and other heart disease.

Stroke is the public health challenge of the 21st century!!



Strokes occur in the brain and affect the opposite side of the body. In the left half of the brain Stroke can cause:

Speech and language problems

The stroke survivor may have trouble speaking or understanding others.

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Slow and cautious behavior

The stroke survivor may need a lot of help to complete tasks.

Memory problems

The stroke survivor may not remember what she did ten minutes ago or she may have a hard time learning new things.

Recognize the symptoms of a stroke

3 Simple Questions

- i. Ask the person to smile
- ii. Ask the person to raise both arms
- iii. Ask the person to say a simple sentence "I am in Nekemte"

Management of stroke

General management of patients with stroke

The goal of treating stroke is to reduce the ongoing neurologic injury and decrease mortality and long-term disability. It also targeted to prevent complications secondary to immobility and neurologic dysfunction, and preventing stroke recurrence. Minimizing the volume of brain that is irreversibly damaged and handicap of the patients through rehabilitation were other prioritized areas of the treatment.

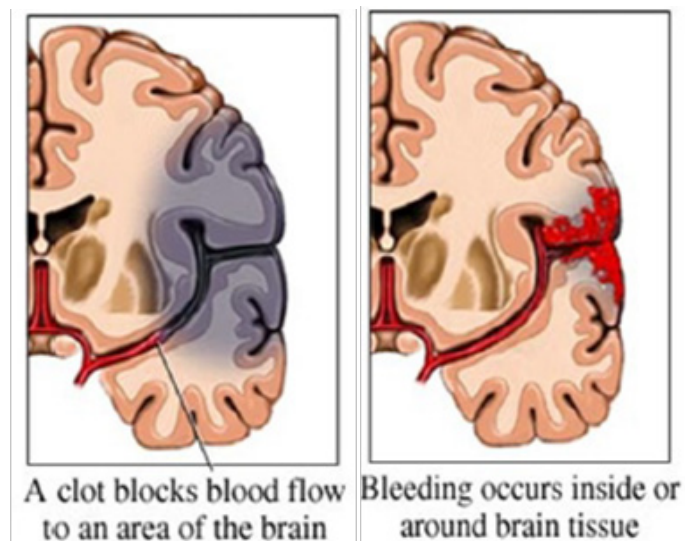
Currently available technologies for diagnosis of stroke

1. Computed Tomography (CT)
2. Magnetic Resonance Imaging (MRI)
3. Cerebral Angiography: identify responsible blood vessel
4. Electrocardiogram (ECG): underlying heart conditions
5. Echocardiogram: blood clot from heart
6. Carotid Duplex: carotid artery stenosis
7. Heart monitors, blood work and many more tests!!

Management of stroke is based on type of stroke

Ischemic stroke

A blood vessel becomes blocked and the blood supply to that part of your brain is blocked. There are two types of ischemic stroke constituting of thrombotic stroke and embolic stroke.



Treatment

Acute treatment the first line drug is t-PA (Alteplase) 0.9mg/kg IV (maximum 90mg) over 1hour in selected patients within 3hours of onset or 0.9mg/kg IV (maximum 90mg) over 1hour between 3 and 4.5hours of on-set. Rapid administration of intravenous recombinant tissue type plasminogen activator (rt-PA) to appropriate patients remains the mainstay of early treatment of acute ischemic stroke. Timely restoration of blood flow in ischemic stroke patients is effective in reducing patients' morbidity. For patients who meet national and international eligibility guide-lines, intravenous rt-PA improves functional outcomes at 3 to 6months when given within 4.5 hours of ischemic stroke on-set and should be administered. The guidelines highlight that, once the decision to administer rtPA is made, treatment should begin as rapidly as possible.^{1,2}

The other drug widely studied for the treatment of acute ischemic stroke is aspirin 160–325mg/day started between 24–48hours after completion of alteplase reduces longterm disability and death. But it should never be given within 24hours of the administration of tPA because it can increase the risk of bleeding in such patients.

Additionally there are different devices as non-pharmacological treatments currently approved by FDA. One of FDA approved device is **Merci Retriever**. It is a catheter-like device is an option for patients ineligible for t-PA treatment. The device is threaded through a catheter up through the body to the clot in the brain. The clot is then removed, restoring the blood flow to the affected area of the brain. The other device is the Penumbra System. It is a new embolectomy device specifically designed to remove the thrombus in acute ischemic stroke secondary to large vessel thromboembolism.

Secondary prevention

For noncardioembolic antiplatelet therapy is the cornerstone of antithrombotic therapy for the secondary prevention of ischemic stroke and should be used in noncardioembolic strokes. Aspirin 50–325 mg daily (is best studied), clopidogrel (75mg daily), and extended release dipyridamole (200mg BID)-ASA (25mg) are considered first-line antiplatelet agents.

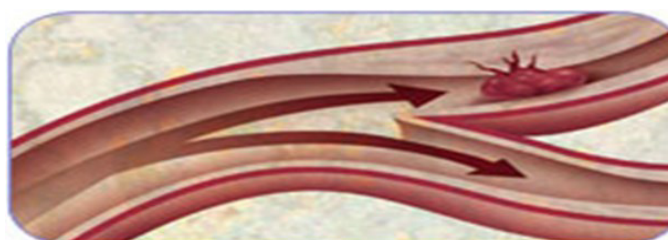
Cilostazol is also a recommended first-line antiplatelet agent, but its use has been limited by a lack of data in other than Asian populations. In patients with atrial fibrillation and a presumed cardiac source of embolism, warfarin is the antithrombotic agent of first choice. In the European Atrial Fibrillation Trial (EAFT), 669 patients were randomized to warfarin (INR=2.5 to 4), aspirin 300mg/day, or placebo. Patients in the placebo group experienced stroke, MI, or vascular death at a rate of 17% per year compared with 8% per year in the warfarin group and 15% per year in the ASA group. This represents a 53% reduction in risk with anticoagulation.

In addition to drugs there are also non pharmacological instruments and surgical procedures for embolic origin of ischemic stroke as secondary prevention. These include **Carotid Endarterectomy** and **Angioplasty/Stents**. American stroke association on 2015 passed new recommendation on the stents and angioplasty. "Angioplasty and stenting of proximal cervical atherosclerotic stenosis or complete occlusion at the time of thrombectomy may be considered, but the usefulness is unknown thus future randomized studies are needed"

In addition to treating ischemic stroke, baseline risk factors and cause like hypertension and dyslipidemia should be treated with appropriate medications.

Current challenges with treatment

Despite its effectiveness in improving neurological outcomes, many patients with ischemic stroke are not treated with recombinant tissue plasminogen activator (rt-PA), because they arrive late or because of delays in assessment/administration of IV t-PA. But in developing countries t-PA and newly approved devices are unaffordable and there is inappropriate treatment due to misdiagnosis due to lack of appropriate diagnostic agents.



Hemorrhagic stroke

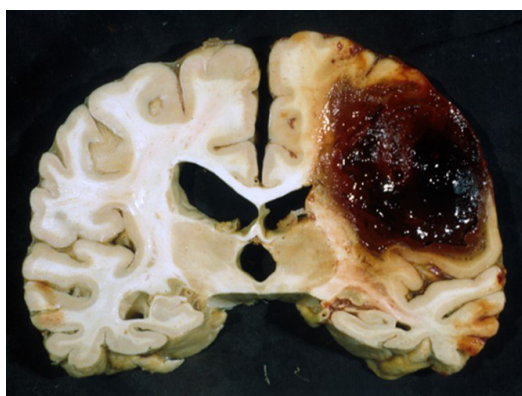
Occurs when a small blood vessel in the brain becomes weak and ruptures. It includes bleeding around brain and bleeding into brain. Based on the manifestations and causes there are 3 types of hemorrhagic stroke. Subarachnoid hemorrhage (SAH), intracerebral hemorrhage (ICH) and subdural hematomas.

Treatment

Treatment for Intracerebral hemorrhage currently there is no

standard pharmacologic strategies available. Management involves a combination of medical and surgical interventions. Use of antipyretic medications to lower body temperature to normothermia in febrile patients with is necessary. Patients may require external ventricular drainage (EVD) if there is intraventricular blood and evolving hydrocephalus (enlargement of the ventricles). When ICH occurs in a patient on warfarin (INR >1.3), rapid reversal of anticoagulation to prevent expansion and allow surgical intervention is recommended with intravenous vitamin K, hemostatic agents and prothrombin complex concentrate (PCC). High doses (10 to 20mg) of intravenous vitamin K can fully reverse warfarin-induced anti-coagulation.

Treatment of subarachnoid hem-orrhage goes to initial supportive treatments like bed rest and analgesic. In addition blood pressure control and oral ni-modipine 60mg every 4hours for 21 days is necessary. If an aneurysm is found by angiography, endovascular coiling or clipping via a craniotomy should be performed to reduce the risk of rebleeding. Vasospasm of the cerebral vasculature is thought to be responsible for the delayed ischemia and occurs between 4 and 21 days after the bleeding.



Hemorrhagic stroke

The essentials of the treatment protocol for Alteplase (t-PA)

- a. stroke team activation
- b. onset of symptoms within 3hours
- c. CT scan to rule out hemorrhage
- d. avoiding anticoagulant or antiplatelet therapy for 24hours, and Monitoring the patient closely for response and hemorrhage

Latest meta-analysis of randomized trial Research of 2015 revealed that “Irrespective of age or stroke severity, and despite an increased risk of fatal intracranial hemorrhage during the first few days after treatment, Alteplase significantly improves the overall odds of a good stroke outcome when delivered within 4.5h of stroke onset, with earlier treatment associated with bigger proportional benefits.”³³

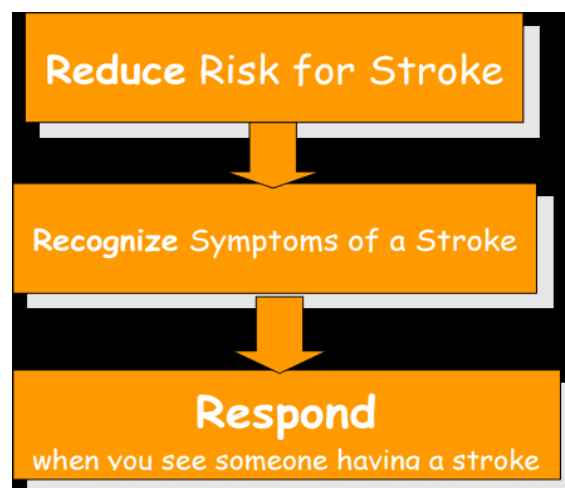
Challenges of stroke managements in developing countries including Ethiopia

Virtually all of the excess morbidity and mortality that occur as a consequence of stroke and other neurological disorders in developing countries result from scarcities of resources.

The first resource deficit is Human Resources. Countries in developing counties like Ethiopia do not have sufficient qualified staff in the clinical neurosciences (neurologists, neurosurgeons, psychiatrists)

The other problem is lack of diagnostic facilities (instrumentation). There are no sophisticated diagnostic agents like CT scan, MRI, cerebral angiography, ECG, carotid duplex and others. The most important diagnostic measures are through interviews and by the usual clinical examination, looking for signs and symptoms of disturbed neurologic functions this could lead to misdiagnosis affecting the treatment approach. However accurate diagnosis and management often re-quires diagnostic means that are usually found in well equipped hospitals and facilities.

In addition most drugs for stroke like tissue plasminogen activator (t-PA) are cost which are unaffordable by most patients and countries in developing countries. Other facilities like System for maintaining medical records, referral facilities are very poor in developing countries like Ethiopia.



Be Stroke Smart: The 3 R's of Stroke

“Together, with the best possible adherence to currently existing recommendations and with novel options that could become available in the future; the golden hour of stroke could be used much more efficiently than it is used today”

Key issues in preventing recurrent stroke

High blood pressure can put a person at risk for having another stroke. So can depression. According to a new study, though, the risk to more than 80 percent for stroke survivors experiencing both hypertension and depression. Taking these precautions to ensure that susceptible people should not be fall into either category. The study found that, in the first four years after a stroke or heart attack, depressed survivors with high blood pressure were 83 percent more likely to have another stroke or heart at-tack, heart failure, or die due to heart disease than were their counterparts who had normal blood pressure and were not depressed. It is such a significant percentage that the study suggests doctors should not only closely monitor stroke survivors' blood pressure but also screen them for depression.

Other study proven strategies in primary prevention of stroke

Different studies revealed that more than 80% of stroke could be prevented. This could be possible by creating awareness to community in life style modification and behavioral change by knowing reality behind the stroke. There are different recommendations and advices to different peoples. Some of could be:

- a. Stopping tobacco use, or reducing the amount smoked, or not start the habit
- b. becoming physically active: reducing body mass index, waist-hip ratio/waist circumference
- c. Drinking the alcohol so in moderation.
- d. Managing stress
- e. Knowing one's own cholesterol number: lowering blood cholesterol and low density lipoprotein cholesterol (LDL-cholesterol)
- f. Eating a healthy diet: Enjoying lower sodium (salt) and lowering fat diet.
- g. Controlling glycemia
- h. Taking antiplatelet therapy when necessary.
- i. If one experiences any stroke symptoms, seeking immediate medical attention are the bench mark of stroke prevention strategies.

Challenges: Why people don't recognize and respond to symptoms

- a. Don't recognize symptoms
- b. Denial
- c. Think nothing can be done
- d. Worry about cost
- e. Think symptoms will go away
- f. Fear or don't trust hospitals

Pay Attention to these symptoms

Transient Ischemic attack should not be ignored

- a. More than 1/3 of people will go on to have an actual stroke
- b. 5% of strokes will occur within 1 month of the TIA or first stroke
- c. 12% will occur within 1year
- d. 20% will occur within 2years
- e. 25% will occur within 3years

Current rehabilitation processes of patients with stroke

The rehabilitation starts by preventing, recognizing, and managing co morbid illness and medical complications. Training for maximum independence and facilitating maximum psychosocial coping and adaptation by patient and family is one of the key issues. In addition

to this prevention of secondary disability by promoting community reintegration, including resumption of home, family, recreational, and vocational activities are necessary. Enhancing quality of life in view of residual disability; and preventing recurrent stroke and other vascular conditions such as myocardial infarction that occur with increased frequency in patients with stroke are also recommended.

Future perspectives of stroke prevention and management strategies especially in Ethiopia

Creating a community education outreach team with public relations, volunteers, and hospital educators is necessary in minimizing current severity of stroke. The issue is government concern and policy in provision of standardized instruments for stroke recognition and priority transport to the closest hospital with appropriate emergency stroke care. Primary prevention, early diagnosis and appropriate management of stroke should be improved by education of the public and healthcare professionals. As in developed countries *F.A.S.T.* (faces, arms, and speech, time) education to entire hospital and proposing a clear and specific action in response to stroke is mandatory.

Perceptions of people affect the treatment because of having myths views which are not real-ly true like:

- a. Stroke is not preventable
- b. Stroke cannot be treated
- c. Stroke only strikes the elderly
- d. Stroke happens in the heart
- e. Stroke recovery ends after 6 months

Management and prevention strategies of stroke: summary

Management of stroke includes primary prevention, active management of the acute stroke phase, secondary prevention and rehabilitation. Hypertension, the single most important risk factor for stroke, should be actively managed; patients should be monitored regularly to ensure optimal control and to promote compliance with therapy. Early detection and management of atrial fibrillation as well as proactive management of modifiable risk factors such as smoking, diet (including salt intake), alcohol intake and exercise has also been shown to greatly re-duce the risk of stroke.

Patients with ongoing symptoms suggestive of acute stroke should be advised to seek immediate hospital admission, in order to increase their chance of thrombolytic therapy if warranted. In addition to thrombolytic therapy, patient outcome in the acute phase is improved by multidisciplinary management in a stroke care unit, use of aspirin (≥ 24 hours after thrombolysis) and early rehabilitation. Stroke patients are at increased risk of further strokes therefore they need to be actively managed with antihypertensive and lipid lowering therapies, and management of life-style factors; regular follow-up ensures optimal control and improves patient compliance Up to 30% of patients who experience a transient Ischemic attack (TIA) are at risk of developing an acute stroke within 30 days; therefore TIA patients require urgent assessment and aggressive management of risk factor. Primary prevention, early diagnosis and appropriate management of stroke can be improved by education of the public and healthcare professionals.⁴⁻³⁵

Taking full responsibility, together we can save life's of millions from stroke!

Acknowledgments

None.

Conflicts of interest

Author declares there are no Conflicts of interest.

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