Preventing and Treating Stroke in Women: Why, When and How?

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Learning Objectives
- Describe the key symptoms of stroke, its presentation and major risk factors in women
- Discuss management and treatment approaches of acute strokes.
- List major strategies for stroke prevention in women.
**What Is A “STROKE”?**

- Permanent BRAIN damage. *(NOT HEART!!)*
- Caused by blood vessel blockage or rupture.
- **Result = Loss of brain function.**

**Major Types of Stroke**

- **Ischemic Stroke**
  - Brain damage caused by lack of blood flow to an area of brain.
  - Blood vessel blockage from clot.
  - Most common type of stroke
- **Hemorrhagic Stroke**
  - Brain damage caused by blood rushing out of broken blood vessel.
  - Blood crushes and destroys the brain.
US Stroke General Statistics

- **Incidence**
  - ~ 800,000 strokes yearly
  - One stroke every 40 seconds
  - Leading cause of disability in adults

- **Prevalence**
  - ~ 7 million Americans ≥20 years of age have had a stroke.
  - Silent cerebral infarction 6% - 28%.
  - 2030 Projections: additional 4 million strokes (21.9% increase v. 2013)

- **Mortality**
  - 30,000 Stroke-related death yearly (1 of 19 deaths in 2009)
  - One stroke-related death every 4 minutes
  - 1999-2009: 36.5% decrease in annual stroke death rate stroke
  - 3 -> 4th -> 5th leading cause of death

- **Costs**
  - ~ $40 billion direct & indirect medical costs.
  - $140,048 Mean lifetime cost of ischemic stroke in US.


Strategies For Treating Stroke (6 Rs)

- **Recognize symptoms**
- **Remedy damage**
- **Relieve complications**
- **Recover from deficits**
- **Restore function**
- **Relentlessly Prevent**

**Recognize A Stroke**
When You Feel it or ... When You See it !!!
Major Stroke Symptoms

- Sudden **weakness** or **numbness**
- Sudden **Speech** difficulties
- Sudden loss of **vision**
- Sudden loss of **balance**
- Sudden and severe **headache**

SPOT A STROKE **FAST**

ACT on Stroke

- Call 911
- Go to Emergency Room
- Choose a hospital
- Stroke Certified Hospitals
  - Non-Stroke Hospitals
  - Stroke-Ready Hospitals (SRH)
  - Primary Stroke Centers (PSC)
  - Thrombectomy- Capable Stroke Center (TSC)
  - Comprehensive Stroke Centers (CSC)
- Stroke Systems of Care
  - Pre-Hospital Emergency System Protocols
  - State Legislation for Stroke Care

- [https://www.betterhelp.com/stroke](https://www.betterhelp.com/stroke)
Learn About Stroke

Hemorrhagic Stroke
(Caused by brain vessel rupture and Bleeding)
Hypertension is consistently high blood pressure of at least 140 (systolic) over 90 (diastolic).

Arteriovenous Malformations

Subarachnoid space

Middle cerebral artery

Saccular aneurysm
Aneurysm Coiling

Ischemic Stroke
(Caused by Brain vessel blockage of Lack of Blood Flow)
Representative figures showing diffusion-weighted imaging (DWI)-fluid-attenuated inversion recovery (FLAIR) mismatch and perfusion-weighted imaging (PWI)-DWI mismatch.


Ischemic Cascade

Brott T et al, NEJM 2000;343:715-721
Japanese Tsunami 2011

Hurricane Katrina 2005

Time Is Brain
Brain Substance Loss With Each Minute of Ischemia

A typical untreated acute ischemic stroke loses with each minute

- 1.9 million neurons
- 14 billion synapses
- 12 Km/7.5 miles of myelinated fibers

Saver J. Stroke 2006; 37: 263-269

Strategies For Acute Stroke Treatment

- Open blocked blood vessel (in Less than 24 hours)
  - Medication through vein (in Less than 4.5 hours)
  - Use device to take clot out (in Less than 24 hours)

- Protect damaged brain from further damage (Research)
- Cool the brain
  - Give medication through vein to stop chemical reactions.
Benefits/Risks of IV tPA For Stroke <3 hrs

For every 100 patients treated

**Benefits**
- 13 patients cured or almost from neurologic deficits
- 19 patients with improved neurologic deficits

**Risks**
- 6 have neurologic deterioration from ICH
- 3 patients worsen
- 1 patient severely disabled or dead

Acute L-MCA Occlusion (CTA-COW)
Mechanical Thrombectomy

Acute Thrombectomy 0-6 Hrs
Major Outcomes

For every Four patients treated with thrombectomy, One patient is functionally independent at 3 months.
Neurologic Deficits (NIHSS) are cut in half within 24 hours

Acute Treatments and Time
- 0 - 4.5 Hours  IV tPA
- 0 - 24 Hours  Thrombectomy
Decompressive Craniectomy: CT

Neurologic Deficits After Stroke

Strategies For Stroke Recovery

- Utilize undamaged brain
  - Use strategies to compensate for deficits
  - Use tools to compensate for deficits
- Enhance function of undamaged brain
  - Special therapies
  - Special technologies
  - Brain Computer Interface
- Rebuild neural networks
  - Brain Electric/Magnetic Stimulation
  - Chemical substances
  - Stem cells
Preventing Stroke

Before it Happens

Stroke Risk Factors

Modifiable

<table>
<thead>
<tr>
<th>Medical Conditions</th>
<th>Behaviors</th>
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<tbody>
<tr>
<td>- Hypertension</td>
<td>- Cigarette smoking</td>
</tr>
<tr>
<td>- Cardiac disease</td>
<td>- Heavy alcohol use</td>
</tr>
<tr>
<td>- Atrial fibrillation</td>
<td>- Physical inactivity</td>
</tr>
<tr>
<td>- Hyperlipidemia</td>
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<tr>
<td>- Diabetes mellitus</td>
<td></td>
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<tr>
<td>- Carotid stenosis</td>
<td></td>
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<tr>
<td>- Prior TIA or stroke</td>
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</tbody>
</table>

Non-Modifiable

- Age,
- Gender,
- Race,
- Heredity

Hypertension

<table>
<thead>
<tr>
<th>HTN Category</th>
<th>SBP mm Hg</th>
<th>DBP mm Hg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;120</td>
<td>&lt;85</td>
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</tbody>
</table>
Mediterranean Diet

Alcohol
Major Treatments for Preventing Stroke

Heart is cause of stroke
- Warfarin (Coumadin®)
- Dabigatran (Pradaxa®)
- Apixaban (Eliquis®)
- Rivaroxaban (Xarelto®)
- Edoxaban (Savaysa®)

Heart is not cause of stroke
- Aspirin
- Aspirin + extended-release dipyridamole (Aggrenox®)
- Clopidogrel (Plavix®)

Carotid artery cause of stroke
- Medications
- Carotid endarterectomy or stenting
Stroke Epidemiology in Women

- Stroke affects more women than men (women live longer and stroke risk increases with age).
- Women have more pre-stroke disability than men.
- Women are more likely to be living alone, in assisted living or nursing home before their stroke.
- Women suffer greater stroke-related disability and a poorer quality of life than men.
- Women with stroke are older (5 years average) than men.
- Among those aged 85 years and older there are almost three times more black women than men with stroke, and double in whites.


Stroke Epidemiology in Women

- Women who have a stroke are more likely to have hypertension, dementia and atrial fibrillation.
- Hypertension becomes increasingly prevalent and is higher in postmenopausal women than men after the age of 55 years.
- Women are less likely than men to have myocardial infarction and diabetes.
- Stroke Subtypes:
  - Increase risk of subarachnoid hemorrhage in women.
  - Increased risk of cardioembolic ischemic stroke in older women (atrial fibrillation).

Stroke Risks Specific to Women: Pregnancy & Delivery 1

- Overall the risk of stroke during pregnancy is low: 34.2 per 100,000 deliveries compared with 11 per 100,000 non-pregnant women of childbearing age.
- The risk for all stroke subtypes increases with pregnancy, but the relative risk for intracerebral hemorrhage is higher than for cerebral infarction.
- The highest stroke risk is in the peripartum (-2 to +2 days).
- Excess stroke risk persists into the puerperium (ie, 2 days to 6 weeks postpartum).
- 50% of women with gestational diabetes will develop type 2 diabetes mellitus, a major risk factor for stroke, within 5 to 10 years of their pregnancy.

Stroke Risks Specific to Women: Pregnancy & Delivery - 2

- Certain pregnancy complications further increase stroke risk, including pre-eclampsia, eclampsia, postpartum obstetric hemorrhage, and postpartum infection.
- Early-onset preeclampsia (before 32 weeks' gestation) in particular has been noted to increase risk for stroke 5-fold compared with later-onset preeclampsia.
- Postpartum preeclampsia is associated with a high risk for stroke and may be the underlying cause of severe postpartum headaches.
- Women with high BP during pregnancy who have given birth, continue to be at risk for preeclampsia and stroke.
Stroke Risks Specific to Women: Pregnancy & Delivery - 3

- The incidence of Cerebral Venous Thrombosis (CVT) during pregnancy and the puerperium is 1 in 2,500 deliveries to 1 in 10,000 deliveries.
- The greatest risk periods for CVT include the third trimester and the first 4 postpartum weeks.
- Up to 73% of CVTs in women occur during the puerperium.
- Cesarean delivery appears to be associated with a higher risk of CVT.

Stroke Risks Specific to Women: Exogenous Female Hormones

- Oral contraceptives use increases stroke risk three times, although in absolute terms it is a small risk (one stroke per 24,000 women per year).
- Stroke incidence rises steeply from 3.4 per 100,000 at ages 15 to 19 years to 64.4 per 100,000 in women aged 45 to 49 years.
- Certain subgroups of women, those who are older, smoke cigarettes, or have hypertension, diabetes mellitus, obesity, hypercholesterolemia, or mutations, may be at higher risk for stroke.
- Hormonal therapy in post-menopausal women does not reduce stroke risk and may increase the risk of stroke.

Stroke Strategic Planning

Am I At Risk For Stroke?

- Did I have a stroke or TIA?
- Am I older than 65?
- Do I have hypertension, diabetes, heart disease, high cholesterol, or atrial fibrillation?
- Do these diseases run in my family?
- Do I smoke?
- Do I exercise? Is my diet healthy?
- Is my pulse regular?
- Do I crack my neck or the chiropractor cracks my neck?
Stroke Strategic Planning
I Know I am At Risk For Stroke
What Should I do?

- Learn about the type of stroke you had and your risk factors
- Manage your risk factors: Diet, exercise, weight, blood pressure, diabetes, cholesterol, …..
- Take your medications.
- Know the signs and symptoms of stroke.
- Know the certified stroke hospitals in your area.
- Know if you have a Stroke System of care legislation in your state.
- Call 911 or instruct others to do it!!!