Stroke and TIA
Assessment and Management

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Critical Care Neurologist
Outline

- Stroke definition and statistics
- TIA definition and statistics
- Stroke and TIA risk factors
- Pathophysiology (causes)
- Cases
Types of stroke

Ischemic stroke (Blockage)
Caused by blockage of a blood vessel in the brain
83%

Hemorrhagic stroke (Bleeding)
Caused by burst or a leaking blood vessel in the brain
17%
Stroke Statistics in USA
Public Health Impact of Stroke

- Estimated 700,000 strokes occur each year.
- Every 45 seconds, someone in the U.S. has a stroke.
- Stroke is 4\textsuperscript{th} leading cause of death
- > 140,000 death/year, 1 in every 17 deaths (5.8\%)
1 in every 17 deaths (5.8%)
Public Health Impact of Stroke

• **Stroke is single leading cause of long-term care disability**

• 5 million Americans currently living with effects of stroke

• AHA stroke calculated costs ~ $58 billion in 2006

• The cost of stroke will double by 2030
Projected number of strokes in US: 2002 - 2025
Stroke Statistics in North Dakota
• Between Jan/2009 to Sep 2012
• # of Patient diagnosed with ischemic stroke 2,279
• Only 154 patient presented within 2 hours (6.7%)
• Only 63 received IV tPA (2.7%)

* North Dakota State Stroke Registry
North Dakota State Stroke registry

- <18: 0.1
- 18-45: 3.8
- 46-65: 26.1
- 66-85: 49.3
- >85: 19.1
- Unknown: 1.6
• Stroke is the 5th leading cause in ND
  – 3rd from CDC
• In 2013 > 6% of patient received IV tPA
TIA

• **Old Definition:** TIA was originally defined as a sudden onset of a focal neurologic symptom and/or sign lasting less than 24 hours and caused by reversible cerebral ischemia.

• **Definition:** Transient ischemic attack (TIA) is now defined as a transient episode of neurologic dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction.
TIA statistics

• 52 - 83 per 100,000

• Estimated 240,000 TIA every year

• Carries a risk of stroke up to 8% (14% of small infarct was found)
Stroke and TIA risk Factors
Risk Factors: Things you CAN’T control

- Age (being over age 55)
- Genetics (family history of stroke)
- Race
- Gender
Risk Factors: 
Things you CAN control

– **Blood pressure**: Know your numbers. If your blood pressure is high, work with your doctor to lower it
Risk Factors: Things you CAN control

- **Smoking and tobacco use**: If you smoke or use tobacco, stop.
- Smoking doubles your risk for stoke.

- After your last cigarette:
  - In 20 minutes, heart rate drops
  - In 12 hours, carbon monoxide levels return to normal
  - In 2 weeks to 3 months, heart attack risk drops
  - In 2 weeks to 3 months, lung function improves
  - In 1 year, heart disease risk is reduced
  - In 5 years, stroke risk is reduced
  - In 10 years, cancer risk is reduced
  - In 15 years, heart disease risk is similar to a nonsmoker’s.
  - **For help with quitting, call the ND Tobacco Quitline at 1.800.QUIT.NOW**

Source: ND Dept of Health
Risk Factors: Things you CAN control

- **Alcohol**: If you drink alcohol, do so in moderation
- Heavy drinking can increase your risk for stroke
- Drinking one glass of wine, beer or mixed drink each day may lower your risk for stroke
- Remember: alcohol is a drug. It can interact with other drugs you are taking
Risk Factors:
Things you CAN control

• **Cholesterol**: Know your numbers. If it is high, work with your doctor to control it.
  • Total cholesterol should be below 200
  • HDL “good cholesterol” should be around 50
  • LDL “bad cholesterol” should be less than 100

Ways to improve your numbers:
• Eating a balanced diet
• Regular exercise
• Cholesterol-lowering medications
Risk Factors: Things you CAN control

• **Diabetes**: If you are diabetic, follow your doctor’s advice to get your blood sugar level under control.

• Eat healthy meals, exercise, and take the medicine that your doctor prescribes
Risk Factors:
Things you CAN control

- **Exercise**: Include exercise in your daily routine.
  - Even a little bit of exercise can improve your health and may reduce your risk of stroke.
    - Walk
    - Bicycle
    - Swim
Risk Factors: Things you CAN control

- **Lower sodium, lower fat diet**
- Cutting down on salt and fat may lower blood pressure and cholesterol and lower your risk for stroke
Pathophysiology of TIA and Ischemic stroke
4: Hypoperfusion
5: Cryptogenic
Initial Evaluation of TIA

• Need urgent evaluation
  – High risk of stroke
  – Early treatment prevent strokes
TIA differential diagnosis

- Transient Neurological deficit
  - Seizure
  - Migraine
  - Syncope
  - Peripheral nerve disease (less frequent)
Hospitalization vs ambulatory evaluation

- Not clear
- Urgent assessment is needed regardless
- Advantage of hospitalization
  - Expedite TIA evaluation
  - Expedite early secondary prevention
  - Facilitate early use of IV tPA if symptoms recur
### ABCD score

<table>
<thead>
<tr>
<th>ABCD² risk factor</th>
<th>Value</th>
<th>Score</th>
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<tbody>
<tr>
<td>Age</td>
<td>[\geq 60\text{ years}]</td>
<td>1</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Systolic ([&gt;140\text{ mmHg}]) or diastolic ([&gt;90\text{ mmHg}])</td>
<td>1</td>
</tr>
<tr>
<td>Clinical symptoms</td>
<td>Unilateral weakness</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Speech disturbance without weakness</td>
<td></td>
</tr>
<tr>
<td>Duration of symptoms</td>
<td>[&gt;60\text{ minutes}]</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>10–59 minutes</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Oral medication or insulin</td>
<td>1</td>
</tr>
</tbody>
</table>
## ABCD score

<table>
<thead>
<tr>
<th>Risk Group</th>
<th>Guide to ABCD2 Total Score (Score)</th>
<th>Stroke risk after TIA at:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>2-day</td>
</tr>
<tr>
<td>Low</td>
<td>0 - 3</td>
<td>1%</td>
</tr>
<tr>
<td>Moderate</td>
<td>4 - 5</td>
<td>4.1%</td>
</tr>
<tr>
<td>HIGH</td>
<td>6 - 7</td>
<td>8.1%</td>
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</table>
Recommendations (National Stroke Association)

- The National Stroke Association recommends that hospitalization be considered for patients with a first TIA within the past 24 to 48 hours, and is generally recommended for patients with the following conditions:
  - Crescendo TIAs
  - Duration of symptoms >1 hour
  - Symptomatic internal carotid artery stenosis >50 percent
  - Known cardiac source of embolus such as atrial fibrillation
  - Known hypercoagulable state
  - High risk of early stroke after TIA (ABCD2 score)
Recommendations (Continued)

• Patients who need urgent evaluation and are not hospitalized should have rapid access to the following studies:
  – Brain imaging with head CT and/or MRI
  – Neurovascular studies such as CT angiography (CTA), MR angiography (MRA), and/or ultrasound
  – Electrocardiogram (ECG)
Recommendations (Continued)

• All patients with a TIA within the past two weeks who are not hospitalized should undergo investigations within 24 to 48 hours to determine the mechanism of ischemia and subsequent preventive therapy.

• Patients who are not admitted should be informed that they need to go to an Emergency Department immediately if symptoms recur.
Signs and symptoms
Warning Signs of Stroke

Loss of speech or comprehension

Numbness on one side
Call 9-1-1 right away!
## Time is brain

<table>
<thead>
<tr>
<th>Time</th>
<th>Neurons lost</th>
<th>Myelinated fibers lost</th>
<th>Accelerated aging</th>
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</thead>
<tbody>
<tr>
<td>Per second</td>
<td>32,000</td>
<td>218 yards</td>
<td>8.7 hours</td>
</tr>
<tr>
<td>Per minutes</td>
<td>1.9 million</td>
<td>7.5 miles</td>
<td>3.1 weeks</td>
</tr>
<tr>
<td>Per hour</td>
<td>120 million</td>
<td>447 miles</td>
<td>3.6 years</td>
</tr>
<tr>
<td>Per stroke</td>
<td>1.2 billion</td>
<td>4470 miles</td>
<td>36 years</td>
</tr>
</tbody>
</table>

Saver JL, Stroke. 2006: 37 (1: 263-266)
CASES
Cases

- 77 y/o with recurrent vertigo
Cases

- 70 y/o female with multiple TIA’s (left sided numbness)
Cases

- 82 y/o male with episode of blindness
Cases

- 70 y/o with TIA and HA
Endovascular therapy for acute ischemic stroke
Ziad Darkhabani, MD

53 year-female presented to Essentia Health-Fargo emergency room with severe acute ischemic stroke, severe aphasia and right sided hemiplegia, NIHSS 2

Received IV tPA (clot busting treatment) and endovascular therapy (using catheter techniques)

2 (severely disabled with inability to speak or move her right arm and leg)

Patient was completely back to normal with very mild right arm weakness when she was discharged from the hospital with NIHSS of 1.
IV Thrombolytics (clot busting medications)

- FDA approved in 1995
- Standard of care for ischemic stroke for patients presenting within 3 hours of acute ischemic stroke
- Can be used up to 4.5 hours in certain patients.
- Within 90 minutes, Odd ratio for improvement
  \[ \text{OR} = 4.43 \] (patient is 4 times more likely to improve)
IV Thrombolytics (clot busting medications)

From 1995–2005, the stroke death rate fell ~30 percent and the actual number of stroke deaths declined ~14 percent.
Thank you