

Stroke: TIA and Stroke, Diagnosis and Treatment

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Dr. Baldor has been teaching for more than 20 years and practices family medicine at the University of Massachusetts Medical School Clinic. A member of the Massachusetts Governor's Commission on Developmental Disabilities, he has been recognized in The Best Doctors in America: Northeast Region and is past-president of the Massachusetts Academy of Family Physicians. Dr. Baldor specializes in developmental and intellectual disabilities and is focused on the increasing incidence of autism diagnosis and the benefits of early recognition and intervention. He has spoken on a variety of primary care topics at past Assemblies/FMX meetings.



Learning Objectives

1. Diagnose and evaluate patients presenting with possible signs of TIA or stroke.
2. Counsel patients on the warning signs of a stroke.
3. Use current evidence-based guidelines in selecting appropriate imaging study for diagnosing acute ischemic stroke.
4. Develop evidence-based treatment plans that focus on risk factor modification and medical therapy, emphasizing shared decision making and motivational interviewing.



Audience Engagement System

The image shows three sequential screenshots of a mobile application interface for an audience engagement system. Step 1 shows a home screen with navigation icons and a 'CME Activity' section. Step 2 shows a list of CME activities with details like '7am', 'Acute Ischemic & Ischemic Stroke', and 'CME01 Acute Coronary Syndromes'. Step 3 shows a detailed view of the 'CME01 Acute Coronary Syndromes: Unchain My Heart' activity, including a description and a 'View Report' button. Red arrows indicate the flow from Step 1 to Step 2, and from Step 2 to Step 3.



Epidemiology

- Affects 800,000 annually in US
 - 125,000 deaths
- 2nd leading cause of death worldwide
- Leading cause disability, cognitive impairment, death

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Risk Factors

- | Modifiable | Others |
|--|--|
| <ul style="list-style-type: none">• Hypertension• Diabetes• CAD/PAD• Obesity• Tobacco Use• Hyperlipidemia• Physical inactivity | <ul style="list-style-type: none">• Age• Sex (M>F)• Race• Prior stroke / TIA• Sickle Cell |

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Sickle Cell

- 10% Stroke incidence
- Screen annually with transcranial Doppler ultrasound flow velocities from age 2 to 18
- Treat prophylactically with chronic transfusions
- Hydroxurea appears to be as effective

TWITCH trial Dec 2015

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Medications....

- Combination BCPs..
 - Risk of stroke doubles (but still very low)
 - Progestin-only – no increased risk
- NSIADs
 - Increased risk with prolonged, high dose...
 - Use low dose for short periods of time...

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Long Hours ????!?!?!

- Meta-analysis with significant association between work hours and stroke
- Working ≥ 55 hours/week associated with 33% \uparrow stroke risk vs ≤ 40 hours



"Our findings suggest that more attention should be paid to the management of vascular risk factors in individuals who work long hours."

Lancet August, 2015; Creative Commons License

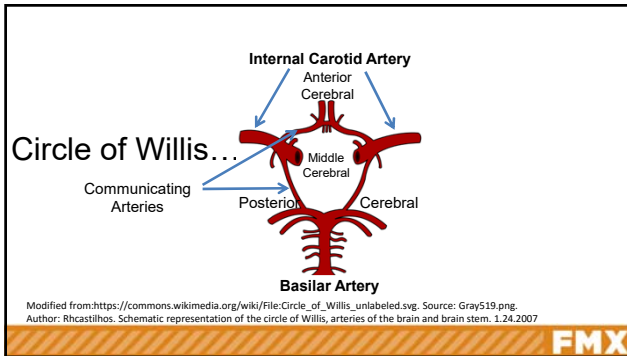
Depression



- The Health & Retirement Study (1998-2010)
 - 16,000 men & women
 - 1,200 strokes occurred
- High depressive symptoms 2X stroke risk

J AHA, May 2015 ; Creative Commons License

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AES Question

Which artery is most commonly involved with stroke?

1. Anterior cerebral artery (ACA)
2. Middle cerebral artery (MCA)
3. Posterior cerebral artery (PCA)
4. Basilar artery

Etiology

- Ischemic (85%)
 - MCA occlusion → 90% of infarcts
- Hemorrhage
 - Intracerebral (10%)
 - Subarachnoid (5%)

MCA effects...

- Lower face, arm, hand
 - Hemiplegia
 - Sensory loss
- Minimal lower extremity involvement

Public Domain Henry Gray (1918) Anatomy of the Human Body: <https://upload.wikimedia.org/wikipedia/commons/f/ff/Gray677.png>

Laterality Determines Speech

L sided (dominant) stroke: Aphasia

Wernicke's Area
Receptive Aphasia
(understanding language)

Broca's Area
Expressive Aphasia
(making language)

R sided stroke: Apraxia and Neglect

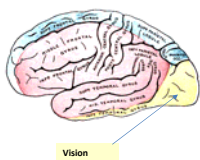
ACA Effects.....

- Less common stroke
 - Leg weakness/sensory loss
 - Behavioral abnormalities
 - Incontinence

Modified from: Public Domain Henry Gray (1918) Anatomy of the Human Body: <https://upload.wikimedia.org/wikipedia/commons/f/ff/Gray677.png>

PCA effects...

- Visual deficits
 - Homonymous hemianopia
 - Alexia
 - inability to understand written language



Public Domain Henry Gray (1918) Anatomy of the Human Body: <https://upload.wikimedia.org/wikipedia/commons/1/1c/Gray677.png>

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Warning Signs

- F**ace Drooping
- A**rm weakness
- S**peech difficulty
- T**ime to call 911

Am Stroke Assn

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Ischemic Etiology

- Large Artery
 - Carotid atherosclerosis/Dissection/Vasculitis
- Small Artery
 - Lacunar infarct
- Cardiac embolism
 - Valve disease/Afib/Cardiomyopathy/Myxoma/
Patent *foramen ovale*

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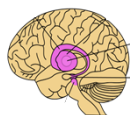
Intracranial Hemorrhage

- Aneurysm or AVM rupture (47%)
- Hypertensive 36%
- Tumor/Other (17%)
 - A sense of unease, then....
 - ...abrupt onset of symptoms, acute decompensation

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Hypertensive ICH

Small artery rupture deep in brain



Basal Ganglion Bleed
Stupor, coma



Pontine Hemorrhage
Coma, Decerebrate
posturing or flaccidity



Cerebellar Hemorrhage
Ataxia, Vomiting

Modified from : Public Domain: [wikimedia.org/wiki/File:Basal_Ganglia_lateral.svg/473px-Basal_Ganglia_lateral.svg.png](https://commons.wikimedia.org/wiki/File:Basal_Ganglia_lateral.svg/473px-Basal_Ganglia_lateral.svg.png)

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Subarachnoid Hemorrhage

- “Worst headache of my life”
- 40% ‘Sentinel’ HA 2-8 weeks prior
 - Photophobia
 - Nuchal rigidity
 - Seizures
 - Nausea and vomiting

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Headache 'Red Flags'...

- Worse headache of my life...
 - Sudden onset
- 1st HA after age 50
- Focal neurologic signs
- S&S of systemic illness
 - fever, immunocompromise
- Trauma



Creative Commons: <https://openclipart.org/detail/133015/al-with-red-flag>

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Ischemic vs Hemorrhagic

Hemorrhagic More Likely to have:

- Headache/Nuchal rigidity
- Vomiting
- Coma
- Diastolic BP > 110 mm Hg

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TIA...



10x more likely to have a stroke after a TIA

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Transient Ischemic Attack

- Temporary blockage of cerebral blood flow
 - Thrombosis or Embolism
- A brief episode of neurologic dysfunction
 - Symptoms typically lasting < 1 hour

AHA/ASA Stroke 2009

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ABCD2 TIA Scoring System

(Age, BP, Clinical features, Duration, DM)

Sign/Symptom	Points
Age ≥ 60 years	1
SBP ≥ 140 mm Hg or DBP ≥ 90 mm Hg	1
Unilateral weakness	2
Speech impairment without weakness	1
TIA Duration ≥ 60 minutes	2
TIA Duration 10 - 59 minutes	1
Diabetes mellitus	1
Consider Admission Total Points	≥ 3

Lancet. 2007

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TIA Evaluation ...

- MRI performed within 24 hours
 - R/O infarct
- Carotid Ultrasound
 - If > 60 years of age

AHA/ASA Stroke 2009; Int J C Pract April 2015

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TIA Treatment

- Anti-coagulate if afib
- Antiplatelet if not
- Carotid endarterectomy for critical stenosis
- Treat HTN
- Statin therapy

NEJM April 2016

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Stroke Management

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Acute Treatment Decisions....

Ischemic Stroke

- tissue plasminogen activator (*t-PA, alteplase*)
- Anticoagulants (*warfarin, aspirin*)
- Angioplasty/Stents

Hemorrhagic Stroke

- Neurosurgical Intervention
- Endovascular Procedures

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FIRST 10 MINUTES

Asses ABC's, Vitals, Wgt → O₂ if hypoxic
Start IV, Draw CBC, Lytes, glucose
Neuro exam, EKG, Activate Stroke team, **Emergent CT scan**

- Non- contrast CT Scan Gold Standard
 - Superior for showing hemorrhage
- Contrast CT identifies aneurysms, AVMs, tumors
 - Not required to determine if a tPA candidate

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NIHSS Interpretation

Stroke Scale	Stroke Severity	Outcomes
0	No Stroke	80% good to excellent outcome
1-4	Minor Stroke	
5-15	Moderate Stroke	
15-20	Moderate/Severe Stroke	80% poor to severe outcome
21-42	Severe Stroke	

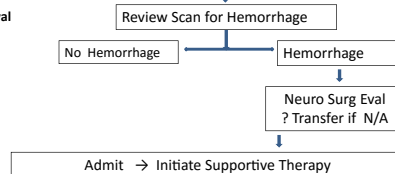
Neurology 1999

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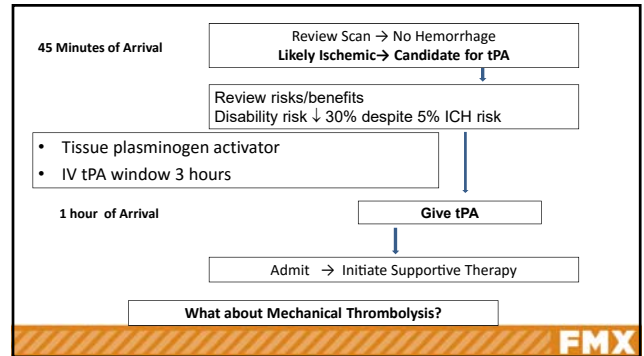
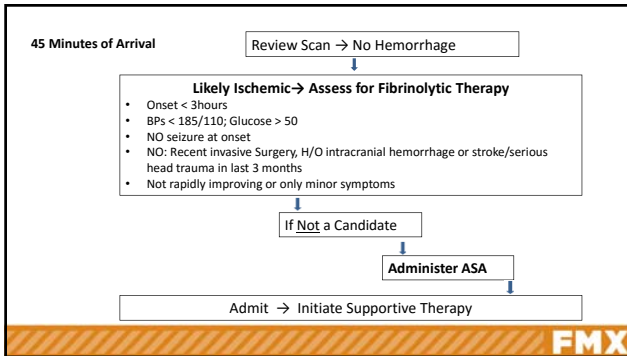
FIRST 10 MINUTES

Asses ABC's, Vitals, Wgt → O₂ if hypoxic
Start IV, Draw CBC, Lytes, glucose (treat if indicated)
Neuro exam, EKG, Activate Stroke team, Emergent CT scan

45 Minutes of Arrival



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Endovascular Thrombectomy

- Proximal ICA or MCA occlusion
- Used in adjunct with tPA
- Effective up to 6 hours
 - MERCI system removes clot with corkscrew-like apparatus
 - PENUMBRA system aspirates clot

Lancet 2016; Stroke 2016

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Ischemic stroke BP Management

- Maintain cerebral perfusion
- ↑BP a response, not cause of arterial occlusion
 - an effort to perfuse penumbra
- Lower BP only if SBP > 220 or DBP > 120
- Or if tPA candidate...
 - *labetalol* 10 mg IV q 10 min, till BP ↓ 20%

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AES Question:

What is the target Systolic BP for a hemorrhagic stroke?

1. Treat to < 220
2. Treat to < 200
3. Treat to < 180
4. Treat to < 140

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Hemorrhagic stroke BP Management

- Lower SYS BP < 180
- No benefit for < 140
 - IV nicardipine if needed
- Avoid hemorrhagic expansion, especially in AVMs and aneurysms

NEJM 2016

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What about Hypotension??

- Maintain adequate cerebral blood flow
- Keep BP > 100/70
- Fluids and vasopressors if needed
- Search for cause

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AES Question

Which is an independent risk factor for poor stroke outcomes?

1. Hypoglycemia
2. Hyperglycemia

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Supportive Therapy

- Treat Hyperglycemia
 - Edema/infarct worsen
- Treat fevers > 37.5 C
 - Fever for > 24 hrs correlates with stroke extension
 - Don't assume neurogenic – look for source

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AES Question

A Cryptogenic Stroke is:

1. An infarct for which no probable cause is identified after an adequate work-up
2. An incidental infarct seen on an MRI not obtained as part of a stroke work-up
3. An infarct in an adult due to a previously undiagnosed patent *foramen ovale*

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Basic stroke evaluation

- Carotid ultrasonography ± transcranial Doppler
- Transthoracic echocardiography (TEE)
- ECG/Markers of cardiac ischemia
- EKG monitoring
- Routine Labs
 - CBC; BMP (glucose)
 - RPR; ESR
 - INR; PT/INR, PTT



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Other considerations...

- 30 day event monitor
- Blood alcohol /Tox screen
- Pregnancy test
- CXR (? lung disease)
- EEG (? seizures)
- Thrombotic W/U (unclear cause/ + FH)
 - Antiphospholipid syndrome

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3 Main Rehab Goals

Tailor to specific stroke-related sequela

1. Prevent complications of inactivity
2. Treat medical complications
3. Prevent recurrent stroke/cardiovascular events

Stroke May 2016

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1. Complications of Inactivity

- NPO/bedside swallow assessment for aspiration
- Compression devices/ambulation for PE/DVT
- Reposition q2h to avoid skin breakdown



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2. Medical complications

Spasticity

- ROM exercises/thermal/electric stimulation/splinting
- Dantrolene, tizanidine

Depression (↑ mortality)

- Pharmaco/Psychotherapy

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3. Prevention of Recurrence...

Non-cardiogenic etiology

- Antiplatelet therapy with Aspirin
- 60% ↓ risk of recurrent stroke next 6 weeks
- 90% ↓ risk of stroke after TIA, in next 12 weeks

Stroke April 2015, Lancet May 2016

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Antiplatelet therapy

Non-cardiogenic etiology

- Aspirin alone (50-325mg daily)
- Extended-release dipyridamole/aspirin (Aggrenox)
- Clopidogrel (Plavix) alone
- Ticagrelor (Brilinta) alone

Stroke April 2015, NEJM May 2016

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USPSTF April 2016

Grade B recommendation for low-dose (81mg) ASA for the primary prevention of CVD and colorectal CA in adults 50 to 59 years who:

- have a $\geq 10\%$ 10-year CVD risk,
- are not at increased risk for bleeding,
- have a life expectancy of at least 10 years,
- and are willing to take daily ASA for ≥ 10 years.

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Cardiogenic Embolism: Anti-coagulate or Not?

- Anticoagulation ↓ stroke risk 60-80%
 - But increases risk of bleeds.....
- Calculators score relative risk vs benefit...

<http://www.mdcalc.com/specialty/cardiology/>

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To Predict Stroke Probability...

- CHADS₂
- CHADS₂ – VAS_c
 - CHF, HTN, Age, DM, Sex, Stroke, Vascular Disease
- ATRIA
 - Proteinuria, GFR
- ABC
 - BNP, Troponin

Eur Heart 2016

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To Predict Bleeding Risk...

HAS-BLED

- HTN, ABN renal/liver function, Stroke, Bleeding history, Labile INR, Elderly, Drugs/alcohol

ATRIA (AnTicoagulation and Risk factors In Afib)

- Anemia, Renal Fxn, Age (> 75), Prior Bleed, HTN

ORBIT

- Older age (>75), Reduced H/H anemia), Bleeding history, renal Insufficiency, antiplatelet Treatment

Eur Heart J 2015

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Anticoagulants...

- Warfarin
- Dabigatran (Pradaxa)
 - Idarucizumab (Praxbind) reversal
- Apixaban (Eliguis)
- Rivaroxaban (Xarelto)
- Edoxaban (Savaysa)

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Warfarin or DOAC...

- DOAC are non-inferior in reducing stroke risk and lowering all-cause mortality for nonvalvular afib, while not increasing major bleeding complications...
- Well-managed warfarin has low all cause death rates and low complication rates...

JFP June 2016; JAMA May 2016, JAMA April 2016

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Carotid Endarterectomy (or Stenting) ?

- Stroke or TIA with carotid artery stenosis > 70%, endarterectomy is recommended if perioperative morbidity and mortality are estimated to be less than 6 percent...
- ACT I and CREST studies found stenting comparable to endarterectomy

NEJM Feb 2016

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Insulin Resistance?

- Screen TIA, stroke for pre-diabetes
- Prescribe pioglitazone?
- IRIS trial treated group 24% less likely to have a stroke or MI in next 5 years...
- Side effects..
 - Wgt gain, edema, fractures, bladder CA
- PPAR- α target gene therapy...

NEJM Feb 2016; DynaMed April 2016

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PREVENTION WORKS!

- Control high blood pressure
- Treat heart disease
- Stop cigarette smoking
- Reduce blood cholesterol levels

Lancet June 2016; Creative Commons: <https://rkutchjm.files.wordpress.com/2013/06/prevention-works-to-lower-risk-of-disease.jpg>

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Mediterranean Diet

Less likely to suffer an ischemic stroke

- Fruits and vegetables, whole grains, legumes, nuts, fish, poultry and olive oil
- Limited consumption of red meat, sweets, saturated fats

American Stroke Association, news release, Feb. 2015

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Exercise...

- Physically active lifestyle
 - At least 40 minutes of walking/biking/day
 - Plus 1 additional hour of exercise/week

AFP June 2016

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THE FUTURE NEXT EXIT

- POC diagnostic test for ischemic stroke
- Stem cells to repair damage
- VR video games...
- Robotic exo-skeletons...

PLOS One 2016, Stroke 2016
Creative Commons License: <http://thinkingfutures.net/resources/building-strategic-futures-guides/>

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Practice Recommendations...

- Educate your patients about F.A.S.T.
- Work with your community to insure timely stroke protocols are in place
- Emphasize stroke prevention
- Develop post-stroke rehabilitation protocols for your office

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Questions

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THANK YOU!

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Billing & Coding

When services performed in conjunction with:

Office Visit 992xx *

*Time-based selection documentation criteria:

- Face-to-face time
- greater than 50% spent counseling/coordinates care

Additional tests to confirm or monitor:

99490 Chronic Care Management-20 minutes monthly

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Interested in More CME on this topic?

aafp.org/fmx-neurologic

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