Stroke School

December 5, 2017

Dr. Albert Jin PhD MD FRCPC

Medical Director, Stroke Network SEO

Disclosures

- I receive a stipend for my role as Medical Director
- I have no commercial disclosures or conflicts of interest

Four Main Objectives

- Part 1: Obtain a history and examination in five minutes in the ED
- Part 2: Stroke syndromes
- Part 3: TIA and acute stroke in the ED

Part 1: History and Exam

Stroke History in 5 Minutes

- Last seen normal, or last known well: this is the time of onset
  - Time of onset is not necessarily when the patient was found
  - Time of onset is not necessarily when there was an abrupt change if the patient changed from having a mild deficit to a severe deficit
  - “When was the last time today that Mr. Jones was walking and talking normally?”

What are the symptoms?

- Weakness in face, arm or leg
- Speech difficulty
- Sensory changes
- Vision changes
- Ataxia

Describing symptoms

- For weakness, say what the patient can do rather than estimate a power rating:
  - “Lifts the arm against gravity but can’t sustain against light resistance” is likely more informative than estimating an MRC scale rating
- Keep in mind that it’s very rare for language to be in the right hemisphere
  - It should be very rare to see “Left hemiparesis and aphasia”

“Sudden onset…”

- How quickly did symptoms reach maximal severity?
  - Symptom onset is often described as sudden
  - But symptoms often worsen after “sudden onset”
  - “Sudden onset right face and arm numbness” becomes “Sudden onset right face numbness which got worse over the next 30 minutes and spread to the right arm”

- **“Did things get worse after you first noticed problems? How long did it take to get to the very worst?”**

Medications, Comorbidities, **Independence**

- **Anticoagulants** and when taken? Other meds? Allergies?

- Medical conditions, recent stroke/TIA, recent trauma or surgery?

- **Are they independent at baseline?**
  - **If not independent, can they walk, converse, cognitive impairment?**

Vitals includes Glucose

- Stroke and TIA mimics include:
  - Hypertension, e.g. Posterior reversible encephalopathy syndrome
  - Hyper or hypoglycemia

- Paramedics often take vitals and glucose and it's one of the first things you should note when the patient comes in to ED

History: Key Questions.

- When last known to be well?
- What were the symptoms?
- How quickly did symptoms reach worst severity?
- Any change in symptoms since onset?
- Vitals from paramedics?
- Medical conditions, including allergies?
- Medications, especially anticoagulants?
- If on anticoagulants, when last taken?
- Recent trauma, surgery, or stroke?

Case

- Mrs. Smith calls paramedics after hearing her husband fall out of bed at ~2150h. He is unable to get up on his own and his left arm and leg were not moving. He didn’t notice anything wrong with the left side.

Case

- They had been in Ottawa earlier that day for a lung biopsy.

- After the biopsy, ~1500h, he was unable to walk to the car and needed help from two people to get in to a wheelchair and then in to the car. He was still a little drowsy from procedural sedation. His left leg was dragging.

Case

- At home, ~ 1800h, he needed help from two neighbours and his wife to get in to the house where he then went to bed.
- He woke up at around ~2000h and clearly said he felt unwell and drank a glass of water which was brought to him by his wife.
- He then went back to sleep and was heard to fall out of bed at 2150h.

What else would you like to know?

Some key points on history for Case

- Time last known well is not clear
- The full extent of the symptoms are not clear
- Medications?
- Why a lung biopsy?

Examination in 3 minutes

- Vitals and brief general physical exam
- NIH Stroke Scale:
- *Consciousness*
- *Gaze*
- *Visual Fields*
- *Face, arm, leg weakness/clumsiness*
- *Sensory loss*
- *Language*
- *Dysarthria*
- *Inattention*

Examination in 3 minutes

- **NIH Stroke Scale**
- *Consciousness*
- *Gaze, Visual Fields, Face*

⬇

- *Arm & leg: weak, clumsy, numb*

⬇

- *Language*
- *Dysarthria*
- *Inattention*

Start at head

⬇

Move to arms and legs

⬇

Back up to the head

Let’s practice the NIHSS

- Please pair off and we’ll go through the examination technique together

NIHSS

1a. Level of Consciousness (LOC)*

0 = Alert (keenly responsive)
1 = Not alert but arousable by minor stimulation
2 = Not alert: requires repeated stimulation to attend, or is obtunded and requires strong or painful stimulation to make movements
3 = Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, and flexic

1b. LOC Questions*

Ask the patient: "What month is it? How old are you?"
0 = Answers both correctly
1 = Answers one correctly
2 = Answers neither correctly

1c. LOC Commands*

Command the patient to: "Open and close your eyes. Grip and release your hand."
0 = Performs both correctly
1 = Performs one correctly
2 = Performs neither correctly

2. Best Gaze*

Establish eye contact and ask the patient to: "Follow my finger."

0 = Normal
1 = Partial gaze palsy
2 = Forced deviation or total gaze paresis

3. Visual Fields*

Use confrontation, finger counting, or visual threat.
Confront upper/lower quadrants of visual field.

0 = No visual loss
1 = Partial hemianopsia
2 = Complete hemianopsia
3 = Bilateral hemianopsia

4. Facial Palsy*

By words or pantomime, encourage the patient to: "Show me your teeth. Raise your eyebrows. Close your eyes."

0 = Normal symmetrical movement
1 = Minor paralysis (flattened nasolabial fold, asymmetry on smiling)
2 = Partial paralysis (lower face)
3 = Complete paralysis

5. Arm Motor*

Alternately position patient's arms. Extend each arm with palms down (90° if sitting, 45° if supine).

0 = No drift 1 = Drift
2 = Some effort vs gravity
3 = No effort vs gravity
4 = No movement

6. Leg Motor*

Alternately position patient's legs.
Extend each leg (30°, always while supine).

0 = No drift 1 = Drift
2 = Some effort vs gravity
3 = No effort vs gravity
4 = No movement

7. Limb Ataxia*

Ask patient (eyes open) to: "Touch your finger to your nose. Touch your heel to your shin."

0 = Absent
1 = Present in one limb
2 = Present in two or more limbs

8. Sensory*

Test as many body parts as possible (arms [not hands], legs, trunk, face) for sensation using pinprick or noxious stimulus (in the obtunded or aphasic patient).

0 = Normal
1 = Mild-to-moderate sensory loss
2 = Severe-to-total sensory loss

9. Best Language*

Using pictures and a sentence list (see reverse), ask the patient to: "Describe what you see in this picture. Name the items in this picture. Read these sentences."

0 = No aphasia
1 = Mild-to-moderate aphasia
2 = Severe aphasia
3 = Mute, global aphasia

10. Dysarthria*

Using a simple word list (see reverse), ask the patient to: "Read these words" or "Repeat these words".

0 = Normal articulation
1 = Mild-to-moderate dysarthria
2 = Severe dysarthria

11. Extinction and Inattention*

Sufficient information to determine these scores may have been obtained during the prior testing.

0 = No abnormality
1 = Visual, tactile, auditory, spatial, or personal inattention
2 = Profound hemi-inattention or extinction to more than one modality

A 3-minute exam doesn't have to be perfect!

- Remember the general sequence:
  - Assess LOC, eyes and face (head)
  - Assess the arms and legs (body)
  - Assess speech and neglect (head)

- If you can’t recall the NIHSS scoring system, then just describe what you see
  - “Arms drifts to bed within 5 seconds”
- Double check the exam in case you missed something on the first time

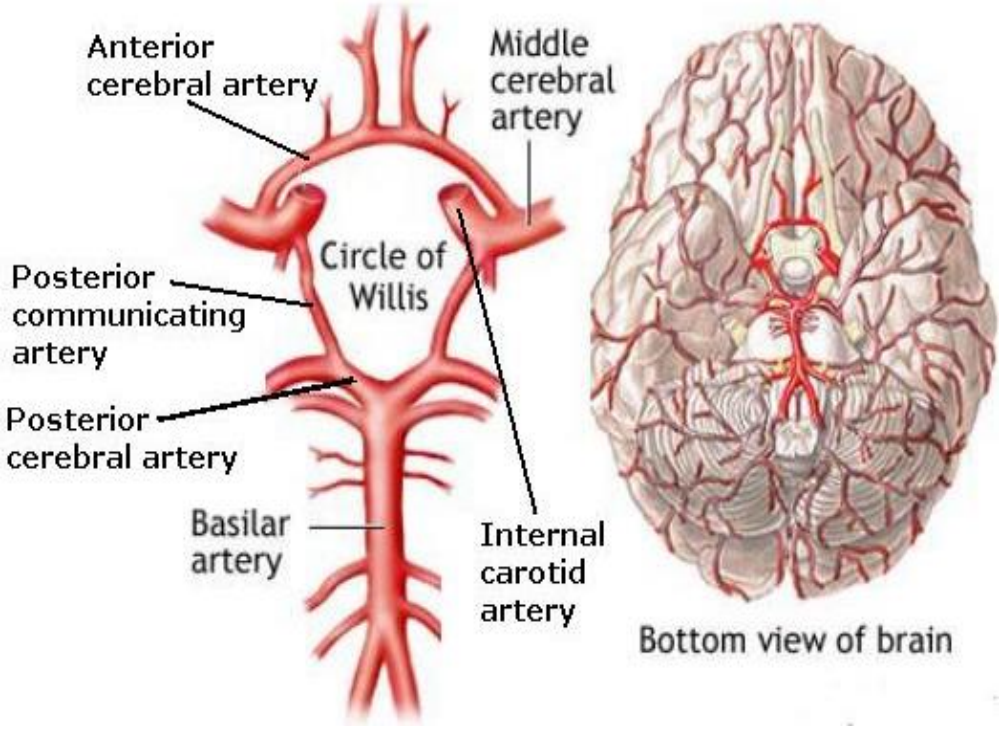
Part 2: Stroke Syndromes

Objectives

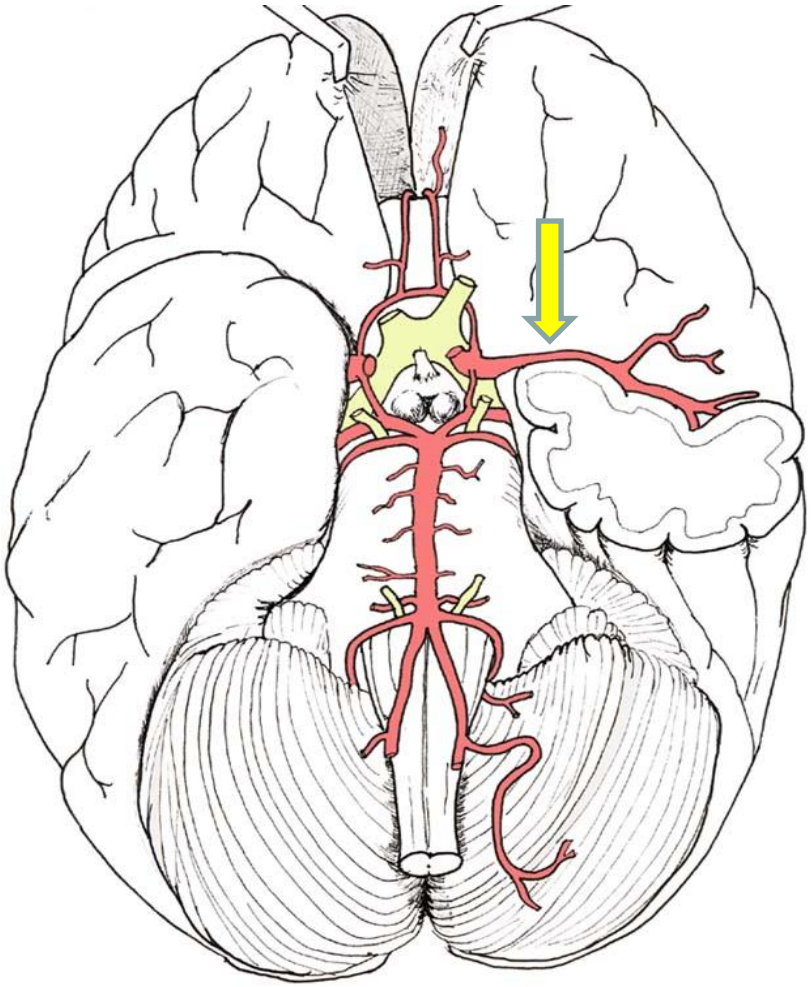
- Recognize clinical features of anterior circulation stroke involving:
  - Middle cerebral artery
  - Anterior cerebral artery
- Recognize features of posterior circulation stroke involving:
  - Posterior cerebral artery (occipital lobe, thalamus, medial temporal lobe)
  - Brainstem (midbrain, pons, medulla)
  - Cerebellum
- Recognize four common lacunar stroke syndromes
  - Pure motor stroke
  - Pure sensory stroke
  - Sensorimotor stroke
  - Ataxic hemiparesis
  - Clumsy hand-dysarthria

Anterior Circulation Stroke

- MCA and/or ACA
- Occlusion of the ICA can result in ischemia in both MCA and ACA territory simultaneously



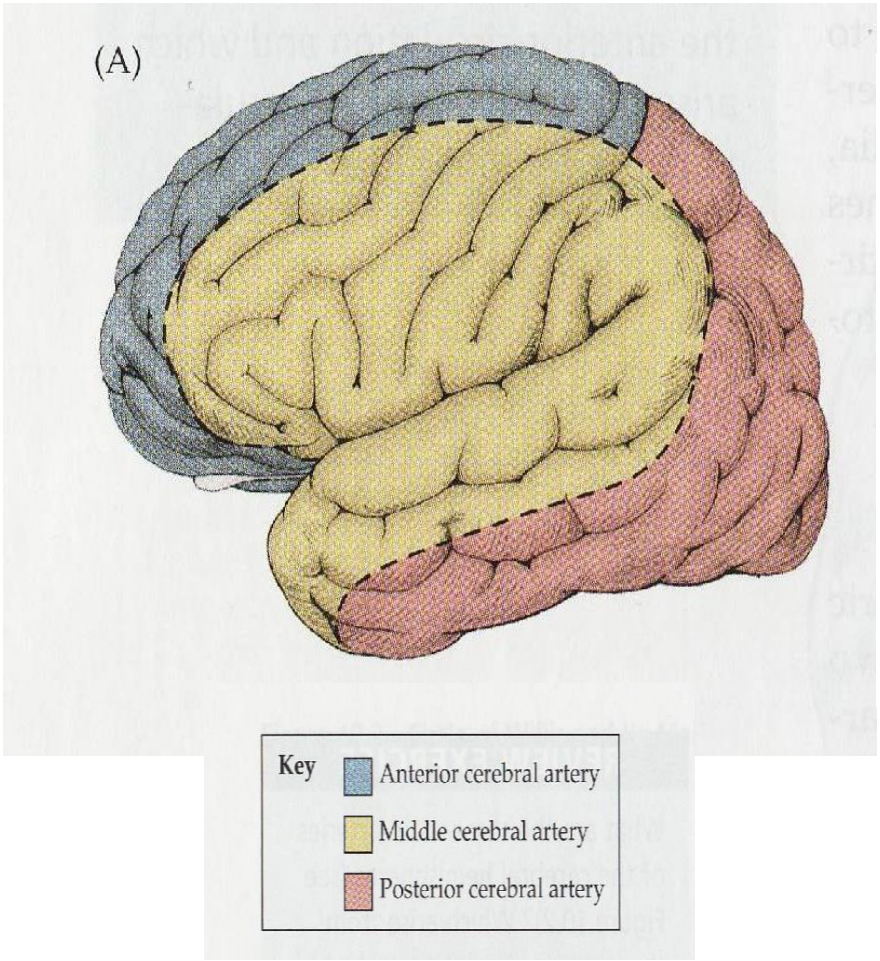
Middle cerebral artery

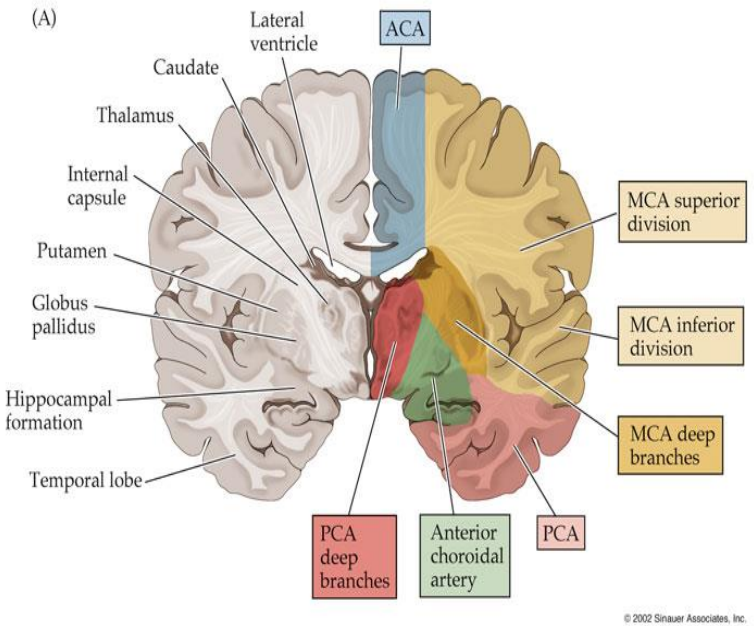


- About two-thirds of all ischemic stroke occurs in the middle cerebral artery territory
- MCA stroke can involve the frontal, temporal, and parietal lobes
- MCA stroke can also involve the basal ganglia through the *lenticulostriate arteries*

- The MCA covers a large territory shown in blue on this CT scan image taken at the basal ganglionic level

MCA covers a large portion of the hemisphere



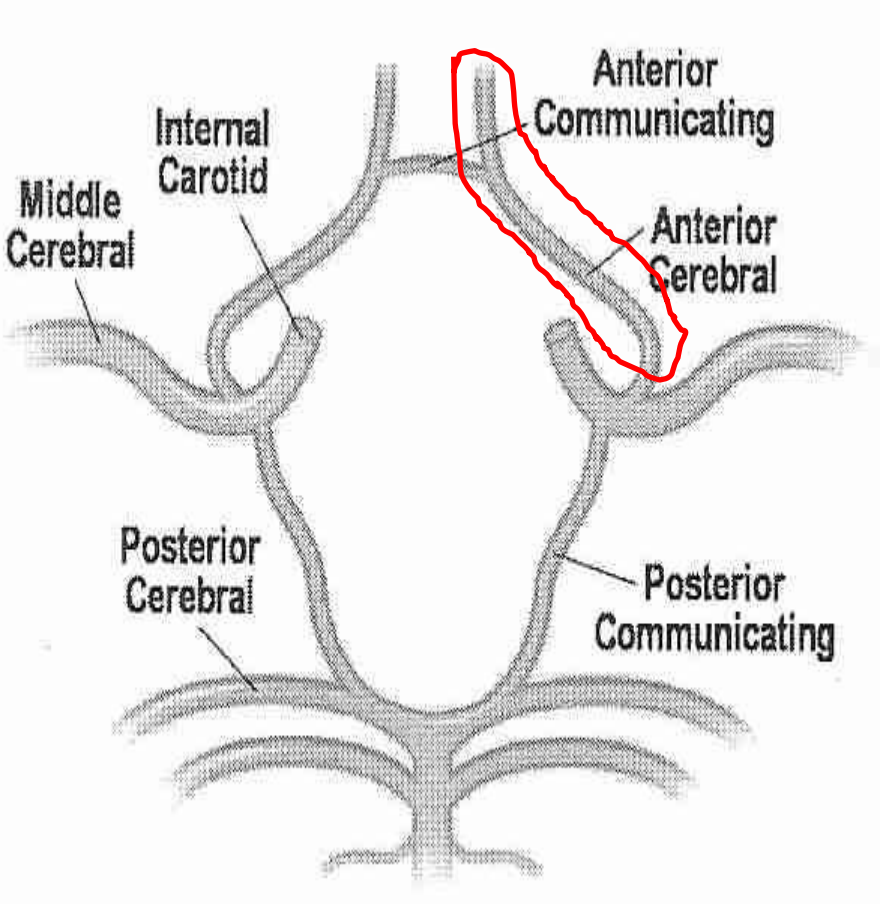


MCA stroke syndromes

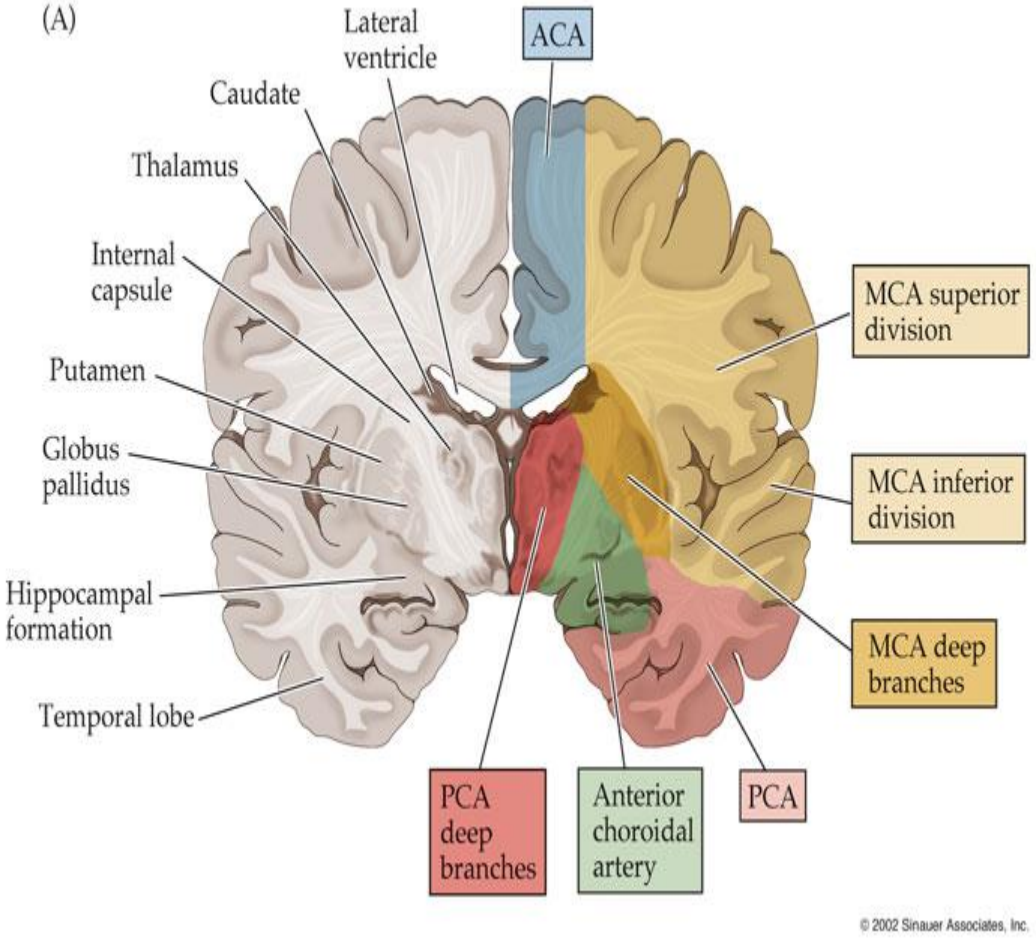
- **Left hemisphere (ie, dominant)**
- Right hemiparesis
- Right-sided sensory loss
- Right homonymous hemianopia
- Dysarthria
- **Aphasia**

- **Right hemisphere (ie, nondominant)**
- Left hemiparesis
- Left-sided sensory loss
- Left homonymous hemianopia
- Dysarthria
- **Neglect of the left side of environment**

Anterior cerebral artery

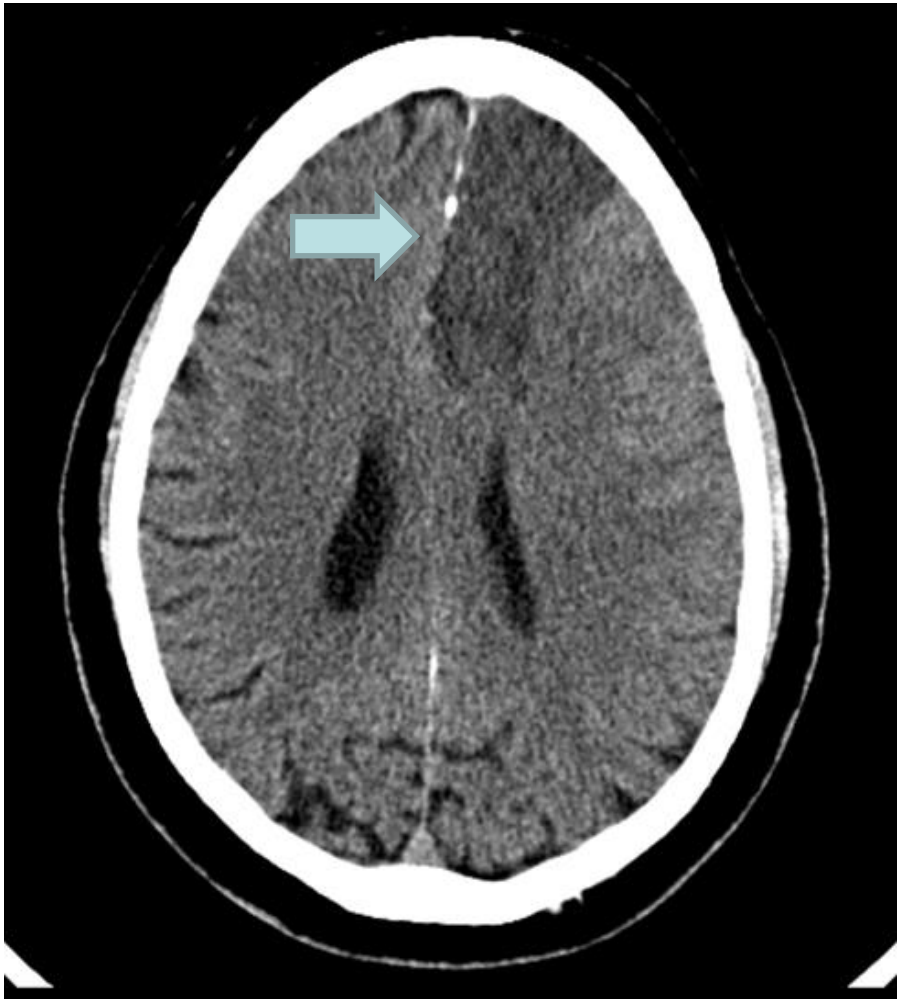


ACA covers the medial portion of the brain



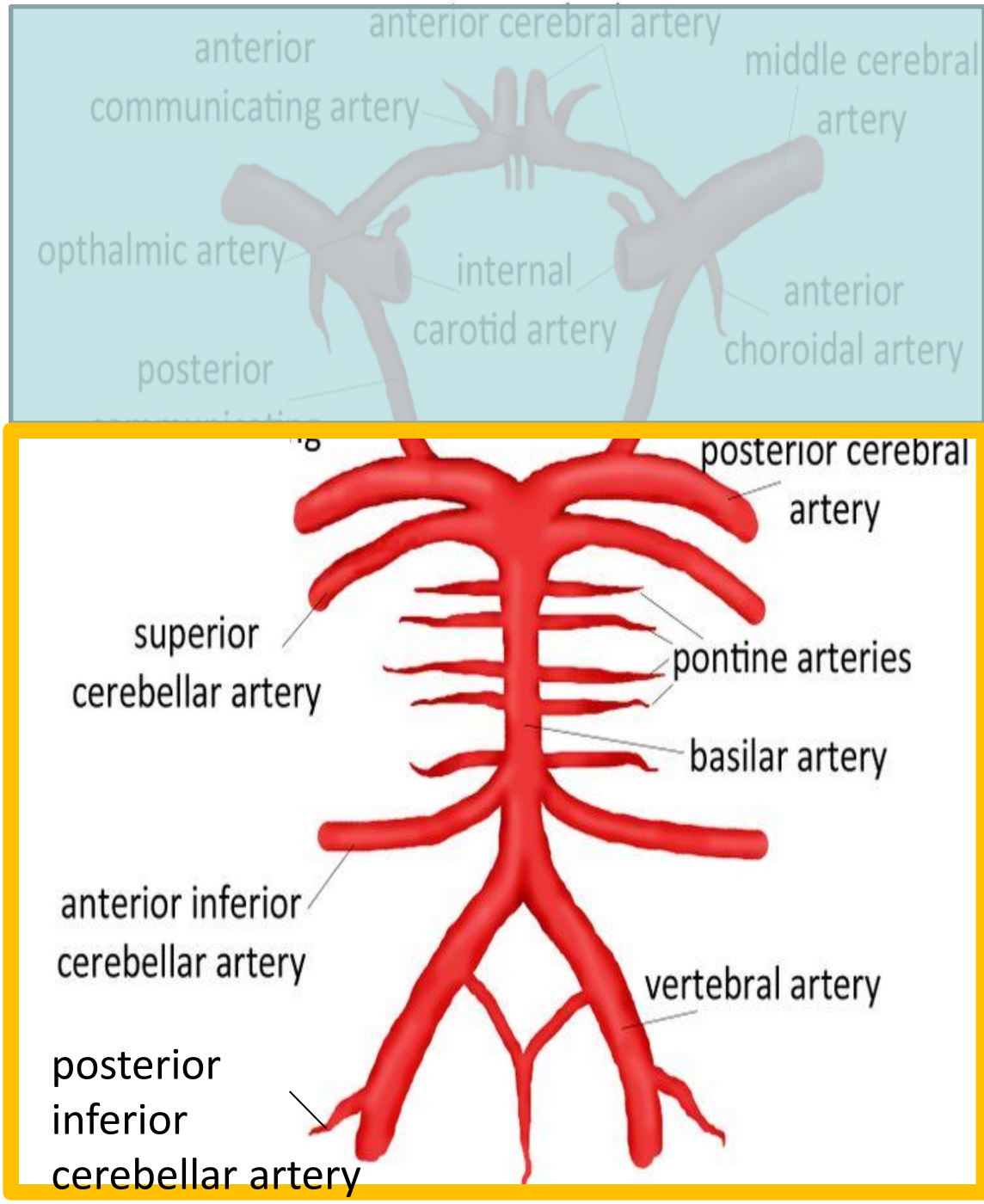
ACA stroke syndrome

- Contralateral leg paresis > arm paresis
- Or, bilateral leg weakness if both ACAs are involved
- Abulia, disinhibition, executive dysfunction
- In some cases, akinetic mutism if bilateral caudate head infarction

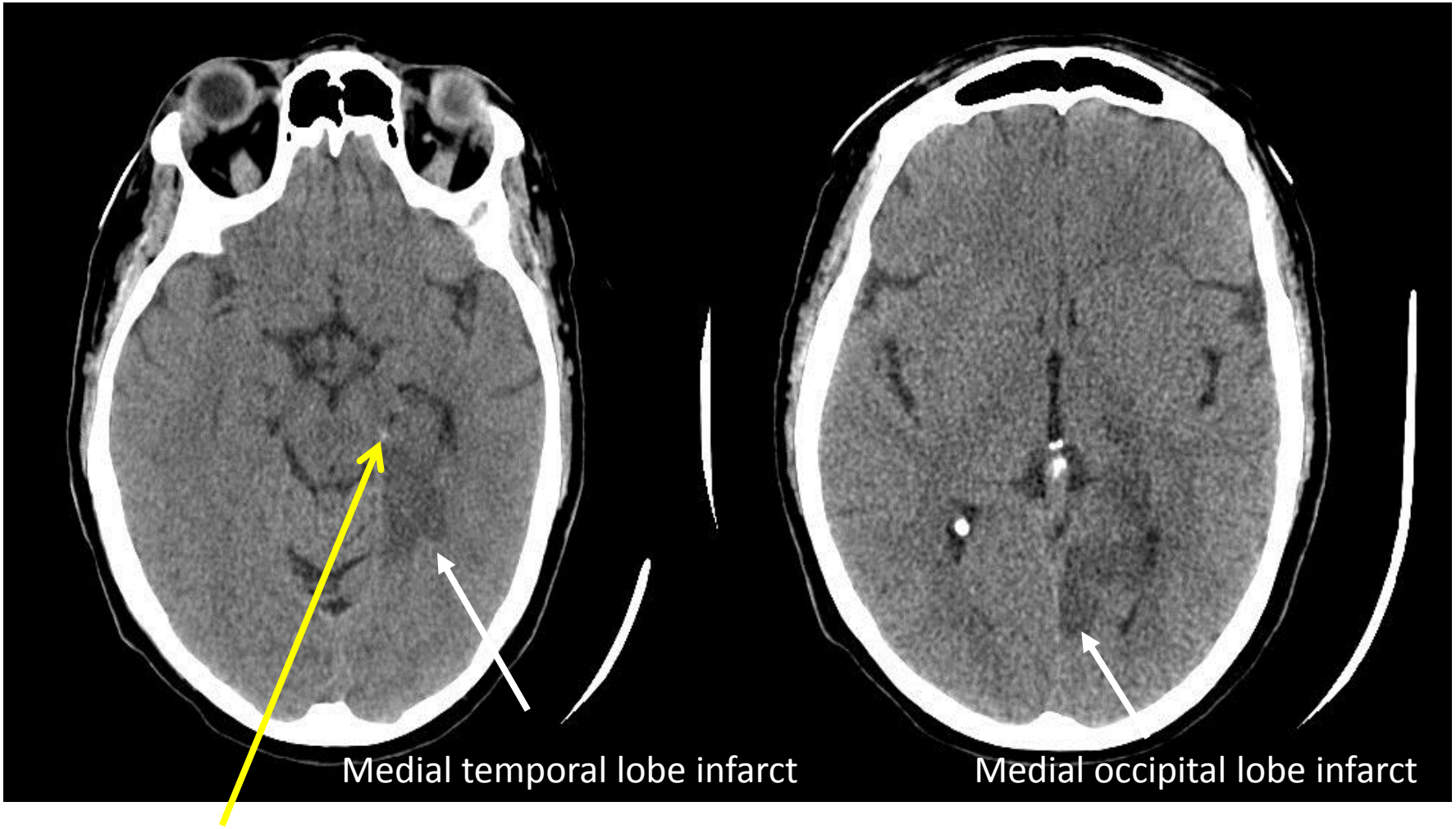


Posterior Circulation

- This includes:
  - Vertebral arteries
  - Posterior and anterior inferior cerebellar artery
  - Basilar artery



Left PCA infarction on CT



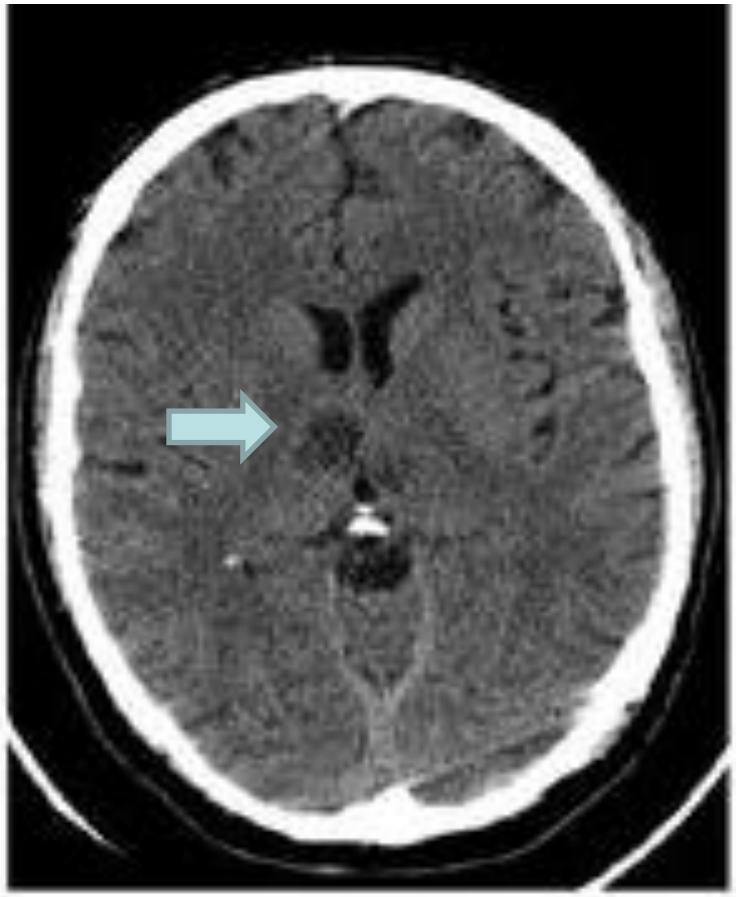
This is a thrombus in the left PCA

PCA stroke syndromes

- The most common syndromes involve the occipital lobe, the medial temporal lobe or the thalamus
- Occipital lobe:
  - Contralateral homonymous hemianopia
  - Cortical blindness (bilateral lesions)
- Medial temporal lobe:
  - Deficits in long-term and short-term memory
  - Behaviour alteration (agitation, anger, paranoia)

PCA stroke syndromes, cont'd

- Thalamic infarct
  - Contralateral sensory loss
  - Aphasia (if dominant side involvement)
  - Executive dysfunction
  - Decreased level of consciousness
  - Memory impairment



Brainstem stroke syndromes

- Some of the clinical features seen are:
  - **Crossed sensory findings (e.g. ipsilateral face and contralateral body numbness)**
  - **Crossed motor findings (ipsilateral face, contralateral body)**
  - **Gaze-evoked nystagmus**

Other findings in brainstem stroke

- Ataxia and vertigo, limb dysmetria
- Diplopia and eye movement abnormalities
- Dysarthria, dysphagia
- Tongue deviation
- Deafness (very rare)
- Locked-in syndrome (can’t move any limb, can’t speak, can sometimes blink

Midbrain stroke

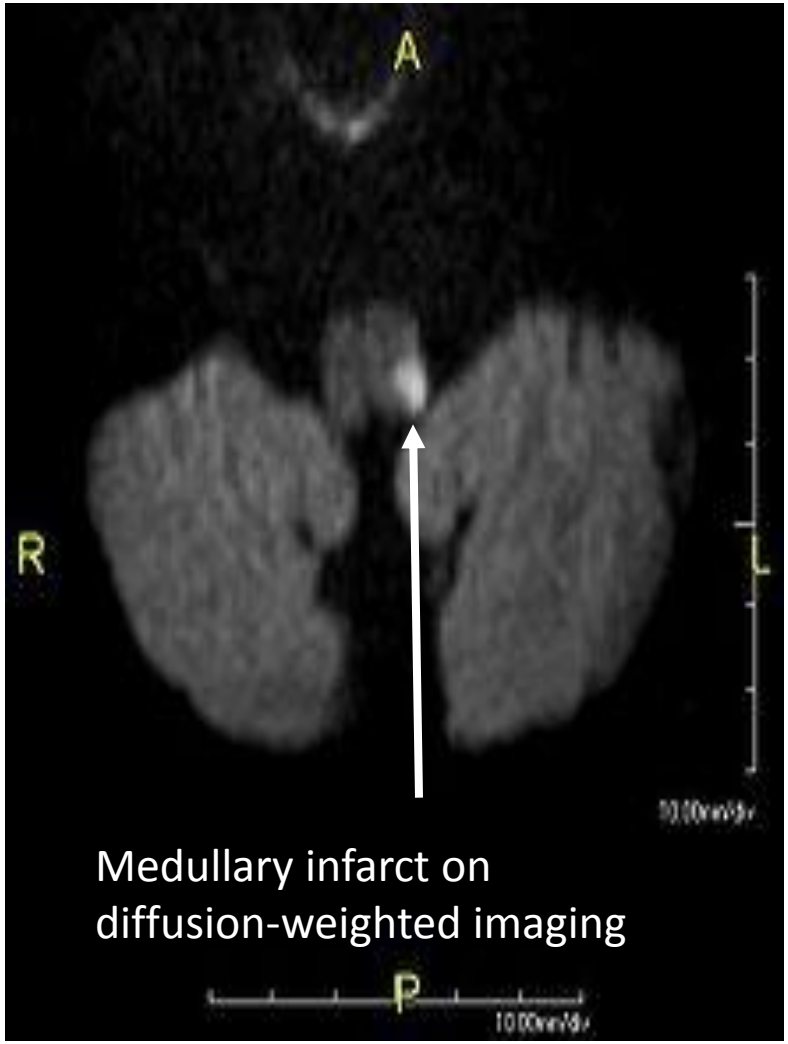
- Ipsilateral 3rd nerve palsy
- Contralateral hemiparesis of the arm and leg, sometimes with hemiplegia of the face
- Contralateral hemiataxia

Pontine stroke

- Ipsilateral signs:
  - Horner's syndrome
  - 6th or 7th nerve palsy (diplopia, whole side of face is weak)
  - Hearing loss (rare)
  - Loss of pain and temperature sense
- Contralateral signs:
  - Weakness in leg and arm
  - Loss of sensation in arm and leg
- Nystagmus, nausea

Medullary stroke

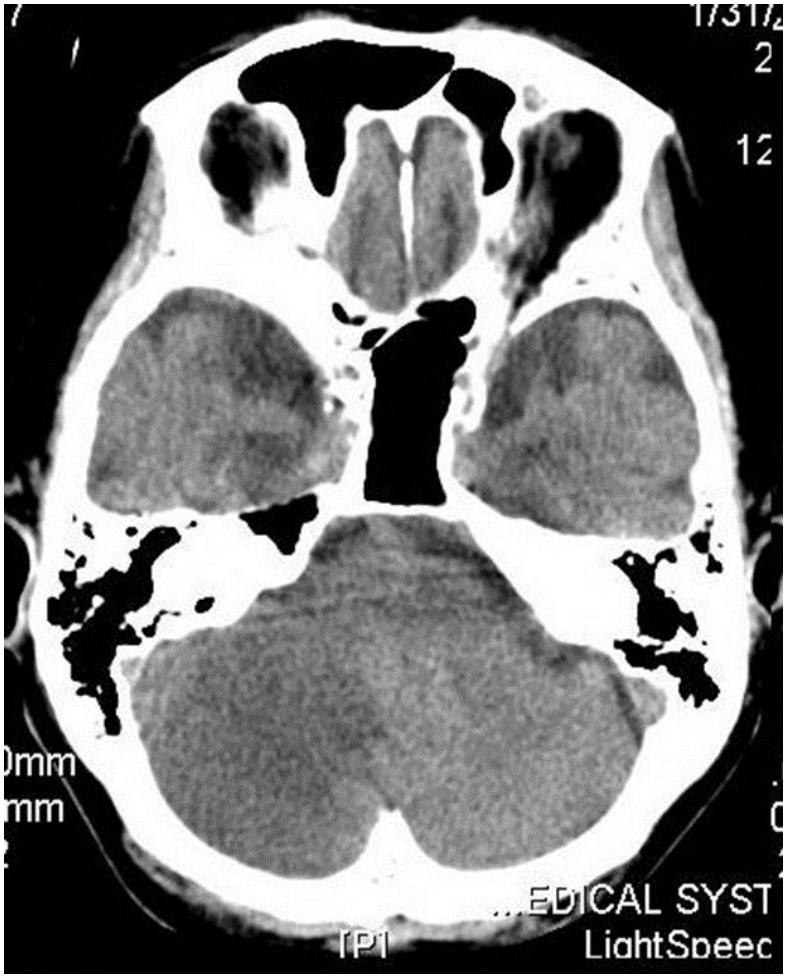
- Ipsilateral signs:
  - Tongue weakness
  - Sensory loss in face
  - Horner's syndrome
  - Ataxia
  - Palate weakness (dysphagia)
- Contralateral signs:
  - Weakness, sensory loss in arm and leg
- Nausea, nystagmus, dysphagia, dysarthria



Medullary infarct on diffusion-weighted imaging

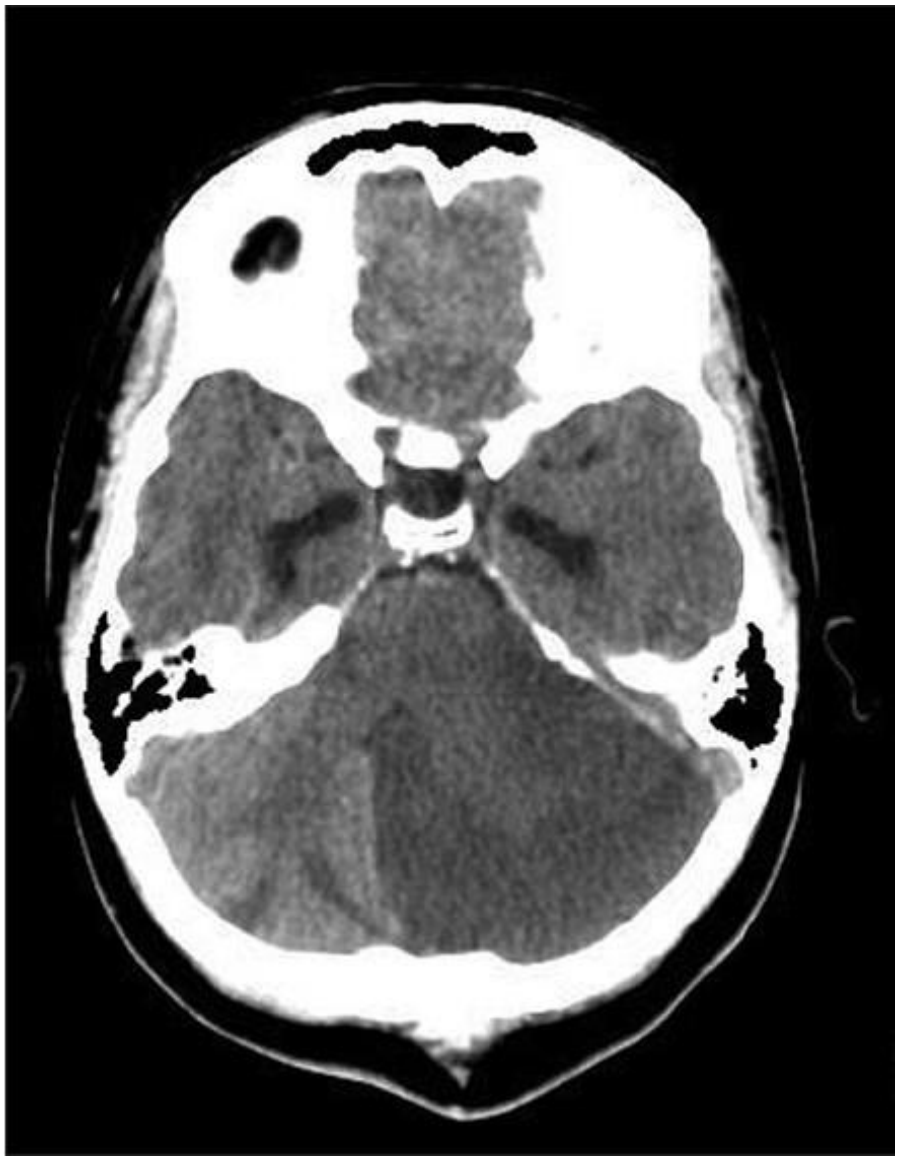
Cerebellar stroke

- Ataxia, vertigo, nausea, vomiting, dysarthria
- Often headache and nystagmus
- Can also have rapid deterioration in level of consciousness



Cerebellar infarction

- Infarction causes edema resulting in mass effect, herniation and compression of the fourth ventricle
- This can lead to rapid deterioration in level of consciousness
- Surgical decompression is often necessary in these circumstances



Lacunar stroke syndromes

- **Pure motor stroke** usually arises from infarction in the posterior limb of the internal capsule; course is often stuttering over hours to days:

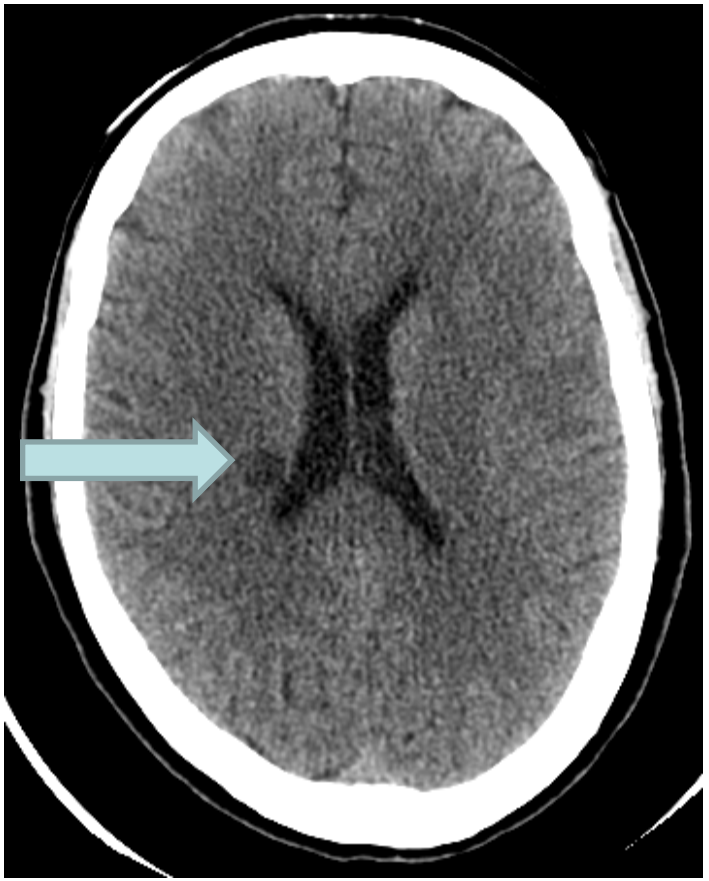
- **Pure sensory stroke** usually arises from thalamic infarction

Lacunar stroke syndromes

- **Sensorimotor stroke** can arise from infarcts at the junction between the thalamus and the internal capsule
- As the name implies, the symptoms consist of weakness and sensory loss with no visual field deficit, aphasia, neglect or other symptoms

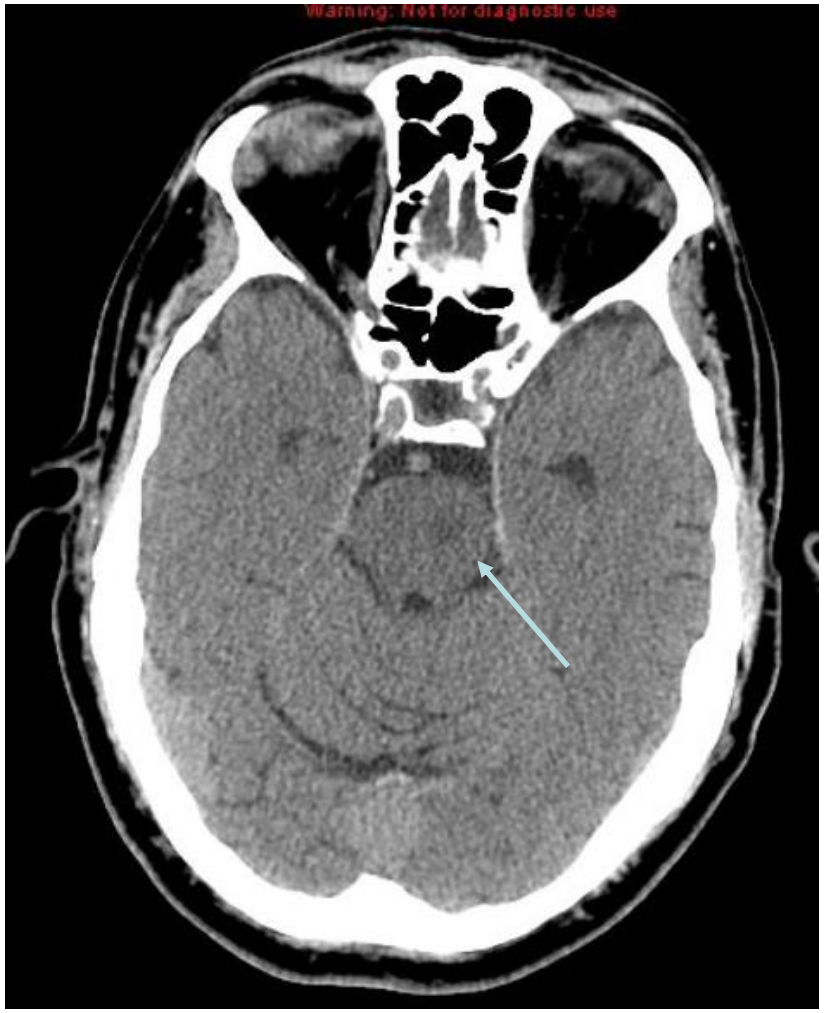
Lacunar stroke syndromes

- **Ataxic hemiparesis** often arises from infarction in the corona radiata
- Ataxia is unilateral and is in excess of the mild weakness found on exam



Lacunar stroke syndromes

- **Clumsy hand-dysarthria** is caused by infarction in the pons, but can also occur in corona radiata and the internal capsule
- Contralateral facial weakness with dysarthria and dysphagia occurs with contralateral hand weakness/ataxia, and sometimes weakness in the arm or leg



Summary

- MCA stroke: hemiparesis, sensory loss, hemianopia, and either aphasia or neglect
- ACA stroke: leg weakness and executive dysfunction
- PCA stroke: hemianopia, pure sensory infarct (thalamus), memory impairment, decreased level of consciousness
- Brainstem strokes: crossed sensory or motor findings, nystagmus, ataxia, dysarthria, diplopia, vertigo, Horner's syndrome
- Cerebellar strokes: ataxia, nystagmus, vertigo, nausea, headache and rapid deterioration in consciousness
- Lacunar strokes: pure motor, pure sensory, sensorimotor, ataxic hemiparesis, clumsy hand-dysarthria

Part 3: TIA and Acute Stroke in the ED

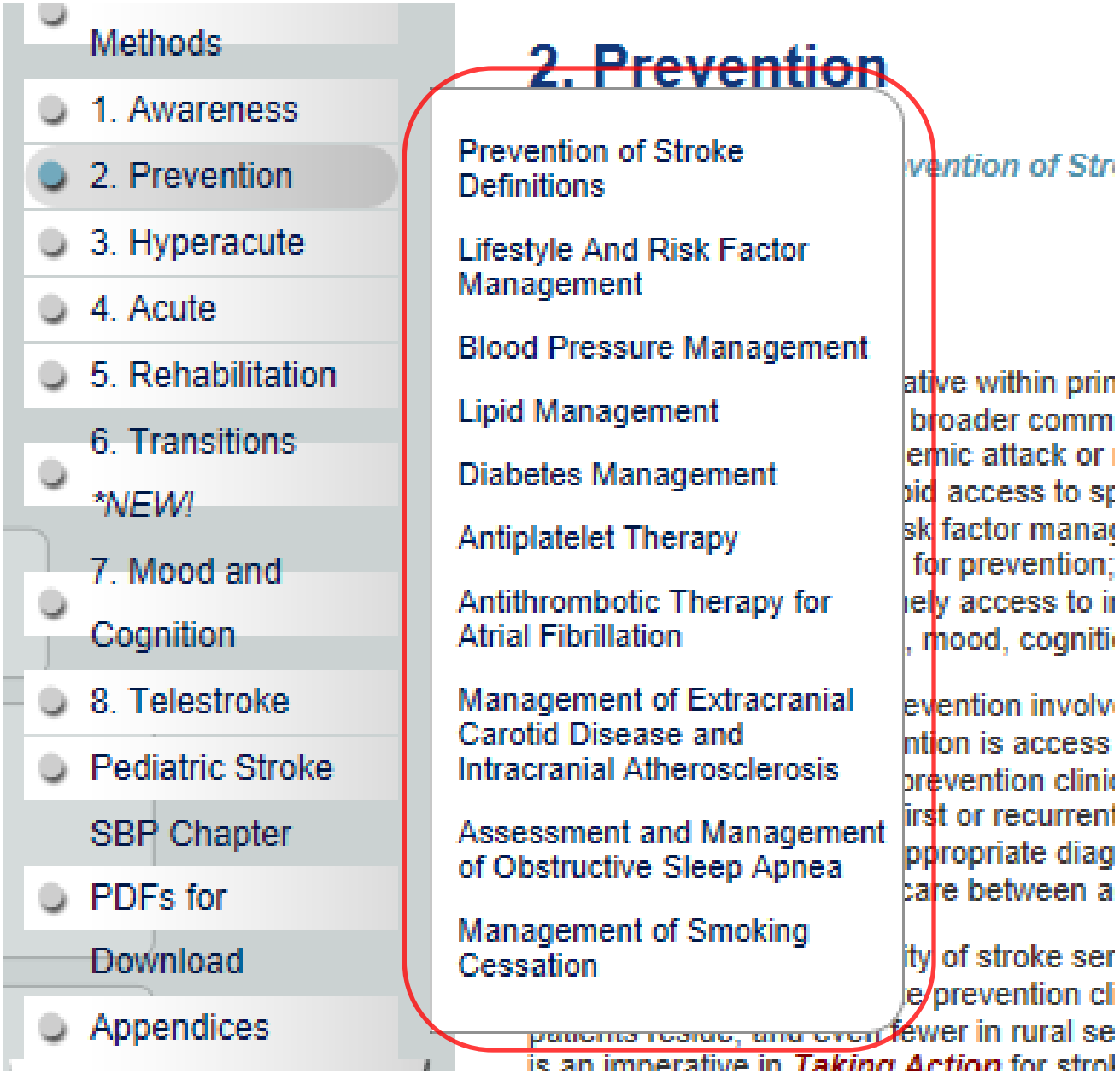
Outline

- Canadian Stroke Best Practice and Ontario Triage Algorithm for TIA
- Is it a TIA or a Stroke?
- When should TIA/Stroke patients be seen?
  - When should patients be seen, and what difference does it make?
    - When to send your patient to the ER?
  - What about atypical stroke symptoms?
- EVT and acute stroke triage

Canadian Best Practice Recommendations for Stroke Care:

http://www.strokebestpractices.ca

Stroke Prevention Recommendations


Methods
1. Awareness
2. Prevention
3. Hyperacute
4. Acute
5. Rehabilitation
6. Transitions
*NEW!
7. Mood and Cognition
8. Telestroke
Pediatric Stroke
SBP Chapter
PDFs for Download
Appendices
2. Prevention
Prevention of Stroke Definitions
Lifestyle And Risk Factor Management
Blood Pressure Management
Lipid Management
Diabetes Management
Antiplatelet Therapy
Antithrombotic Therapy for Atrial Fibrillation
Management of Extracranial Carotid Disease and Intracranial Atherosclerosis
Assessment and Management of Obstructive Sleep Apnea
Management of Smoking Cessation

Antiplatelet Therapy

4th Edition
2012-2013 UPDATE
September 20, 2012
***Minor revisions for 2012**

All patients with ischemic stroke or transient ischemic attack should be prescribed antiplatelet therapy for secondary prevention of recurrent stroke unless there is an indication for anticoagulation [Evidence Level A].

i. Acetylsalicylic acid (81 mg to 325 mg), combined acetylsalicylic acid (25 mg) and extended-release dipyridamole (200 mg), or clopidogrel (75 mg) are all appropriate options and selection should depend on the clinical circumstances [Evidence Level A].
    - For adult patients on acetylsalicylic acid, most patients should be on a maintenance dose of 81 mg/day unless other indications are present which may suggest a higher dose is required [Evidence Level A].
ii. In children with stroke the usual maintenance dosage of acetylsalicylic acid is 1 to 5 mg/kg per day for the prevention of recurrent stroke [Evidence Level B]. The usual maximum dose is 81 mg/day.
iii. The evidence for clopidogrel use in children is sparse at this time. Clopidogrel may be considered an alternative for adolescents at a dose of 1 mg/kg/day up to a maximum of 75 mg/day. Younger children may have higher anti-platelet effects of clopidogrel, and the suggested doses should be considered within the range of 0.2 – 0.5 mg/kg/day [Evidence Level C].[93]
iv. Short-term concurrent use of acetylsalicylic acid and clopidogrel (up to 90 days) has not shown an increased risk of bleeding [Evidence Level B]; however, longer-term use is not recommended for secondary stroke prevention, unless there is an alternate indication (e.g., drug-eluting carotid artery stent requiring dual antiplatelet therapy), due to an increased risk of bruising and bleeding [Evidence Level A]. [104a 104b match sps3]
v. At the present time, there is not enough evidence to guide management if a patient has a stroke while on a specific antiplatelet agent. Some clinicians may choose to switch to an alternate antiplatelet agent. In all cases other vascular risk factors should be aggressively managed [Evidence Level C].

Refer to recommendation 2.6 for additional information on combination therapy for patients with stroke and atrial fibrillation.

RATIONALE

SYSTEM IMPLICATIONS

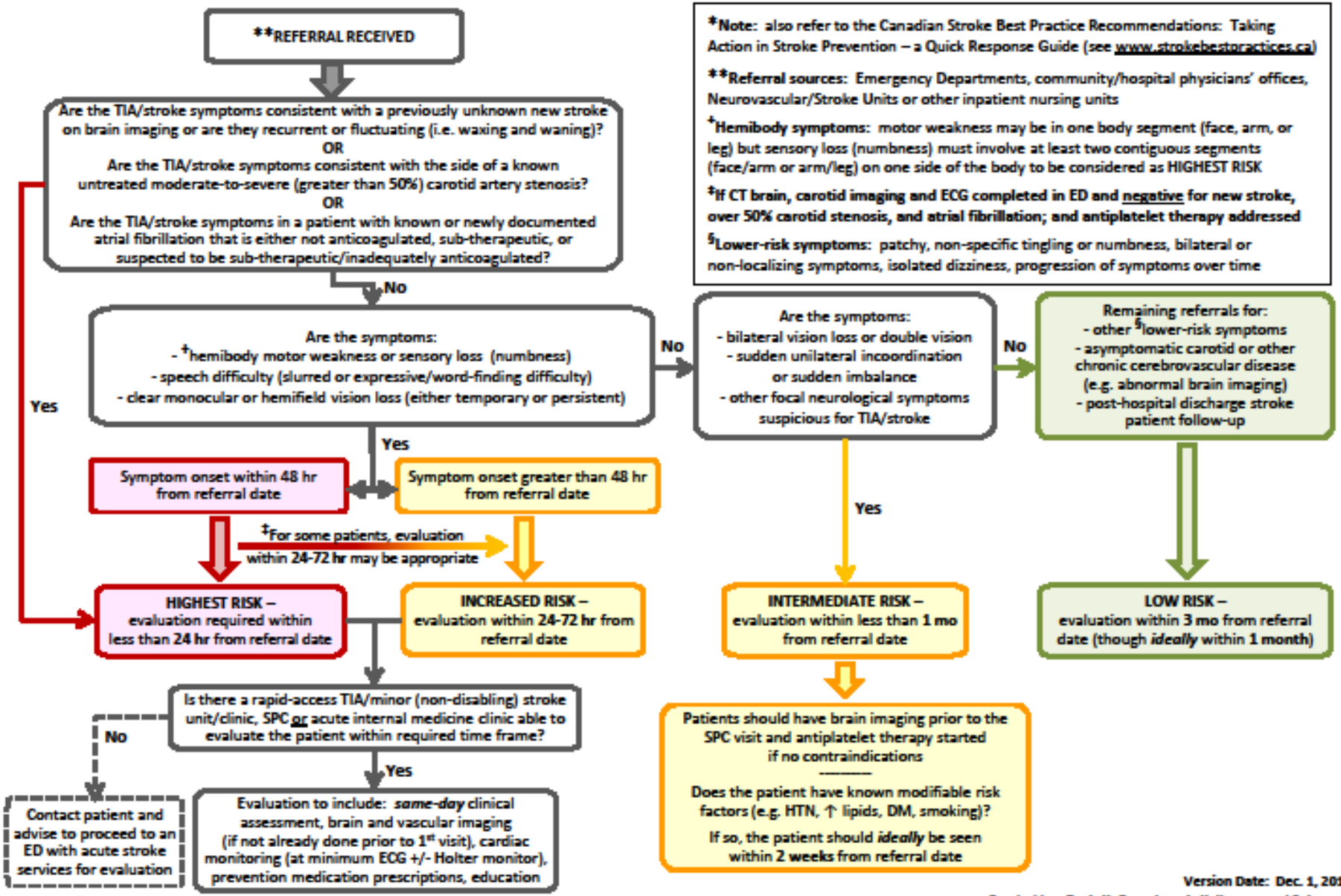
PERFORMANCE MEASURES

IMPLEMENTATION RESOURCES AND KNOWLEDGE TRANSFER TOOLS

SUMMARY OF THE EVIDENCE

Ontario Stroke Network (OSN) Ambulatory Care Triage Algorithm for Patients with Suspected or Confirmed Transient Ischemic Attack (TIA) or Stroke

*For use by regional Stroke Prevention Clinics (SPC) or other ambulatory units/clinics providing stroke prevention services



*Note: also refer to the Canadian Stroke Best Practice Recommendations: Taking Action in Stroke Prevention – a Quick Response Guide (see www.strokebestpractices.ca)

**Referral sources: Emergency Departments, community/hospital physicians' offices, Neurovascular/Stroke Units or other inpatient nursing units

+Hemibody symptoms: motor weakness may be in one body segment (face, arm, or leg) but sensory loss (numbness) must involve at least two contiguous segments (face/arm or arm/leg) on one side of the body to be considered as HIGHEST RISK

‡If CT brain, carotid imaging and ECG completed in ED and negative for new stroke, over 50% carotid stenosis, and atrial fibrillation; and antiplatelet therapy addressed

§Lower-risk symptoms: patchy, non-specific tingling or numbness, bilateral or non-localizing symptoms, isolated dizziness, progression of symptoms over time

Version Date: Dec. 1, 2014

Created by: Dr. L. K. Casaubon, L. Kelloway, and S. Jaspers

Is it a TIA or a Stroke?

Patients with transient brief symptoms can still have infarction

- Many patients with TIA symptoms less than 24 hours have tissue damage on MRI
- Even short duration TIA can have tissue damage:
  - DWI lesion in 50% pts with symptoms > 24 hrs
  - DWI lesion in 33% pts with symptoms < 1 hour

Stroke
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association | American Stroke Association

Definition and Evaluation of Transient Ischemic Attack: A Scientific Statement for Healthcare Professionals From the American Heart Association/American Stroke Association Stroke Council; Council on Cardiovascular Surgery and Anesthesia; Council on Cardiovascular Radiology and Intervention; Council on Cardiovascular Nursing; and the Interdisciplinary Council on Peripheral Vascular Disease: The American Academy of Neurology affirms the value of this statement as an educational tool for neurologists.

J. Donald Easton, Jeffrey L. Saver, Gregory W. Albers, Mark J. Alberts, Seemant Chaturvedi, Edward Feldmann, Thomas S. Hatsukami, Randall T. Higashida, S. Claiborne Johnston, Chelsea S. Kidwell, Helmi L. Lutsep, Elaine Miller and Ralph L. Sacco

Stroke. 2009;40:2276-2293;

Tissue-based definition of TIA

- The American Heart Association now endorses the following statement:
- **Transient ischemic attack (TIA): a transient episode of neurological dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction.**

- Note: Time is not a factor in this definition

If a TIA lasts for > 1 hour, what's the likelihood that symptoms will resolve within 24 hours?

- **Only 1 in 6 patients will have full resolution within 24 hours**

How do MRI findings affect prognosis?

- DWI lesion: ↑short term risk by 2 to 15 fold
- Predictors of **new vascular events** included:
  - symptom duration of 1 hour
  - DWI abnormality.

- Recurrent vascular events occurred in 40% of patients with both of these features.

Purroy F, Montaner J, Rovira A, Delgado P, Quintana M, Alvarez-Sabin J. Higher risk of further vascular events among transient ischemic attack patients with diffusion-weighted imaging acute ischemic lesions. *Stroke.* 2004;35:2313–2319.

Infarction can occur even with brief symptoms. The patient with brief and seemingly innocuous symptoms can still be at very high risk.

When should TIA/minor stroke patients be seen, and what difference does it make?

Case

- A 75 year old healthy man on no medications comes in to the office with a history of 2-3 minutes of numbness in the left arm and mild weakness in the left hand
- Symptoms occurred earlier this AM and have resolved
- The exam is normal

Case: Options

- A. Order a CT scan of the head and a carotid Doppler and refer to Stroke Prevention Clinic
- B. Start aspirin, order a CT head + Doppler, refer to SPC
- C. Start ASA and refer to SPC
- D. Tell the patient to go to immediately

TIA: The warning shot across the bow…

- TIA is a chance to change the patient's heading away from stroke, and towards improved vascular health

What is the most dangerous TIA?

- Prediction rules like ABCD2 are only partially effective
  - Sensitivity vs Specificity
  - Bad at predicting stroke
    - Perry et al CMAJ July 12 2011, 183(10)

ABCD2: Johnston et al Lancet 2007

- Age
  - < 60: 1 pt
- Blood Pressure
  - ≥ 140/90: 1 pt
- Clinical Symptoms
  - Unilateral weakness: 2 pts
  - Speech disturbance, no weakness: 1 pt
- Duration of symptoms
  - ≥ 60 minutes: 2 pts
  - 10-59 min: 1 pt
- Diabetes
  - If present: 1 pt

Performance of stratified, standardized, ABCD2 scores as a predictor of stroke at 7 and 90 days among 2032 patients with transient ischemic attack.

ABCD2 threshold for high risk	Stroke at 7 d *n = 38*		Stroke at 90 d *n = 65*	
	Sensitivity, % (95%CI)	Specificity, % (95%CI)	Sensitivity, % (95%CI)	Specificity, % (95%CI)
> 0	100.0 (90.8–100)	0.7 (0.4–1.1)	100.0 (94.4–100)	0.7 (0.4–1.1)
> 1	100.0 (90.8–100)	4.0 (3.2–4.9)	100.0 (94.4–100)	4.0 (3.1–5.0)
> 2*	94.7 (82.7–98.5)	12.5 (11.2–14.1)	96.9 (89.3–99.1)	12.7 (11.3–14.3)
> 3	92.1 (79.2–97.3)	32.7 (30.6–34.7)	92.3 (83.2–96.8)	33.0 (30.9–35.1)
> 4	65.8 (49.9–78.8)	57.2 (55.0–59.3)	63.1 (50.9–73.8)	57.4 (55.2–59.6)
> 5†	31.6 (19.1–47.5)	86.9 (85.3–88.3)	29.2 (19.6–41.2)	79.7 (77.9–81.4)
> 6	10.5 (4.2–24.1)	97.3 (96.5–97.9)	10.8 (53.2–20.6)	97.4 (96.6–98.0)

Note: CI = confidence interval.
*Threshold for defining high risk as recommended by the American Heart Association.
†Threshold for defining high risk as recommended in the original publication of the ABCD2 score.

Jeffrey J. Perry et al. CMAJ 2011;183:1137-1145

CMAJ·JAMC

- **The most dangerous TIA is the one that has not been adequately worked up quickly**

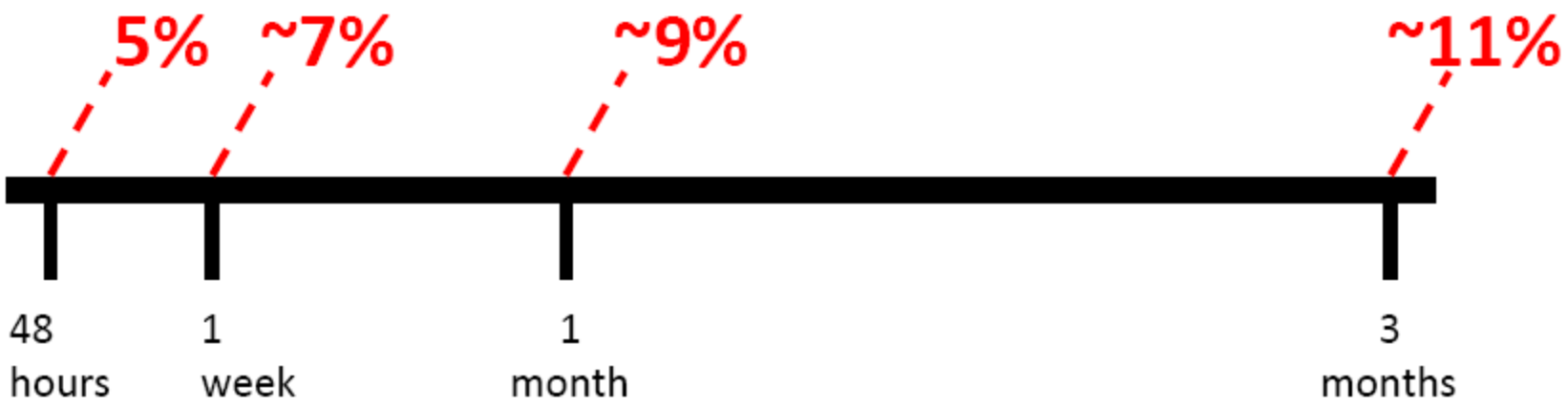
- What is the risk of death or MI within 24 hours in patients presenting with ACS?
  - **2%**

- Rao SV, Ohman EM, Granger CB, Armstrong PW, Gibler WB, Christenson RH, Hasselblad V, Stebbins A, McNulty S, Newby LK.
- Prognostic value of isolated troponin elevation across the spectrum of chest pain syndromes. *Am J Cardiol. 2003;91:936 –940.*

- What is the risk of stroke within 24 hours after TIA?
  - **4%**

- Lovett JK, Dennis MS, Sandercock PA, Bamford J, Warlow CP, Rothwell PM. Very early risk of stroke after a first transient ischemic attack. *Stroke. 2003;34:e138–e140.*

Risk of stroke after TIA



- Most of the risk is loaded up front within the first week
- *Therefore early intervention pays dividends, but late intervention doesn't*

Effect of urgent treatment of transient ischaemic attack and minor stroke on early recurrent stroke (EXPRESS study): a prospective population-based sequential comparison

Peter M Rothwell, Matthew F Giles, Arvind Chandratheva, Lars Marquardt, Olivia Geraghty, Jessica N E Redgrave, Caroline E Lovelock, Lucy E Binney, Linda M Bull, Fiona C Cuthbertson, Sarah J V Welch, Shelley Bosch, Faye Carasco-Alexander, Louise E Silver, Sergei A Gutnikov, Ziyah Mehta, on behalf of the Early use of Existing Preventive Strategies for Stroke (EXPRESS) study

Lancet Neurol 2009; 8: 235–43

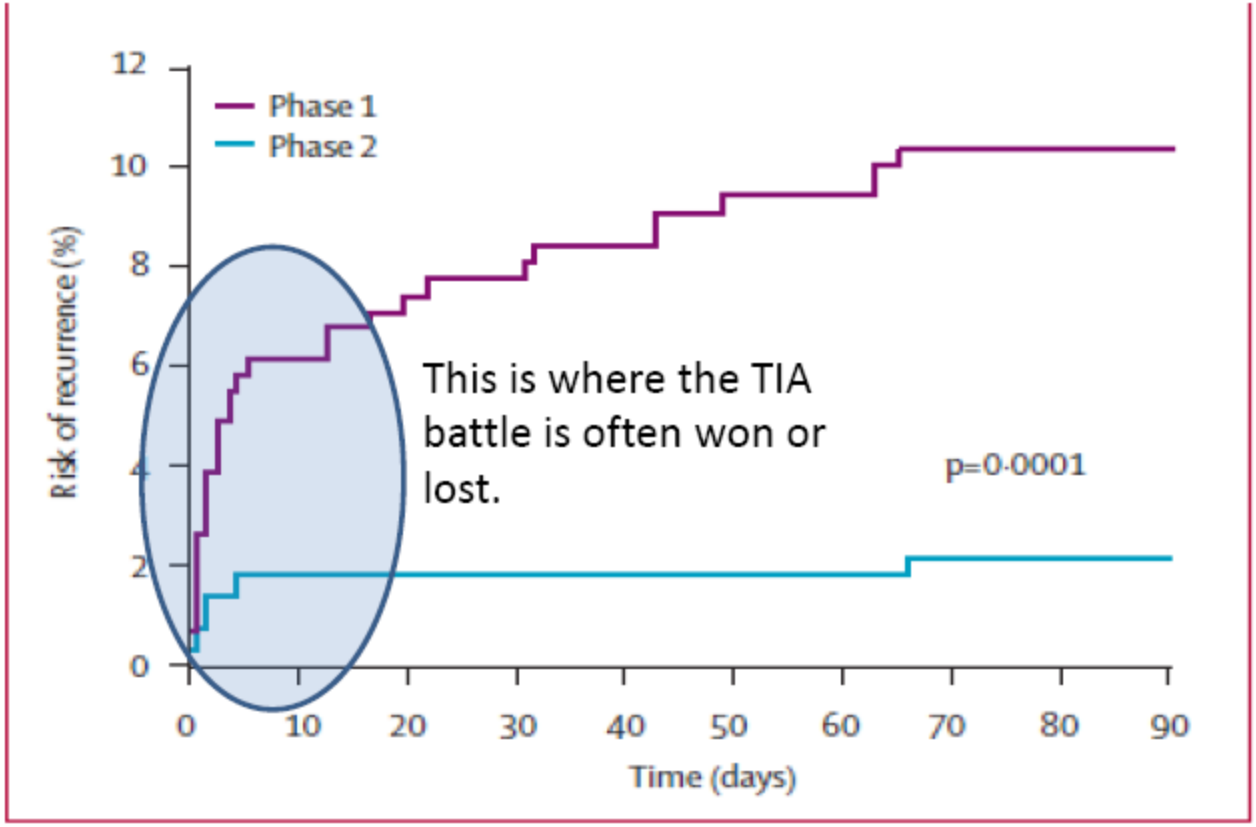
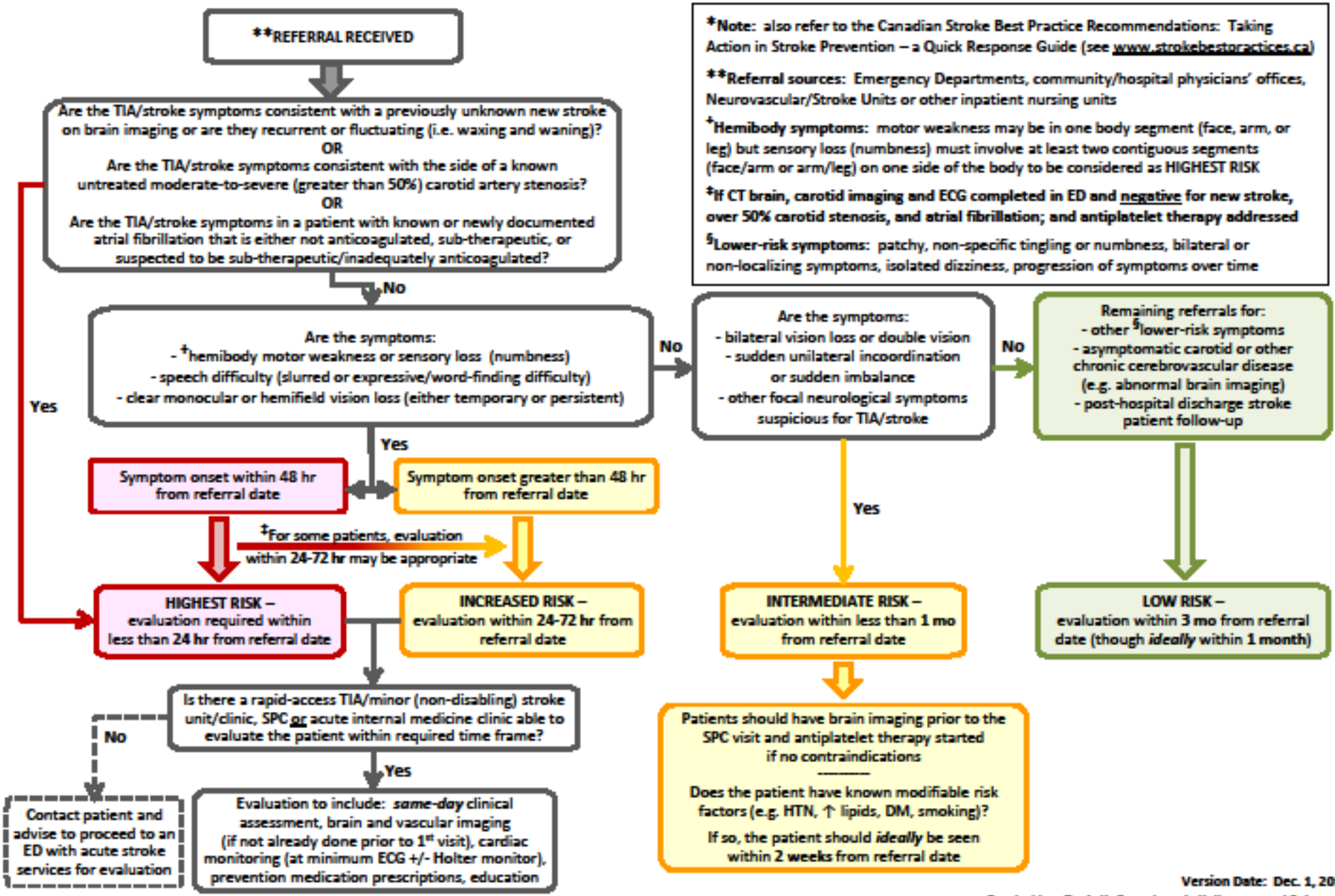


Figure 2: **Risk of recurrent stroke after first seeking medical attention in all patients with TIA or stroke who were referred to the study clinic**

Ontario Stroke Network (OSN) Ambulatory Care Triage Algorithm for Patients with Suspected or Confirmed Transient Ischemic Attack (TIA) or Stroke

*For use by regional Stroke Prevention Clinics (SPC) or other ambulatory units/clinics providing stroke prevention services



*Note: also refer to the Canadian Stroke Best Practice Recommendations: Taking Action in Stroke Prevention – a Quick Response Guide (see www.strokebestpractices.ca)

**Referral sources: Emergency Departments, community/hospital physicians' offices, Neurovascular/Stroke Units or other inpatient nursing units

†Hemibody symptoms: motor weakness may be in one body segment (face, arm, or leg) but sensory loss (numbness) must involve at least two contiguous segments (face/arm or arm/leg) on one side of the body to be considered as HIGHEST RISK

‡If CT brain, carotid imaging and ECG completed in ED and negative for new stroke, over 50% carotid stenosis, and atrial fibrillation; and antiplatelet therapy addressed

§Lower-risk symptoms: patchy, non-specific tingling or numbness, bilateral or non-localizing symptoms, isolated dizziness, progression of symptoms over time

Version Date: Dec. 1, 2014

Created by: Dr. L.K. Casaubon, L. Kelloway, and S. Jaspers

Important Symptoms

- Weakness
- Speech disturbance
- Hemibody sensory loss
- Hemifield vision loss
- Monocular vision loss

Stroke Prevention Clinic Wait Time Targets

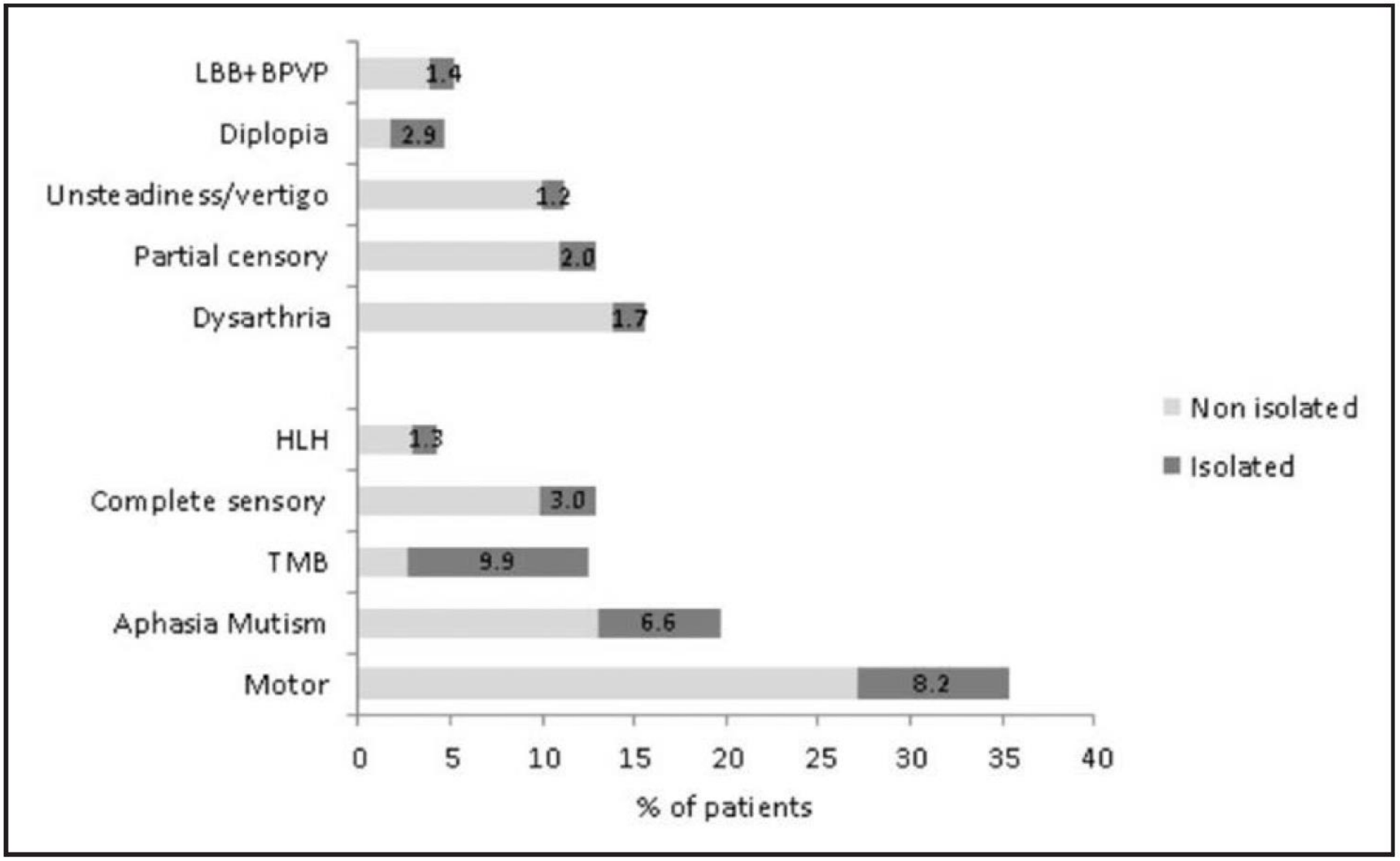
- Emergent: Symptoms less than 48 hours old, no investigations done
  - See immediately in ER and provide full assessment with neurovascular imaging
- Urgent: Symptoms > 48 hours old
  - Provide full clinical and imaging assessment within 24 to 72 hours
- Less urgent symptoms (dizziness, ataxia, diplopia)
  - Provide full clinical and imaging assessment within one month

What about the patient with atypical symptoms?

Clinical Significance of Isolated Atypical Transient Symptoms in a Cohort With Transient Ischemic Attack

Philippa C. Lavallée, MD; Leila Sissani, BST; Julien Labreuche, BST; Elena Meseguer, MD; Lucie Cabrejo, MD; Céline Guidoux, MD; Isabelle F. Klein, MD, PhD; Pierre-Jean Touboul, MD; Pierre Amarenco, MD

(*Stroke*. 2017;48:00-00. DOI: 10.1161/STROKEAHA.117.016743.)


LBB+BPVP
Diplopia
Unsteadiness/vertigo
Partial censory
Dysarthria
HLH
Complete sensory
TMB
Aphasia Mutism
Motor
1.4
2.9
1.2
2.0
1.7
1.3
3.0
9.9
6.6
8.2
Non isolated
Isolated
0
5
10
15
20
25
30
35
40
% of patients

	Isolated Transient Symptoms			*P* Value
	n* (n=1486)	Typical (n=693)	Atypical (n=219)	
Final diagnosis				<0.0001
Minor stroke	227 (15.3)	80 (11.5)	22 (10.0)	
Definite TIA without acute ischemic lesion on brain imaging	640 (43.1)	495 (71.4)	102 (46.6)	
Possible TIA	185 (12.4)	46 (6.6)	53 (24.2)	
Nonischemic event	434 (29.2)	72 (10.4)	42 (19.2)	

Values are numbers of subjects (%). TIA indicates transient ischemic attack.

*TIA with at least 2 symptoms (at least 2 typical, 2 atypical, or at least 1 typical and 1 atypical).

When in doubt, err on the side of caution even if symptoms are atypical

Shorter wait time = Fewer strokes

For the patient in the ED with high risk symptoms

- Vascular imaging (either CTA or carotid Doppler) should be done before leaving the ED.

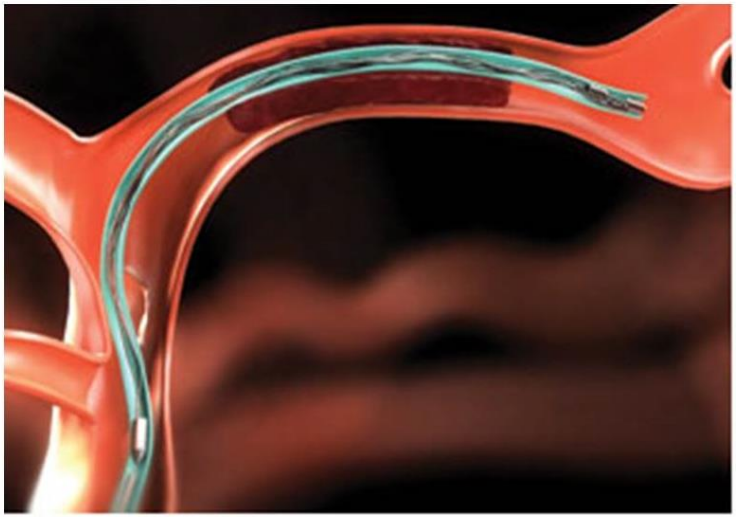
- Ask yourself, if your family member had a TIA, knowing that there is a high chance for infarction in the next 48 hours (5%), where would you wish to be: at home waiting for a vascular imaging appointment, or in the ED being watched closely for any stroke symptom recurrence which may prompt Acute Stroke Protocol?

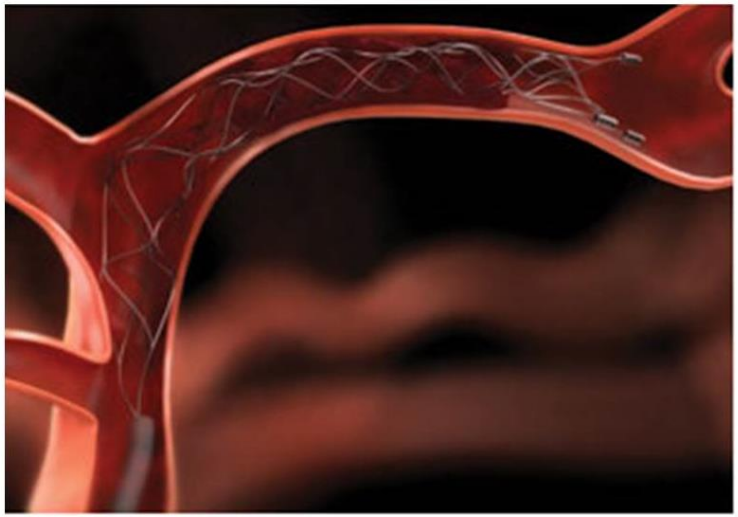
How does Endovascular Therapy for Acute Stroke (EVT) change management?

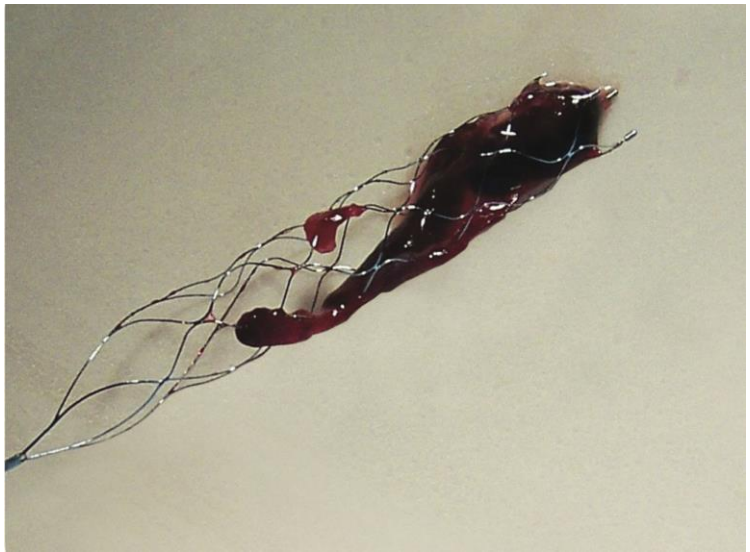
What is EVT?

- Direct treatment using a catheter to effect removal or lysis of a thrombus from an extracranial or intracranial artery
  - Can also include intra-arterial tPA
  - Retrievable stent

Stent retriever







The Big Five EVT Trials of 2015

- Recently in 2015, there were five RCTs comparing IV tPA against an endovascular approach using a “retrievable stent”
  - MR CLEAN
  - EXTEND IA
  - ESCAPE
  - REVASCAT
  - SWIFT PRIME

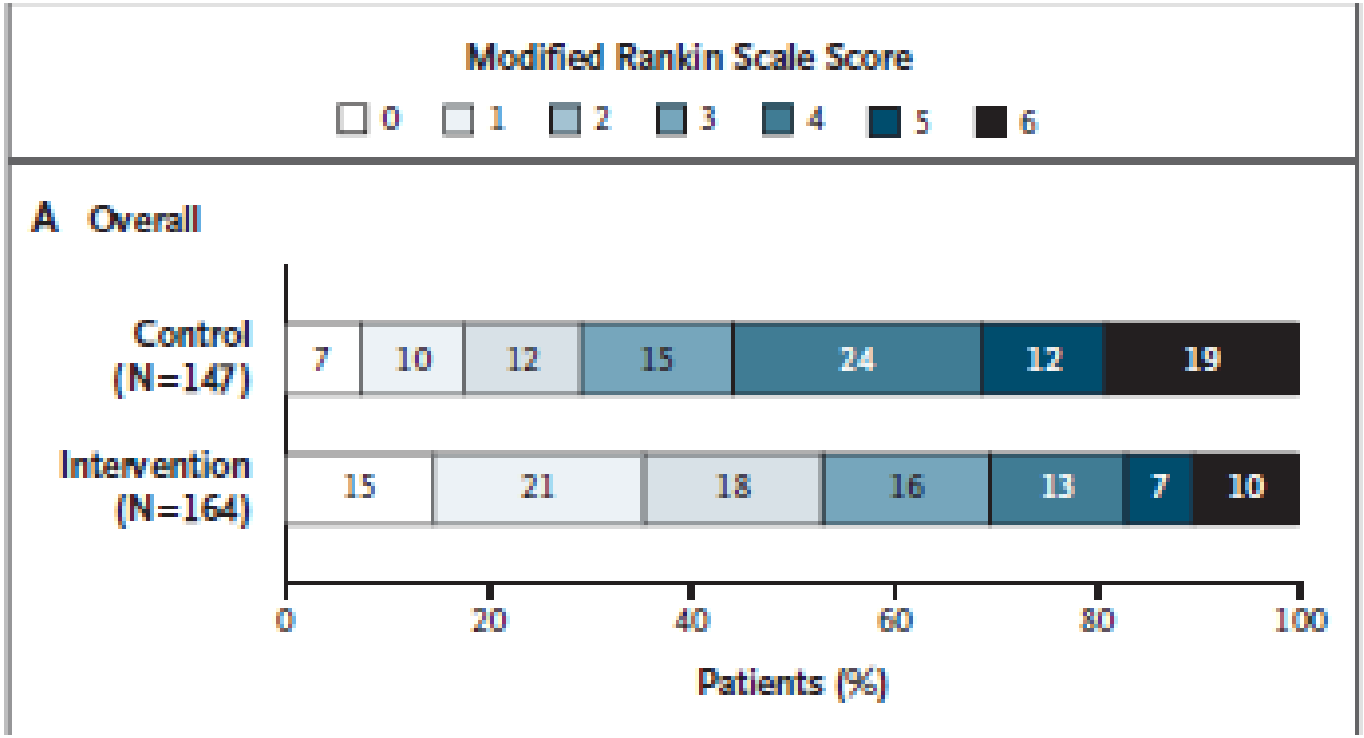
N Engl J Med 2015;372:1019-30

ORIGINAL ARTICLE

Randomized Assessment of Rapid Endovascular Treatment of Ischemic Stroke

M. Goyal, A.M. Demchuk, B.K. Menon, M. Eesa, J.L. Rempel, J. Thornton, D. Roy, T.G. Jovin, R.A. Willinsky, B.L. Sapkota, D. Dowlatshahi, D.F. Frei, N.R. Kamal, W.J. Montanera, A.Y. Poppe, K.J. Ryckborst, F.L. Silver, A. Shuaib, D. Tampieri, D. Williams, O.Y. Bang, B.W. Baxter, P.A. Burns, H. Choe, J.-H. Heo, C.A. Holmstedt, B. Jankowitz, M. Kelly, G. Linares, J.L. Mandzia, J. Shankar, S.-I. Sohn, R.H. Swartz, P.A. Barber, S.B. Coutts, E.E. Smith, W.F. Morrish, A. Weill, S. Subramaniam, A.P. Mitha, J.H. Wong, M.W. Lowerison, T.T. Sajobi, and M.D. Hill for the ESCAPE Trial Investigators*

ESCAPE Trial Results

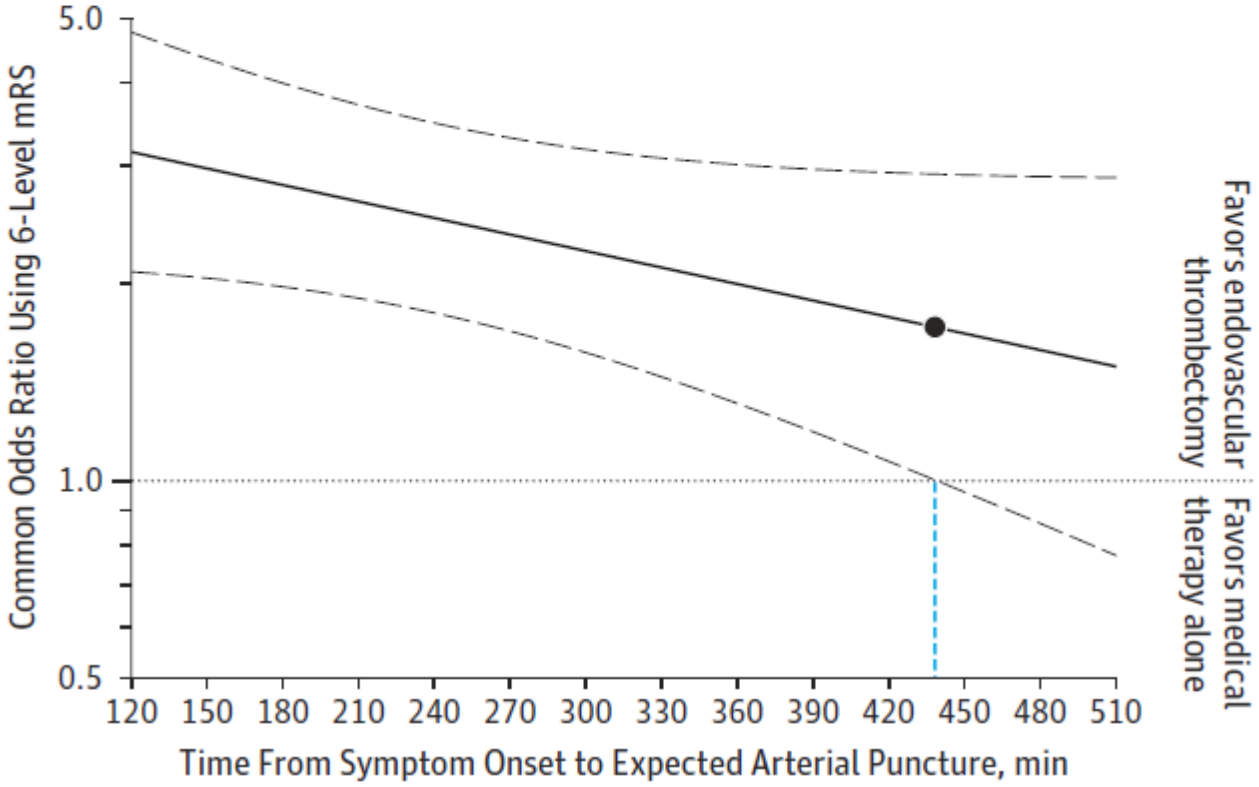


- Intervention: 53% good outcome
- Control: 29% good outcome

Benefit with EVT up to 7.3 hours after stroke onset

A Odds ratio for less disability at 3 mo in endovascular thrombectomy vs medical therapy alone groups by time to treatment

JAMA. 2016;316(12):1279-1288. doi:10.1001/jama.2016.13647
Corrected on December 19, 2016.



When to call Kingston for potential EVT?

- If symptom onset within 3.5 hours, as usual activate Acute Stroke Protocol.
- If symptom onset > 3.5 hours, call to discuss the case with the on-call Neurologist.
  - Some cases have mild symptoms and may not benefit from EVT
  - Some cases won't arrive in Kingston in time for EVT

Los Angeles Motor Scale (LAMS)

- Easy to use
- High sensitivity and specificity for large vessel occlusion
- https://www.mdcalc.com/los-angeles-motor-scale-lams
- Stroke. 2008 August ; 39(8): 2264–2267

The Los Angeles Motor Scale (LAMS)

Facial Droop	
Absent	0
Present	1
Arm Drift	
Absent	0
Drifts down	1
Falls rapidly	2
Grip Strength	
Normal	0
Weak grip	1
No grip	2

- LAMS ≥ 4 predicts large vessel occlusion with sensitivity 81% and specificity 89%

Summary

- Key components of TIA management:
  - Vascular imaging
  - Rapid access TIA clinic

- Treatment of acute stroke is changing quickly with EVT an option for stroke patients who can be transported within 6 hours of onset