

Understanding Stroke: From Etiology to Early Diagnosis

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Introduction

- Importance of early recognition and management of stroke
- Learning outcomes:
 - Understand types and mechanisms of stroke
 - Recognize early signs
 - Appreciate the “time is brain” principle

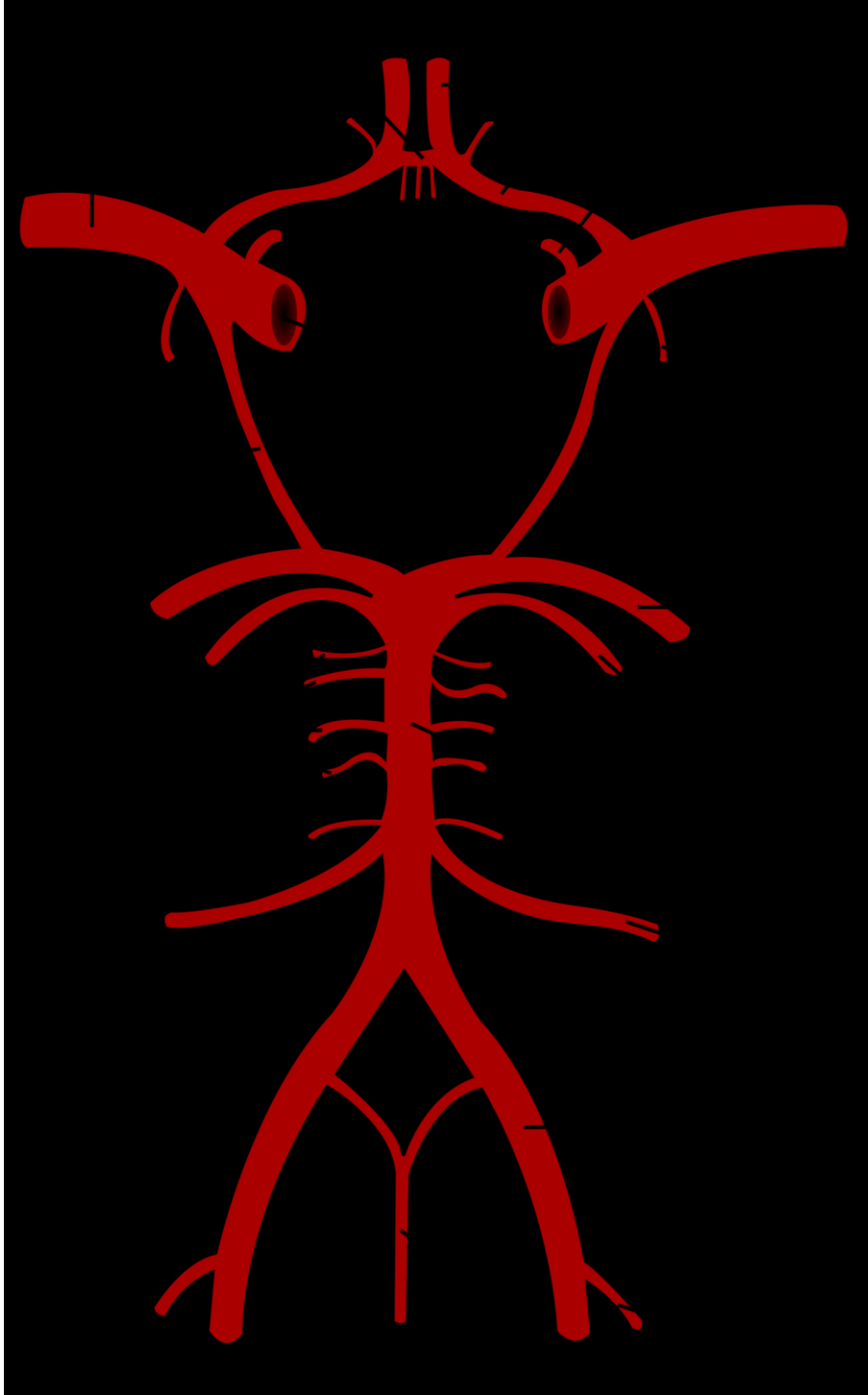
Definition of Stroke

- **General definition:**

- “A clinical syndrome characterized by sudden onset of focal (or occasionally global) neurological deficit lasting >24 hours or leading to death, with no apparent cause other than vascular.”

- **Transient Ischemic Attack (TIA):**

- Neurologic dysfunction lasting <24 h (usually <1 h), without infarction on imaging.



Types of Stroke (video 1):

- **Ischemic Stroke (~85%)**
 - Due to occlusion of a cerebral artery (thrombotic or embolic)
- **Hemorrhagic Stroke (~15%)**
 - **Intracerebral Hemorrhage (ICH)** – bleeding within brain parenchyma
 - **Subarachnoid Hemorrhage (SAH)** – bleeding into subarachnoid space

Epidemiology

- **Global burden:**

- 2nd leading cause of death worldwide
- Leading cause of long-term disability

- **Age and gender distribution:**

- Risk increases with age; men slightly higher incidence, women higher mortality

- **Modifiable vs non-modifiable risk factors:**

- Non-modifiable: age, sex, genetics
- Modifiable: hypertension, diabetes, smoking, atrial fibrillation, dyslipidemia, obesity, sedentary lifestyle

Etiology (videos)

- **Large artery atherosclerosis** (carotid or intracranial)
- **Cardioembolism** (AF, MI, valvular disease)
- **Small vessel disease (lacunar stroke)**
- **Other causes** (dissection, vasculitis, coagulopathies)
- **Cryptogenic** (~25–30%)

Time is brain (video)

- 1.9 million neurons lost per minute of ischemia
- Goal: *door-to-needle < 60 min; door-to-reperfusion < 90 min*
- Emphasize golden window for tPA or thrombectomy

Diagnosis

TABLE 36.3 Prehospital Stroke Scales

Cincinnati Prehospital Stroke Scale/FAST	Yes	No
Facial droop?	☐	☐
Arm drift?	☐	☐
Speech abnormal?	☐	☐

POSITIVE SCREEN if any questions are positive.

Los Angeles Motor Scale	Points		
	0	1	2
Facial strength	Normal	Droop	—
Arms outstretched	Normal	Drifts down	Falls rapidly
Grip strength	Normal	Weak grip	No grip

POSITIVE SCREEN for stroke with high likelihood of large-vessel occlusion for a score of 2 or more.

Abbreviation: FAST, Face Arm Speech Test.

TABLE 16.1 Symptoms and Signs of Acute Stroke

Facial asymmetry

Lateralized limb weakness or clumsiness

Lateralized numbness or paresthesias

Slurred or confused speech

Visual disturbances (diplopia or difficulty seeing)

Dizziness or vertigo

Gait instability

Headache

Alterations in level of consciousness

Door to treatment in ≤ 60 min



0 min

Suspected stroke
patient arrives
at ED



≤ 10 min

Initiate MD evaluation,
including patient history
and time last known
well/symptom onset
Initiate labwork
Examine using NIHSS



≤ 15 min

Notify stroke team
(including neurologic
expertise)



≤ 25 min

Initiate CT scan



≤ 45 min

Interpret CT scan using
ASPECTS
Review labs if available
Review patient eligibility
for tPA



≤ 60 min

Give tPA bolus
and initiate infusion
in eligible patients

Clinical Evaluation

- **FAST** or **BE FAST** mnemonic (Balance, Eyes, Face, Arm, Speech, Time)
- Determine onset time (“last known well”)
- Assess airway, breathing, circulation, glucose

Neurologic Assessment

1a. Level of consciousness (LOC):

0 = Alert; keenly responsive

1 = Not alert but arousable by minor stimulation to obey, answer, or respond

2 = Not alert; requires repeated stimulation to attend or is obtunded and requires strong or painful stimulation to make movements (not stereotyped)

3 = Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid, and areflexic

1b. LOC questions: The patient is asked the month and his or her age.

0 = Answers both questions correctly

1 = Answers one question correctly

2 = Answers neither question correctly

1c. LOC commands: The patient is asked to open and close the eyes and then to grip and release the nonparetic hand.

0 = Performs both tasks correctly

1 = Performs one task correctly

2 = Performs neither task correctly

2. Best gaze: horizontal eye movements

0 = Normal

1 = Partial gaze palsy; gaze is abnormal in one or both eyes.

2 = Forced deviation or total gaze paresis not overcome by the oculoccephalic maneuver

3. Visual loss:

0 = No visual loss

1 = Partial hemianopia

2 = Complete hemianopia

3 = Bilateral hemianopia (blind including cortical blindness)

0 = Normal symmetric movements

1 = Minor paralysis (flattened nasolabial fold, asymmetry on smiling)

2 = Partial paralysis (total or near-total paralysis of lower face)

3 = Complete paralysis of one or both sides (absence of facial movement in the upper and lower face)

5. Motor arm: The limb is elevated for 10 s, scored separately for left and right.

0 = No drift; limb holds 90° (or 45°) for full 10 s.

1 = Drift; limb holds 90° (or 45°) but drifts down before full 10 s; does not hit bed or other support

2 = Some effort against gravity; limb cannot get to or maintain (if cued) 90° (or 45°), drifts down to bed, but has some effort against gravity.

3 = No effort against gravity; limb falls.

4 = No movement

6. Motor leg: The limb is elevated for 5 s, scored separately for left and right.

0 = No drift; leg holds 30° position for full 5 s.

1 = Drift; leg falls by the end of the 5-s period but does not hit bed.

2 = Some effort against gravity; leg falls to bed by 5 s but has some effort against gravity.

3 = No effort against gravity; leg falls to bed immediately.

4 = No movement

7. Limb ataxia:

0 = Absent

1 = Present in one limb

2 = Present in two limbs

8. Sensory:

0 = Normal; no sensory loss

1 = Mild to moderate sensory loss; patient feels pinprick is less sharp or is dull on the affected side; or there is a loss of superficial pain with pinprick, but patient is aware of being touched.

2 = Severe to total sensory loss; patient is not aware of being touched in the face, arm, and leg.

9. Best language:

0 = No aphasia; normal

1 = Mild to moderate aphasia

2 = Severe aphasia; all communication is through fragmentary expression.

3 = Mute, global aphasia; no usable speech or auditory comprehension

10. Dysarthria:

0 = Normal

1 = Mild to moderate dysarthria; patient slurs at least some words and, at worst, can be understood with some difficulty.

2 = Severe dysarthria; patient's speech is so slurred as to be unintelligible in the absence of or out of proportion to aphasia.

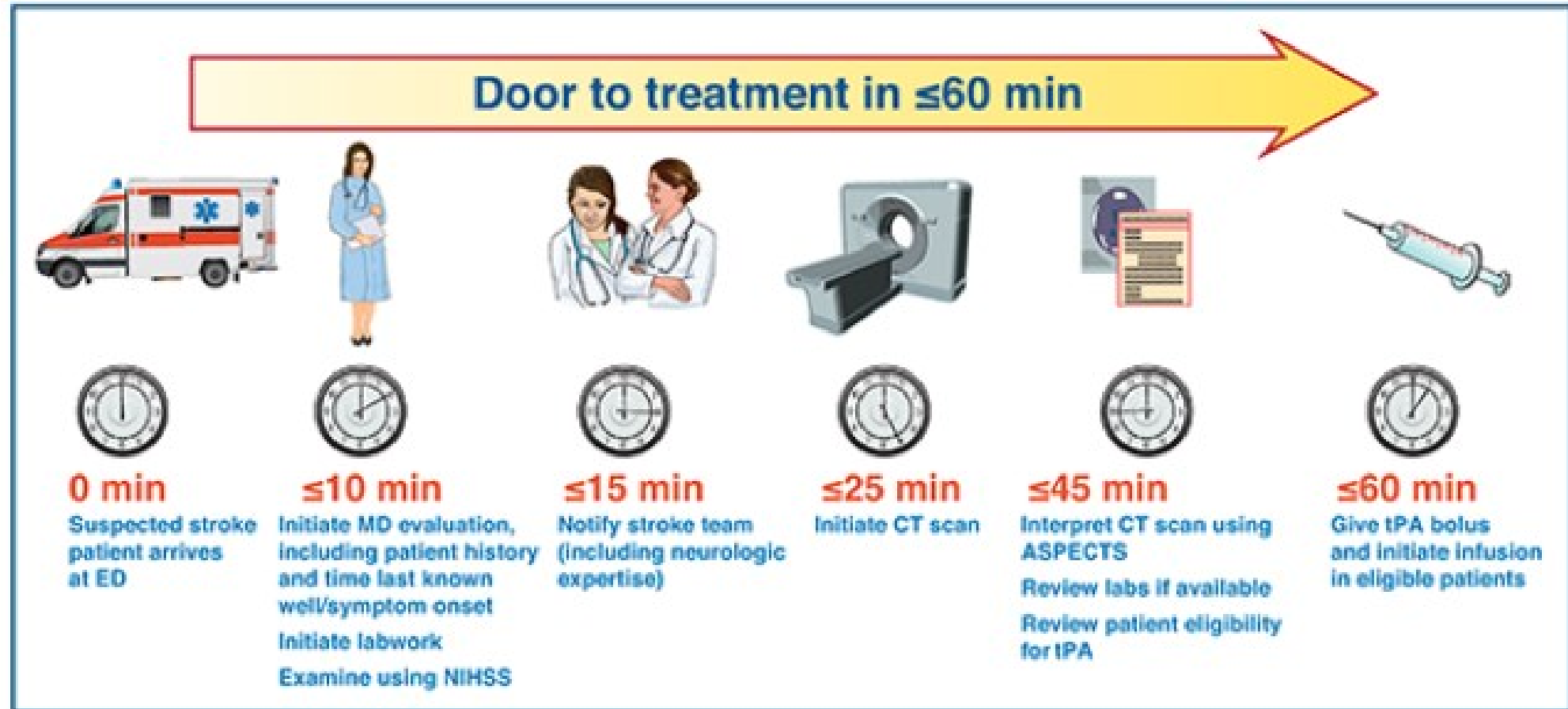
11. Extinction and inattention:

0 = No abnormality

1 = Visual, tactile, auditory, spatial, or personal inattention or extinction to bilateral simultaneous stimulation in one of the sensory modalities

2 = Profound hemi-inattention or extinction to more than one modality; does not recognize own hand or orients to only one side of space

Imaging



Across
Alberta,
Canada

Pre

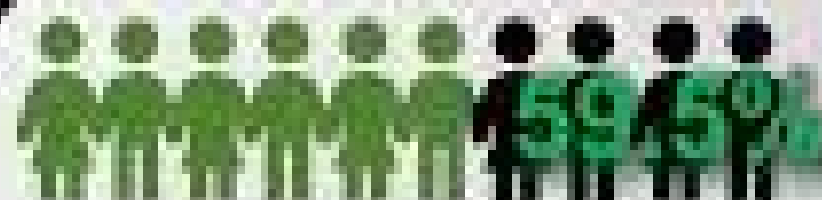
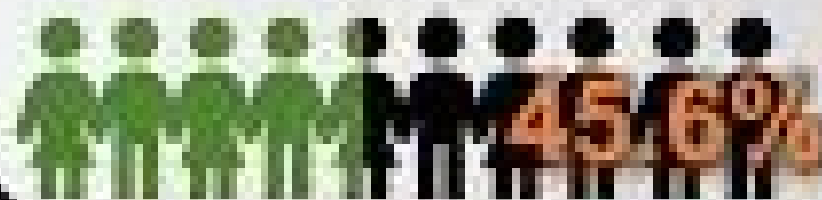
Post

Door-to-Needle Time

70 min

39 min

Percent of Patients
Discharged Home



- **CT scan (non-contrast)**
 - **MRI (DWI/FLAIR)**
 - **CT Angiography**

Laboratory Tests

- Glucose, CBC, electrolytes, coagulation profile, ECG, troponin, etc

•The only emergent one is BS

Asking Questions

