EMS FOR STROKE
EMS: THE FIRST LINE OF DEFENSE
AT THE END OF THIS PRESENTATION, YOU WILL BE ABLE TO:

• Describe the importance of recognizing stroke urgently and acting quickly
• Detail the role of EMS in prehospital stroke management
• Describe the importance of timely arrival
• Describe the impact of stroke disability on patients and their families
UNDERSTANDING STROKE: A major cause of morbidity and mortality in the United States!

- Strikes about 795,000 people a year\(^1\)
- Leads to over 147,000 deaths a year\(^1\)
- Leading cause of serious, long-term disability\(^1\)
- Occurs on average every 40 seconds\(^2\)
- Results in death on average every 3.5 minutes\(^1\)
- Cost projected to more than double between 2015 and 2035\(^1\)
STROKE: THE 5TH LEADING CAUSE OF DEATH IN THE UNITED STATES

STROKE IS THE FIFTH LEADING CAUSE OF DEATH IN THE UNITED STATES

- Unintentional injuries: 68.0 (2019), 68.2 (2018)
- Stroke: 57.1 (2019), 57.0 (2018)

DEATHS PER 100,000 STANDARD POPULATION


Statistically significant decrease in age-adjusted death rate from 2019 to 2018 (P<0.05).
Statistically significant increase in age-adjusted death rate from 2018 to 2019 (P<0.05).
RISK FACTORS:

Stroke can happen to anyone, regardless of race, sex, or age. One in 5 strokes occur in individuals under 55 years of age, and that proportion is increasing.

Certain factors and medical conditions have been associated with increased risk:

• For Black patients aged 45-54, the risk of acute ischemic stroke (AIS) is 4 times that of White patients
• Individuals who smoke or are obese have a greater risk for stroke
• The lifetime risk of stroke is higher for women than for men. Among individuals 55-75 years, lifetime stroke risk is 1 in 5 for women, and 1 in 6 for men.
• Individuals are at a higher risk for AIS if they have comorbidities that affect the circulatory system
  • Hypertension
  • High cholesterol
  • Atrial fibrillation
  • Diabetes
ALARMING FACTS:

• Each year, approximately 55,000 more women than men have a stroke
• In 2018, 84,966 women and 62,844 men died due to stroke
• The AIS hospitalization rate in people under 65 has increased over time
• The number of people 18-64 years old who have had a stroke has increased over time
• Black patients have more than double the incidence of first ischemic stroke compared to White patients and are more likely to die from stroke than any other racial/ethnic group
• Hispanic patients have a high incidence of first stroke compared with White patients
TYPES OF STROKE

ISCHEMIC: Fatty plaque or a clot blocks blood flow, starving cells of oxygen (87% of strokes)

HEMORRHAGIC: A blood vessel leaks or breaks (13% of strokes)

Management varies depending on both the severity and the type
GOAL FOR ISCHEMIC STROKE: SAVE THE PENUMBRA

The penumbra is an area of potentially salvageable tissue beyond the blood-starved infarct.

Over time, the infarct expands in the penumbra, increasing the area of irreversible brain damage.

The average stroke patient can lose over a million neurons in the brain every minute “TIME IS BRAIN”
KNOW YOUR ROLE
EMS PLAYS A CRITICAL ROLE IN EARLY STROKE CARE

Stroke patients who use EMS services can benefit from:

- Earlier arrival to the ED
- Quicker evaluation in the ED
- More rapid treatment
- Greater likelihood of receiving reperfusion treatment (if eligible)

Only 60% of stroke patients call 911/use EMS

- Men and the Black and Hispanic communities are less likely to use EMS
EMS MANAGEMENT OF ACUTE STROKE: ON SCENE

- Manage CABs: give oxygen if needed
- Obtain blood glucose level
- Perform prehospital stroke assessment (BEFAST, SNO) *
- Establish and record exact time patient was last seen normal
- If possible, bring a witness to the hospital; alternatively, get the name and cell phone number of the witness
- Medical history: *
  - Identify current medications taken by patient, especially any antiplatelet or anticoagulant medications: (ASA, warfarin, etc)
  - Record recent illnesses, surgery, or trauma and any history of stroke, drug abuse, migraine, infection
**LVO (Large Vessel Occlusion)**

Think SNO

**S:** Speech (expressive aphasia – unable to speak)

**N:** Neglect (one side of the world does not exist for the patient)

**O:** Ocular deviation (eye gaze deviation to one side only, and not able to look past the midline to the other side)
COMMON STROKE SYMPTOMS

Common stroke symptoms

**Right Hemispheric Stroke**
- Slurred speech - dysarthria
- Weakness or numbness of left face, arm or leg
- Left sided neglect
- Right gaze preference

**Left Hemispheric Stroke**
- Speech problems – what is being said or inability to get words out
- Problems with comprehension
- Weakness or numbness of right face, arm, or leg
- Left gaze preference

**Brainstem Stroke Symptoms**
- Nausea, vomiting or vertigo
- Speech problems
- Swallowing problems
- Abnormal eye movements
- Decreased consciousness
- Crossed findings

**Intracerebral Hemorrhage**

**Intraparenchymal Hemorrhage**
- Nausea and Vomiting
- Headache
- One Sided Weakness
- Decreased Consciousness

**Subarachnoid Hemorrhage**
- Worst Headache of Life
- Intolerance to Light
- Neck Stiffness or Pain
ANTERIOR “EASY”, POSTERIOR “DIFFICULT”

**Common symptoms of anterior stroke**

- Aphasia
- Disturbed consciousness
- Dysarthria
- Facial palsy
- Hemisensory deficits
- Homolateral motor deficit

**Common symptoms of posterior stroke**

Think of the 5 D’s

- Dizziness (accounts for 56% of cases)
- Diplopia: (double vision)
- Dysarthria: (slurred/slow speech that can be difficult to understand)
- Dysphagia: (difficulty swallowing)
- Dystaxia: (impaired balance or coordination)

**Can also have nausea, vomiting, not able to balance sitting or standing**

“Posterior” accounts for 20-25% of ALL ischemic strokes
The NIHSS scoring system is heavily biased toward anterior circulation and left-hemisphere stroke.

Cranial nerve signs and ataxia, typical of posterior circulation strokes, receive fewer points or are excluded entirely (HA, nausea, walking excluded).

Right-hemisphere strokes are often underestimated, as only 2 points are directed toward neglect, compared to 7 toward language.

Due to this uneven scoring, it is therefore possible that, depending on the location of the infarct, some patients may have a low NIHSS score but still have persistent neurological deficits!
WHAT FUNCTION IS AT RISK?

BRAIN AREAS AND RELATED FUNCTIONS

Clot location impacts symptoms based on associated neuroanatomy.

**Frontal lobe**
- Control of mood, emotions, and thought
- Conveys emotion in speech, facial expressions, and gestures

**Parietal lobe**
- Sensory perception

**Occipital lobe**
- Occipitoparietal cortices mediate verbal and nonverbal material for immediate visual memory
- Occipitotemporal regions are used in object and facial recognition

**Insula**
- Language processing and function

**Temporal lobe**
- Emotional modulation of memories
- Fear conditioning
- May store long-term autobiographical memory

**Cerebellum**
- Refines force and timing of movement
- Contributes to coordinated stepping

**Brain stem**
- Balance and locomotion
  - Initiation and speed of locomotion
  - Postural tone
  - Modulation of muscle-generated force

References:
Conditions that may mimic stroke
- Bell’s palsy
- Complicated migraine
- Conversion disorder/psychogenic conditions
- Hypertensive encephalopathy
- Hypoglycemia
- Infection/abscess
- Seizures
- Tumor
**Contraindications** to Alteplase therapy: risk of bleeding is greater than the potential benefit

- Current intracranial hemorrhage
- Subarachnoid hemorrhage
- Active internal bleeding
- Recent (within 3 months) intracranial or intraspinal surgery or serious head trauma
- Presence of intracranial conditions that may increase the risk of bleeding (neoplasms, arteriovenous malformations, or aneurysms)
- Bleeding diathesis (plt count of $<100,000$, INR $>1.7$, aPTT $>40$ seconds, PT $>15$ seconds)
- History of warfarin use
- Received a treatment dose of low-molecular-weight heparin within the previous 24 hours
- Taking direct thrombin inhibitors or direct factor Xa inhibitors
EMS MANAGEMENT OF ACUTE STROKE

Prehospital notification:

• EMS personnel should provide prehospital notification to the receiving hospital that a suspected stroke patient is en route so that the appropriate hospital resources may be mobilized before patient arrival.

En route, EMS should inform the hospital of:

• Time of stroke symptom onset or time patient was last seen normal (LKWT)
• Patient’s medical history
• Current glucose level
• Medication patient is currently taking
CARE EN ROUTE CONTINUED

1. Provide supplemental oxygen to maintain oxygen saturation >94%

2. Monitor blood pressure. Do not treat unless advised by medical control: (tPA can be started with a BP of 185/110, and while infusing needs to be <180/105)

3. Check and record blood glucose to assess for hypoglycemia and manage appropriately. DO NOT administer dextrose in non-hypoglycemic patients

4. Establish cardiac monitoring and intravenous (IV) access if possible
STROKE IS ONE OF THE LEADING CAUSES OF LONG-TERM DISABILITY IN THE UNITED STATES

“Disability is defined as a “yes” response to at least 1 of the following”:

- Use of an assistive device (cane, crutches, walker, or wheelchair"
- Difficulty performing activities of daily living (ADLs)
- Limitation in the ability to work around the house or at a job/business
IN SUMMARY...

Stroke is the 5th leading cause of death in the US

Approximately 87% of strokes are ischemic; 13% are hemorrhagic

Stroke is a major cause of morbidity and mortality in the US

Prehospital notification and acquisition of history of event, is critical

Stroke deficits can lead to disability and can have long-term impacts on both the patient and caregiver

Less than half of 911 calls for stroke are made within the first hour of symptom onset
EMS Recognition

Quarter 1: (ALMC) Elkhorn EMS team: DTN 33 minutes
Quarter 2: (ALMC) Lake Geneva EMS team: DTN 28 minutes
Quarter 3: none
Quarter 4: (ALMC) Medix: DTN 29 minutes
            (AMCB) Waterford: DTN 22 minutes
EMS MAKES A DIFFERENCE: THANK YOU FOR ALL YOU DO!