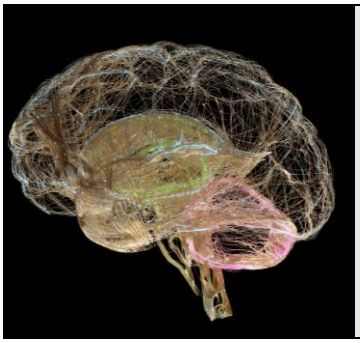
Neurological Assessment

Nicole Zmijewski
NRP

Objectives

- Identify the framework of a neurological assessment
- Review different aspects of the neurological assessment
- Identify abnormalities in neurological responses
- Identify pertinent diagnoses related to neurological assessment findings.



Organization

- Systematic approach
  - Mental status assessment
  - Higher cerebral functions
  - Cranial nerves
  - Sensory exam
  - Motor system
  - Reflexes
  - Cerebellar testing
  - Gait and station

Mental Status

- Can be brief or detailed
- Major elements include: appearance, mood, thought, appropriate awareness, attention and memory
  - Attention can be assessed with number repetition
  - Abnormalities can be the result of: confusion, delirium, language perception
  - Long term memory – assessed with recollection of events from years prior
  - Short term memory – can be assessed with 3 object recall
- Remember: Patients with an abnormal mental status (especially attention problems or disorientation) usually have a medical problem.
  - Psychiatric causes are generally not the underlying problem

Assessment Tidbits

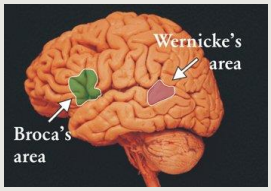
Mnemonic for Altered LOC!

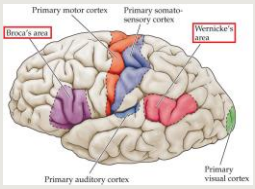
Higher Cerebral Functions

- Language function is main function of the dominant hemisphere of the cerebral cortex
  - Left hemisphere in most people
- Spatial relationships is the main function of the non-dominant hemisphere of the cerebral cortex
  - Right hemisphere in most people
- Dysphasia can be the result of cortical damage
  - You may notice a problem with comprehension, processing, or production of language

Dysphasia Assessment

- Monitor for correct responses to questions
- Follow simple commands
  - Identify common objects: pen, watch, etc.
- Nonfluent Aphasia: speed of language and the ability to find correct words may be impaired.
- Fluent Aphasia: word production is normal, normal grammar and rhythm, clear articulation, however incorrect words are substituted.
- Not uncommon to find a mix of both types in your assessment
- Repeat a phrase: "No ifs, ands, or buts"





Assessment Tidbit

- A patient with fluent aphasia may have such severely impaired communication – they are misdiagnosed as intoxicated or psychotic!

Words of the Day

AGNOSIA

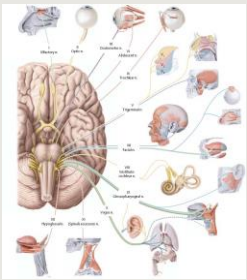
- Unable to state name of object due to breakdown in communication between visual cortex in occipital lobe and temporal lobe.

APRAXIA

- Patient can name an object but has no idea how to use it. Results from damaged nerve tracts between the temporal lobe and the frontal lobe.

Cranial Nerves

- WHAT?!?!?!?!

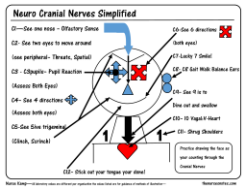


Cranial Nerves

- CN II Optic Nerve: visual acuity, pupillary reactivity – direct and indirect responses
- CN III, IV, and VI: extraocular movements
- CN V: assesses muscles for mastication
- CN VII: facial movement
- CN VIII: hearing
- CN IX and X: pharyngeal musculature and gag reflex
- CN XI: shoulders
- CN XII: tongue

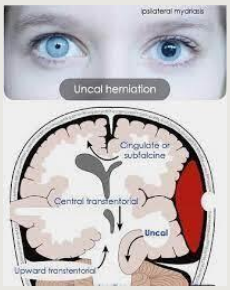
Cranial Nerves

Summation



Assessment Tidbits

- A comatose patient with a unilaterally dilated pupil that is unreactive or sluggish has CN III impingement
  - Consistent with herniation syndrome



NIH Stroke Scale - Assessment


MAY is
Stroke Awareness Month
Together
to End Stroke™
American Heart Association
American Stroke Association

Pain Management

DO WE ALWAYS ADVOCATE FOR OUR PATIENTS?

Mark E Briggs

Learning Objectives

- Review the importance of pre-hospital pain recognition and assessment
- Review barriers to adequate EMS pain management
- Patient Assessment
  - History
  - Pain assessment scale
  - Physical exam and reassessment
- Treatment of Pain
  - Nonpharmacologic
  - Pharmacologic

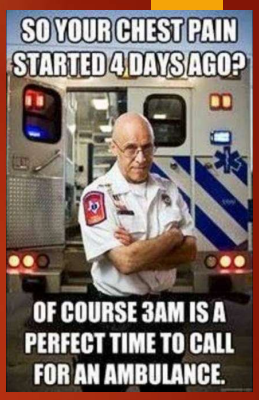
LCEMS Pain Management

- How often do you give pain meds?
- What are the barriers to why you wouldn't give pain meds?
- Do you just not think about it
- Have we just changed our thought process and moved it so far down in the treatment modality that we don't use it

The importance of Pre-Hospital pain recognition and assessment

- Pain is the most COMMON reason for seeking health care and as a presenting complaint accounts for up to 78% of all ED visits.
- Pain affects more Americans than diabetes, cancer, and heart disease combined!
- Acute pain is a common reason for 911 calls.

Pain Management BARRIERS



- Other more emergent treatment priorities
- Concern for delayed transport
- Short transport time
- Dosing concerns, especially in high risk populations (Elderly and Peds)
- Lack of initial and continuing pain assessment and management education

Pain Management MYTHS

- Common rhetoric of "treat first what kills first" or "Pain is not life threatening"
- Administration of pain medications may mask serious underlying disorders
- Use of opioids in acute pain field management leads to increase in addiction
- Most patients exaggerate or over-report pain
- Prior interaction do not affect provider's ability to remain objective

Why is EMS Pain Management Important?

Pain has many effects that can be both Physiologic and Psychologic

Pain can cause:

- Tachycardia
- Hypertension
- Increased myocardial oxygen consumption
- ***Uncontrolled acute pain may have a link to post traumatic stress disorder and if inadequately treated can lead to chronic pain.***
- Pain due to chest trauma may inhibit respiratory effort and therefore decrease oxygenation and ventilation

Why is EMS Pain Management Important?

- In cardiac patients it can help to drop the patients blood pressure
- It also has an affect on preload for that stemi patient
- It reduces anxiety and helps your patient relax
- Vassal dilation can also help with increase in oxygen delivery and save heart tissue.

Why is EMS Pain Management Important?

- Administration of pain medications and comfort measures by EMS significantly decreases waiting times for pain reduction or relief.
- With overcrowded EDs and wait times, many patients will have a delay in ED pain assessment and management while waiting to be seen.
- Studies have shown pain treatment deferred to receiving facilities by EMS led to pain medication delays of up to 90 minutes.
- Pre-hospital pain management aids in improved ED triage, patient comfort, vital signs, and patient assessment.

Why is EMS Pain Management Important?

Early management in the field also provides long-term benefits such as:

- Decreased incidence of post-traumatic stress
- Decreased long-term complications in children
- Prevention of chronic pain, through the development of hypersensitized pain pathways

Pain Assessment

- Vital signs:
- Blood pressure
- Heart rate
- Respiratory rate
- 02 Saturation
- Temp

- Perform a through physical exam including skin exam to look for pain patches
- Look for subtle clues such as facial grimacing and patient position.

Pain Assessment

- Is the pain: Acute, Chronic or Acute on Chronic Pain
- Acute: Lasting less than three months
- Chronic: Lasting more than three months or beyond the expected course of complete tissue healing
- Acute on Chronic pain: Acute exacerbations of a chronic painful syndrome

Pain Assessment

Pain assessment in the field:

- Pain assessment should be evaluated as part of general patient care with both adult and child.
- Assessment of pain should be preformed early and re-assessed after an intervention
- Consider all patients as candidates for pain management and comfort measures

Pain Assessment

Pain assessment tool:

- O: onset (when did the pain start)
- P: Provocation or Palliation(what makes it better or worse)
- Q: Quality/describe your pain (sharp, dull, crushing)
- R: Region and Radiation
- S: Severity (pain score)
- T: Timing (Type of onset, intermittent, constant)

This is a tool that was taught to us in basic EMT class.

Pain Assessment

Pain assessment scores, history and physical exam are used to determine intensity which is subjective and may very from one provider to another.

Pain Intensity can range from:	Scores Typically range from:
MILD	**1-4**
MODERATE	**5-7**
SEVERE	**8-10**

Pain Assessment

How do you interpret pain scores:

There is no single defined score that correlates to actual pain.

Even using the same scale for two different patients doesn't allow for comparison of pain intensity.

Select a scale and be consistent!

Pain Protocols

The flow chart in Tab 900-1 states to use a combination of pain scale, circumstances, MOI, injury or illness severity. Moderate to Severe, IV/IO, Cardiac Monitor, Fentanyl or Morphine sulfate

Fentanyl: Max initial: dose 50mcg

Burns Max initial: 100mcg

Fentanyl: Max cumulative dose: 200mcg

Morphine Sulfate: Max initial dose: 10mg

Morphine: Max cumulative dose: 20mg

Reassess every 5 Minutes keep your patient comfortable

Pain Protocols

The next drug inline is Ketamine. Remember that we use this for excited delirium. This medication has been used in the ED and ICU settings for procedural sedation via dissociative amnesia and analgesia. This drug can be administered as pain medication in certain situations:

- If your patient has a history of opioid use and has built a tolerance for opioids.
- If your patient has suffered a traumatic event during an overdose and you used Narcan to revive them and has a significant injury and pain.
- If you have a patient that is hypotensive and needs pain management
- This is a MED CONTROL ORDER ONLY! Dose 0.25mg/kg IV / IO / IM / IN Max. initial dose 25mg Max. cumulative dose 100mg

Ketamine Related Information

- Below you will fine a couple of links/QR codes. The first one is an article where paramedic got in trouble for giving to much Ketamine.
- The second link is and article about the pros and cons of Ketamine
- https://www.ems1.com/ketamine/articles/report-fd-medic-gave-high-dose-of-ketamine-to-patient-who-later-died-qtiqRbGnltjzVPMY/
- https://www.hmpgloballearningnetwork.com/site/emsworld/article/1223851/pharmacology-101-pros-and-cons-ketamine

Pain Protocols

A number of studies have shown that early administration of analgesics allow patients to relax, removes voluntary guarding and permits better assessment of localized tenderness

Case Scenario

84 year old female c/o difficulty breathing

Upon arrival pt. states that this breathing problem woke her up

The pt. is anxious and sitting forward tripod position

Pt. History: Dialysis, HTN, Hyperlipidemia

Pt. vitals as follows

B/P: 219 / 121

SpO2: 97

ETCO2: 29

Pulse: 107

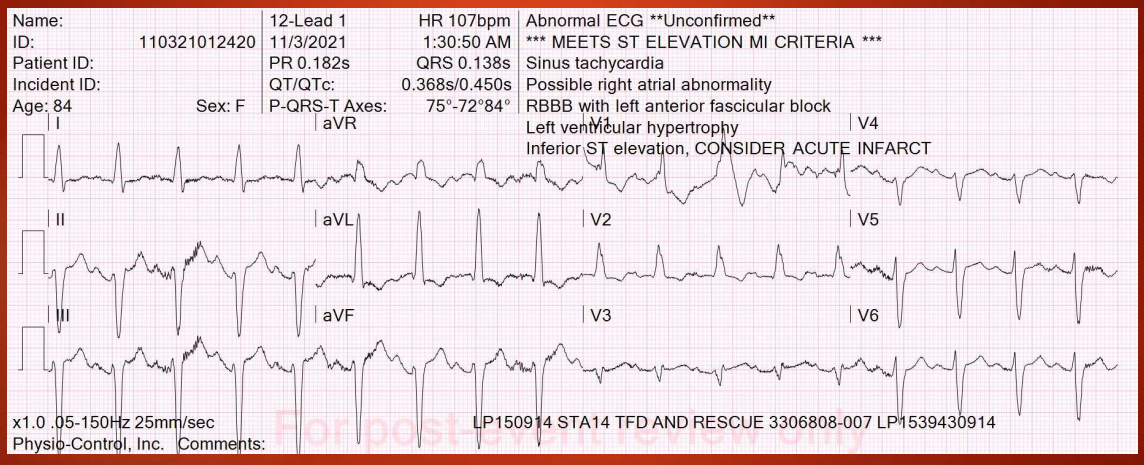
Lung sounds clear but diminished

First responders 12 Lead stamped as a STEMI

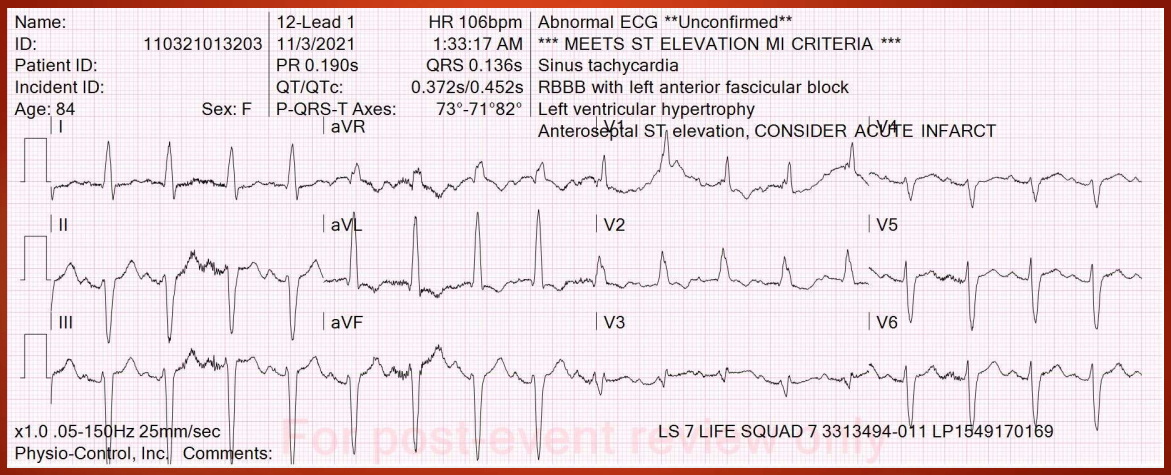
Between the engine crew and LS they est. IV given Oxygen at 15 leader by Non-rebreather ASA, Nitro with no relief

MONA Therapy was completed by giving the patient 3mg Morphine IVP

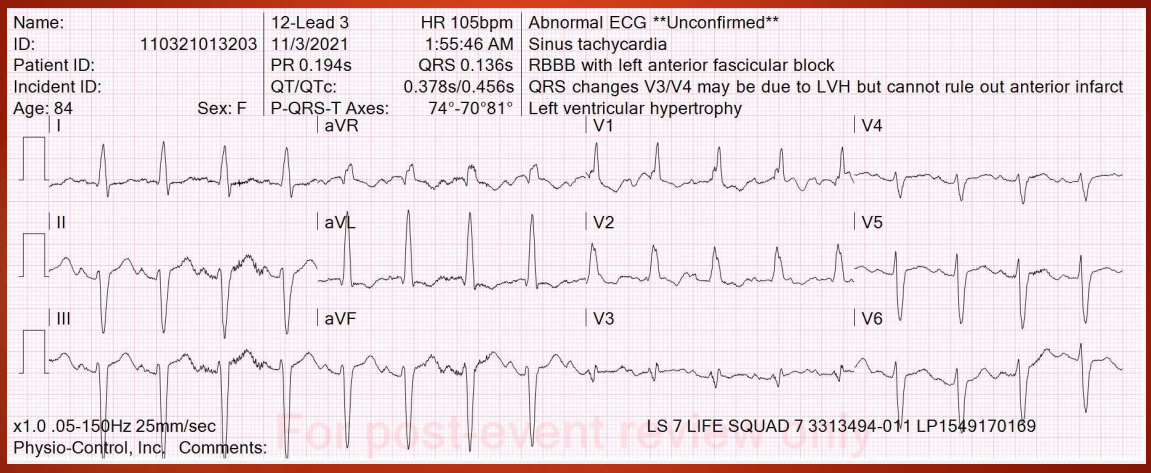
Case Scenario



Case Scenario



Case Scenario



Case Scenario

Last set of vitals

B/P:171/95

Pulse: 98

SpO2: 99%

ETCO2: 35

Pt, stated that she felt better and could breath much better and was less anxious.

Summary

- Advocate for your patient
- Understanding the importance of pre-hospital pain recognition and treatment
- Complete assessment to include History, Pain Assessment and Physical exam.
- Treatment early in the case, Reassessment and Redosing to cover your patient until they can be treated by hospital staff.

Thank You for Your Time!

Mark E. Briggs
mbriggs@co.lucas.oh.us

Evolution of Stroke Recognition and Care

Shawn Wittkop NRP, EMT I, BSN

Stroke Evaluation and Care

Stroke Statistics

In 2018, Someone in the United States has a stroke every 40 seconds. Every 4 minutes, someone dies of stroke.

Every year, more than 795,000 people in the United States have a stroke. About 610,000 of these are first or new strokes.

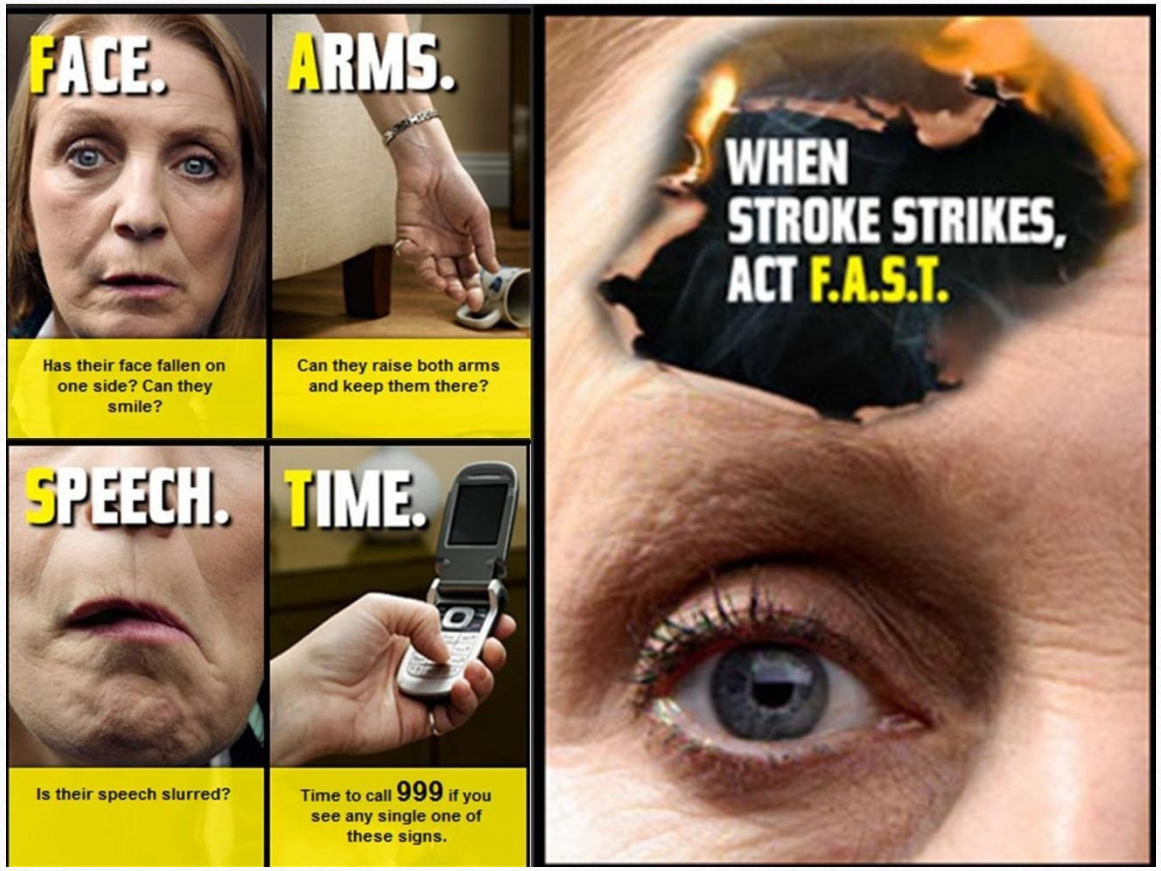
About 185,000 strokes—nearly 1 of 4—are in people who have had a previous stroke.

About 87% of all strokes are ischemic strokes, in which blood flow to the brain is blocked.

Stroke is a leading cause of serious long-term disability. Stroke reduces mobility in more than half of stroke survivors age 65 and over.

FAST

- Facial Palsy
  - Ask Patient to show their teeth
- Arm Motor Function
  - Extend arm 90 degrees(sitting) 45 degrees (supine)
- Speech
  - Is speech garbled or incomprehensible
- Time
  - Onset



RACE

- Rapid Arterial oCclusion Evaluation
  - Arm Motor Function
    - Extending arm for 10 seconds
  - Leg Motor Function
    - Extending leg 30 degrees for 5 seconds
  - Head and Gaze Deviation
    - To one side
  - Aphasia (RIGHT HEMIPARESIS)
    - “close your eyes,” “make a fist”
  - Agnosia (LEFT HEMIPARESIS)
    - “who’s arm is this?” “can you move your arm?”

American Heart Association. Mission:Lifeline Stroke

RACE
RAPID ARTERIAL OCCLUSION EVALUATION SCALE

A STROKE ASSESSMENT TOOL FOR EMS

EMS RACE Stroke Scale - Rapid Arterial oCclusion Evaluation Scale, used to predict large cerebral arterial occlusions.*

ITEM	INSTRUCTION		RACE Score
FACIAL PALSY	Ask the patient to show their teeth	ABSENT (symmetrical movement) MILD (slightly asymmetrical) MODERATE TO SEVERE (completely asymmetrical)	0 1 2
ARM MOTOR FUNCTION	Extending the arm of the patient 90 degrees (if sitting) of 45 degrees (if supine)	NORMAL TO MILD (limb upheld more than 10 seconds) MODERATE (limb upheld less than 10 seconds) SEVERE (patient unable to raise arm against gravity)	0 1 2
LEG MOTOR FUNCTION	Extending the leg of the patient 30 degrees (if supine)	NORMAL TO MILD (limb upheld more than 5 seconds) MODERATE (limb upheld less than 5 seconds) SEVERE (patient unable to raise leg against gravity)	0 1 2
HEAD AND GAZE DEVIATION	Observe eyes and cephalic deviation to one side	ABSENT (eye movements to both sides were possible and no cephalic deviation was observed) PRESENT (eyes and cephalic deviation to one side was observed)	0 1
APHASIA If right hemiparesis	Ask the patient two verbal orders: - *“close your eyes”* - *“make a fist”*	NORMAL (performs both tasks correctly) MODERATE (performs one task correctly) SEVERE (performs neither task)	0 1 2
AGNOSIA If left hemiparesis	Asking: - *“Who’s arm is this?” while showing him/her the paretic arm (asomatognosia)* - *“Can you move your arm?” (anosognosia)*	NORMAL (no asomatognosia nor anosognosia) MODERATE (asomatognosia or anosognosia) SEVERE (both asomatognosia and anosognosia)	0 1 2
		RACE SCALE TOTAL: Any score above a “0” is a “Stroke Alert”	

* *Chart adapted from Perez de la Ossa N, Carrera D, Gorchs M, et al. Design and validation of a prehospital stroke scale to predict large arterial occlusion: the rapid arterial occlusion evaluation scale. Stroke; a journal of cerebral circulation. Jan 2014;45(1):87-91.*

ADDITIONAL INFORMATION

PRE-HOSPITAL MANAGEMENT OF AN ACUTE STROKE[1]

- Assess the airway, breathing and circulatory status
- Check blood glucose
- Obtain full set of vital signs
- Review patient medications
- Perform 12 lead ECG
- Establish IV access

ACUTE ISCHEMIC STROKE - IV t-PA CONTRAINDICATIONS[2]

- Active internal bleeding
- Recent intracranial or intraspinal surgery or serious head trauma
- Intracranial conditions that may increase the risk of bleeding
- Bleeding diathesis
- Current severe uncontrolled hypertension
- Current intracranial hemorrhage
- Subarachnoid hemorrhage

PATIENT REPORT TO ED - KEY ITEMS[3]

- Patients’ age, sex, weight
- Mechanism of injury or medical problem
- Chief complaint with brief history of present illness
- Vital signs
- Level of consciousness
- General appearance, distress, cardiac rhythm
- Interventions by EMS (IV, medication administration)
- ETA (the more critical the patient, the earlier you need to notify the receiving facility)

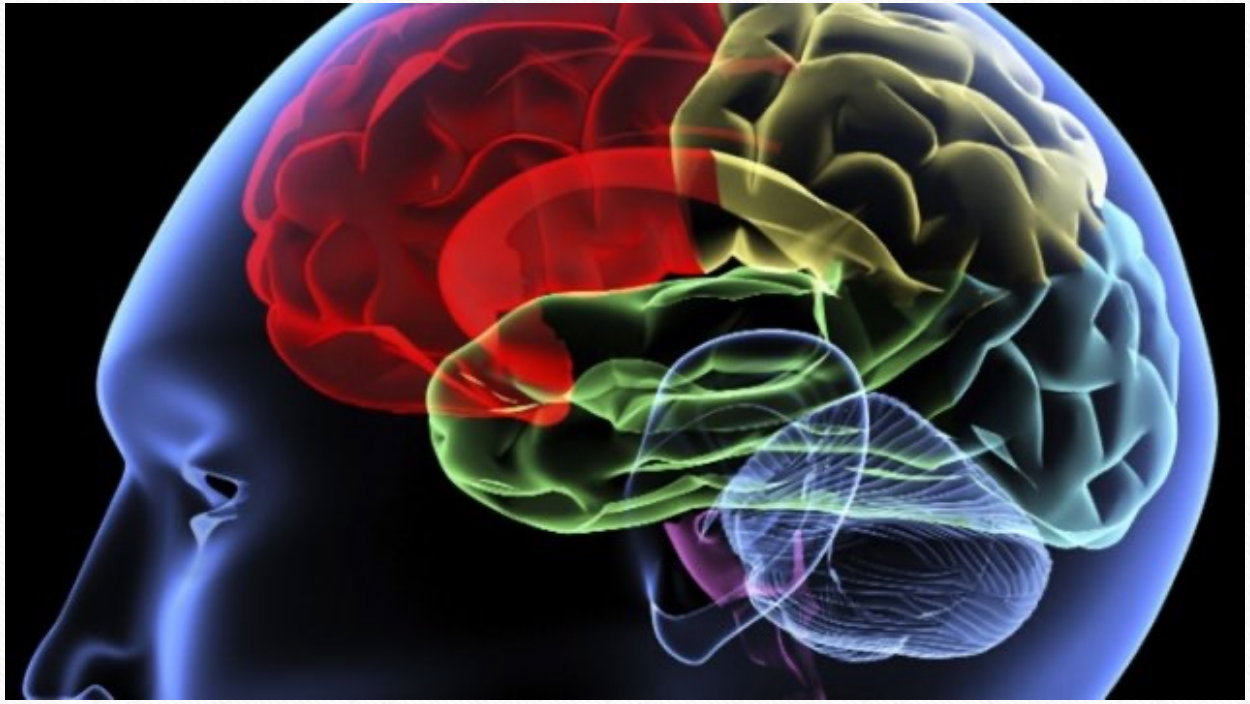
** MECHANICAL THROMBECTOMY IS AN OPTION FOR ALL STROKE PATIENTS UNTIL PROVEN OTHERWISE**
Always follow your state, local or EMS agency/medical directors’ protocols.

[1] Maggiore, W.A. (2012). “Time is Brain’ in Prehospital Stroke Treatment. Journal of Emergency Medical Services, 1-9.
[2] Genentech USA, Inc. Highlights of prescribing information, Activase (alteplase for injection, for intravenous use). http://www.gene.com/download/pdf/activase_prescribing.pdf. Accessed on February 15, 2016.
[3] Campbell S, Robinson MR. Paramedic Lab Manual. Upper Saddle River, N.J.: Pearson Prentice Hall; 2005.

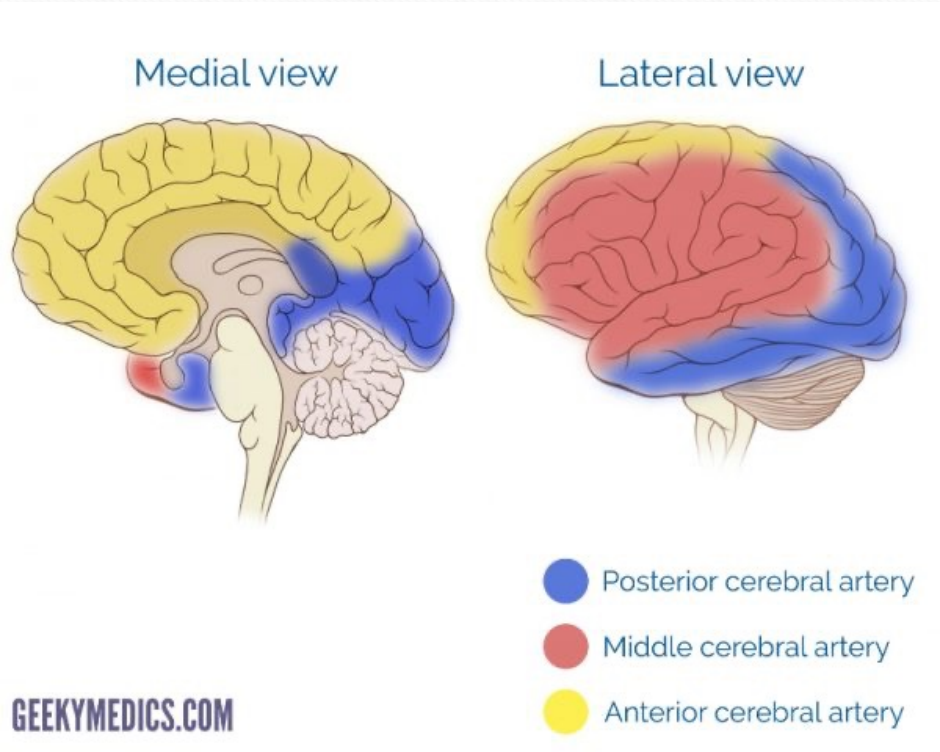
LEARN MORE
To learn more and obtain free EMS resources from the **American Heart Association** - visit
www.heart.org/nebraskamissionlifeline

“one of the next emerging plateaus to EMS”

Anatomy and Physiology



Cerebral Circulation



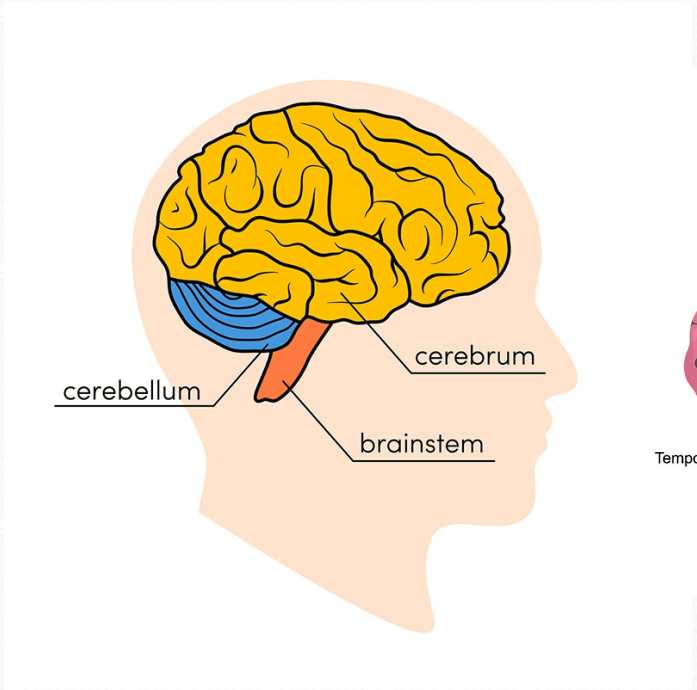
Double click to play video

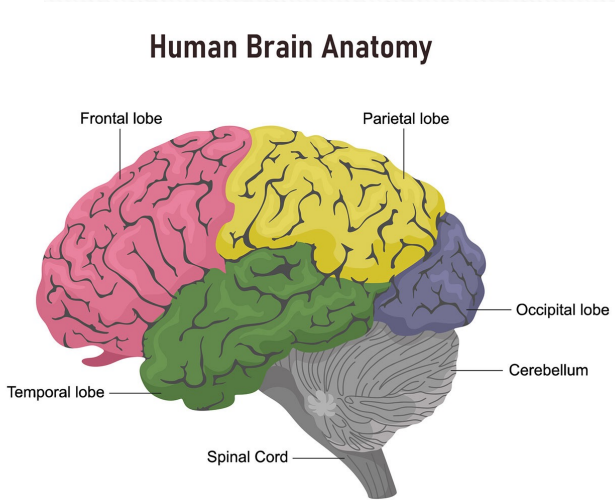
Don’t forget about The Circle of Willis

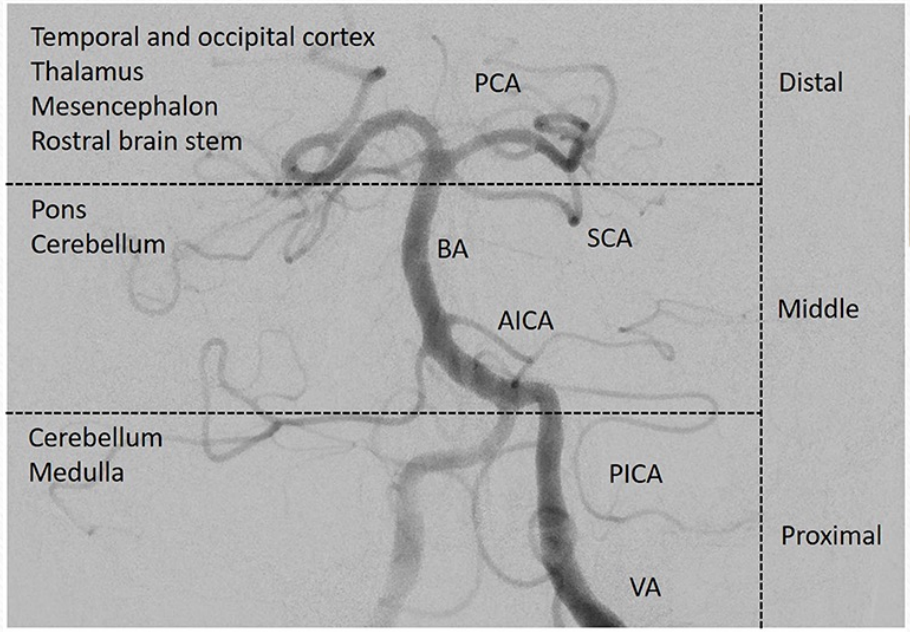
Connects to the Posterior cerebral arteries, to the anterior cerebral arteries, and the middle cerebral arteries.

Originating from the Internal Cerebral Artery and Vertebral Artery

Consider More Closely Posterior Circulation







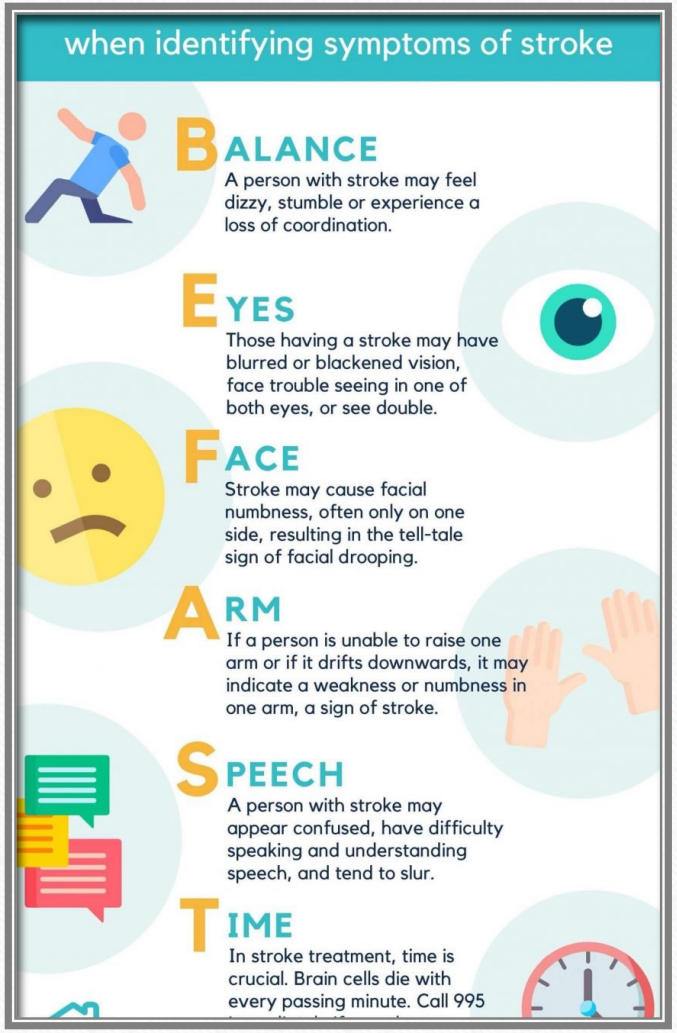
Is Balance and Eyes really important?

UK study suggesting 14% missed early diagnosis of stroke cases

Stroke education BEFAST – Increase Community Awareness

EMS provides initial screening for LVO (RACE) and can further help prioritize stroke patients on a BEFAST

The overall GOAL - Decrease stroke recognition times for smaller more distal circulation occlusions



RACE ALERT

Cincinnati Stroke Scale (BE FAST)

RACE ALERT Patient Check Sheet

Check boxes if findings abnormal:

- ☐ **B (Balance)** — Balance: Loss of balance, trouble walking, loss of coordination, dizziness, headache
- ☐ **E (Eyes)** — Eyes: Vision loss, blurred vision
- ☐ **F (Face)** — Facial Droop: Have patient smile or show teeth. (Look for symmetry)
- ☐ **A (Arm)** — Motor Weakness: Arm drift (close eyes, extend arms, palms up)
- ☐ **S (Speech)** — Speaking: "You can't teach an old dog new tricks". (Repeat phrase)
- ☐ **T (Time)** — TIME LAST SEEN NORMAL:_____

If any of the first 5 boxes are checked, consider the patient to be a STROKE ALERT. Move to section 1.

Section 1: Check all Appropriate Box(es)

- ☐ Patient is DNR/Comfort Care
- ☐ Symptoms started >24 (Don't check box if onset time is unknown or patient woke up with deficit)
- ☐ Hypoglycemia; Drug Overdose; Temperature >101°

Is any item checked?

- ☐ YES: Patient IS NOT a Stroke Alert. **TRANSPORT TO CLOSEST, APPROPRIATE ED.**
- ☐ NO: **PROCEED TO SECTION 2 to determine stroke severity.**

Section 2: Check all Appropriate Box(es)

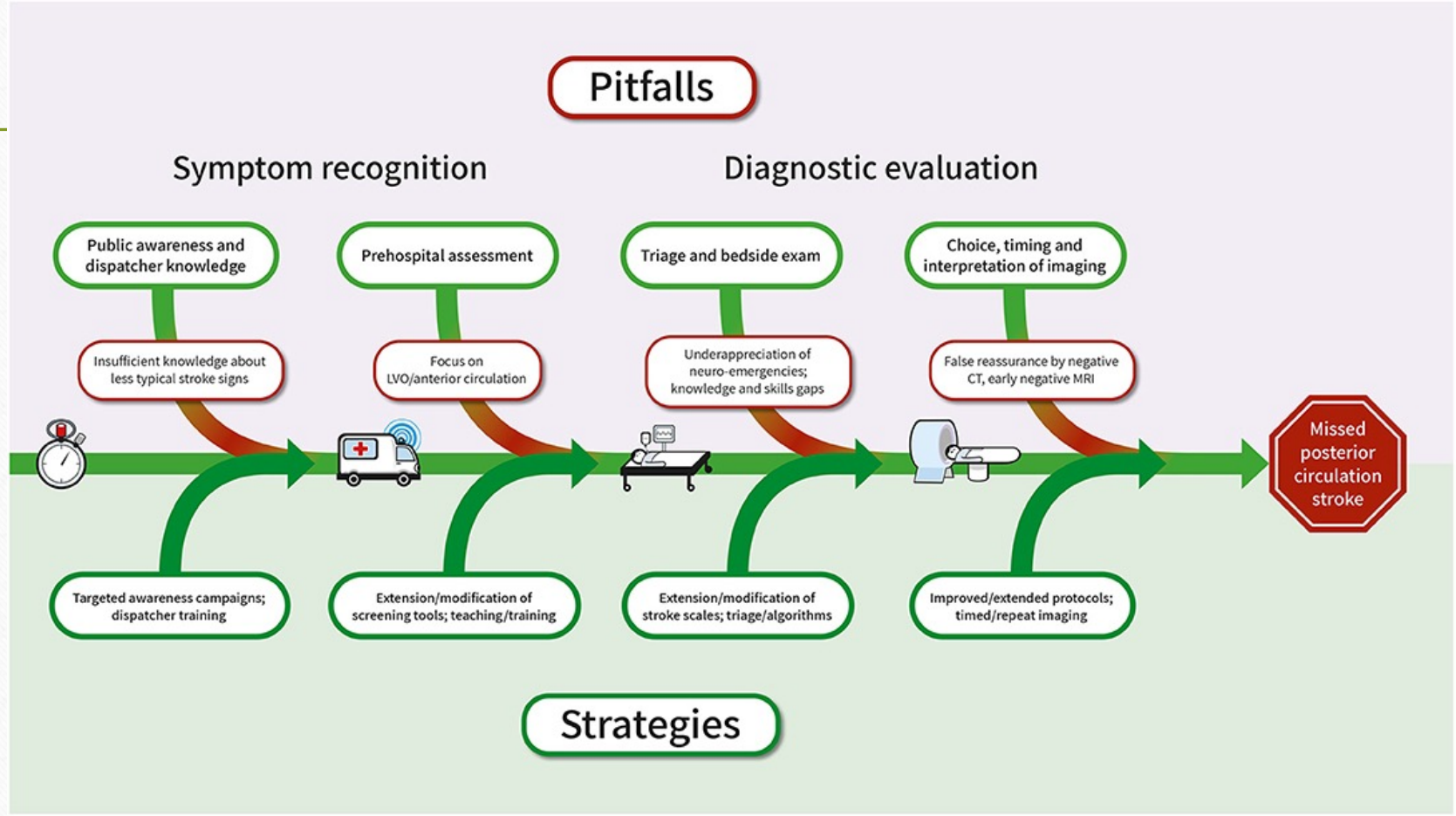
- ☐ RACE Score is >5 (Refer to RACE Score sheet on page 2)
- ☐ Patient is Obtunded, RACE Score cannot be completed.

Is any item checked?

- ☐ **YES:** This is a moderate to severe stroke. **TRANSPORT TO THE CLOSEST INTERVENTIONAL STROKE CENTER.**
- ☐ **NO:** This is a mild stoke. **TRANSPORT TO THE CLOSEST ED.**

Item	Instruction		Race Score
Facial Palsy	Ask the patient to show teeth	**Absent** (symmetrical movement)	0
		Mild (slightly asymmetrical)	1
		Moderate to severe (completely asymmetrical)	2
Arm motor function	Extending the arm of the patient 90° (if sitting) or 45° (if supine)	**Normal to mild** (limb upheld more than 10 seconds)	0
		Moderate (limb upheld less than 10 seconds)	1
		Severe (patient does not raise arm against gravity)	2
Leg motor function	Extending the leg of the patient 30° (in supine)	**Normal to mild** (limb upheld more than 5 seconds)	0
		Moderate (limb upheld less than 5 seconds)	1
		Severe (patient does not raise leg against gravity)	2
Head and gaze deviation	Observe eyes and head deviation to one side	**Absent** (eye movement to both sides were possible and no head deviation was observed.	0
		Present (eyes and head deviation to one side was observed)	1
Aphasia (if right hemiparesis)	Ask the patient two verbal orders • "close your eyes" • "make a fist"	**Normal** (performs both tasks correctly)	0
		Moderate (performs one task correctly)	1
		Severe (performs neither tasks)	2
Agnosia/Neglect (if left hemiparesis)	Asking: • "Whose arm is this?" while showing him/her the impaired arm. • "Does this arm feel weak or impaired to you?	**Normal** (recognizes arm and the impairment)	0
		Moderate (does not recognize arm or impairment).	1
		Severe (does not recognize arm and im-	2

Posterior Circulation Strokes



BE

- Balance
  - Does your patient have a sudden loss of balance or coordination?
    - Is Dizziness or perhaps Vertigo a symptom we are being told?
- Eyes
  - Is the patient reporting visual changes?
    - Visual Field Cut or a Loss of Peripheral Vision
    - Visual Neglect
    - Double Vision or Blurred Vision
    - Nystagmus

EMS Trends using BEFAST

UK EMS Stroke Service

- Nausea
- Vomiting
- Vertigo
- Visual disturbances
  - Further evidence of PCS

EMS agency FTN exam

- Added a finger to nose exam
  - This was done in addition to a Neurological exam that reveals
    - Weakness
    - Dizziness
    - Vision Changes
    - AMS
    - Focal Neurological Symptoms

AHA 5 "D's" of Posterior Stroke

Dizziness - SUDDEN

- Diplopia (double vision)
- Dysarthria (trouble vocalizing words)
- Dysphagia (trouble swallowing)
- Dystaxia (unsteady gait, lack of coordinated muscle movements)

Our Protocols

- Our protocol emphasizes "sudden onset"
  - 24 hours or less

- Taken from our protocols
  - Signs and symptoms of stroke include:
  - Hemiplegia (paralysis on one side of the body)
  - Hemiparesis (weakness on one side of the body)
  - Decreased sensation or numbness without trauma
  - Facial droop
  - Unequal grips
  - **Dizziness, vertigo or syncope**
  - **Aphasia or slurred speech**
  - **Altered level of consciousness or seizures**
  - **Sudden, severe headache with no known cause**
  - **Visual disturbances (e.g. blurred vision, double vision)**
  - **Generalized weakness**
  - **Frequent or unexplained falls**

Time

- **Onset of stroke symptoms (Time Last Seen Normal) is defined as the last witnessed time the patient was symptom-free (this would also include symptom recognition upon awakening < 3.5 hours). With duration of symptoms less than 24 hours**, scene times should be limited to 10-15 minutes, early notification of receiving facility should be performed and transport times should be minimized.

Positive BEFAST Protocol

- Patients assessed with a positive BE FAST exam and a RACE Score of < 5 will be transported to the closest Primary Stroke Center. Declare a STROKE ALERT through LCEMS dispatch and the appropriate Primary Stroke Center will be assigned for Medical Control Contact and transport. (Primary Stroke Centers: UTMC; Promedica Toledo; Mercy St. Vincent; St. Luke's; Promedica Flower; Promedica Bay Park; Mercy St. Charles and Mercy St. Anne).

Reviewing and Discussing Emerging Trends can improve our ability to remain at the front of EMS

- References

Pitfalls in the Diagnosis of Posterior Circulation Stroke in the Emergency Setting

Ischemic Posterior Circulation Stroke: A review of anatomy, clinical presentations, diagnosis, and current management

Design and Validation of a Prehospital Stroke Scale to Predict Large Arterial Occlusion

Outcomes among patients who call the emergency medical service (EMS) due to dizziness

BE-FAST Reducing the Proportion of Strokes Missed Using the FAST Mnemonic

Educating Paramedics on the Finger to Nose Test Improves Recognition of Posterior Stroke

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Questions

Feel free to call or email

419 – 283 -4260 or Swittkop@co.lucas.oh.us