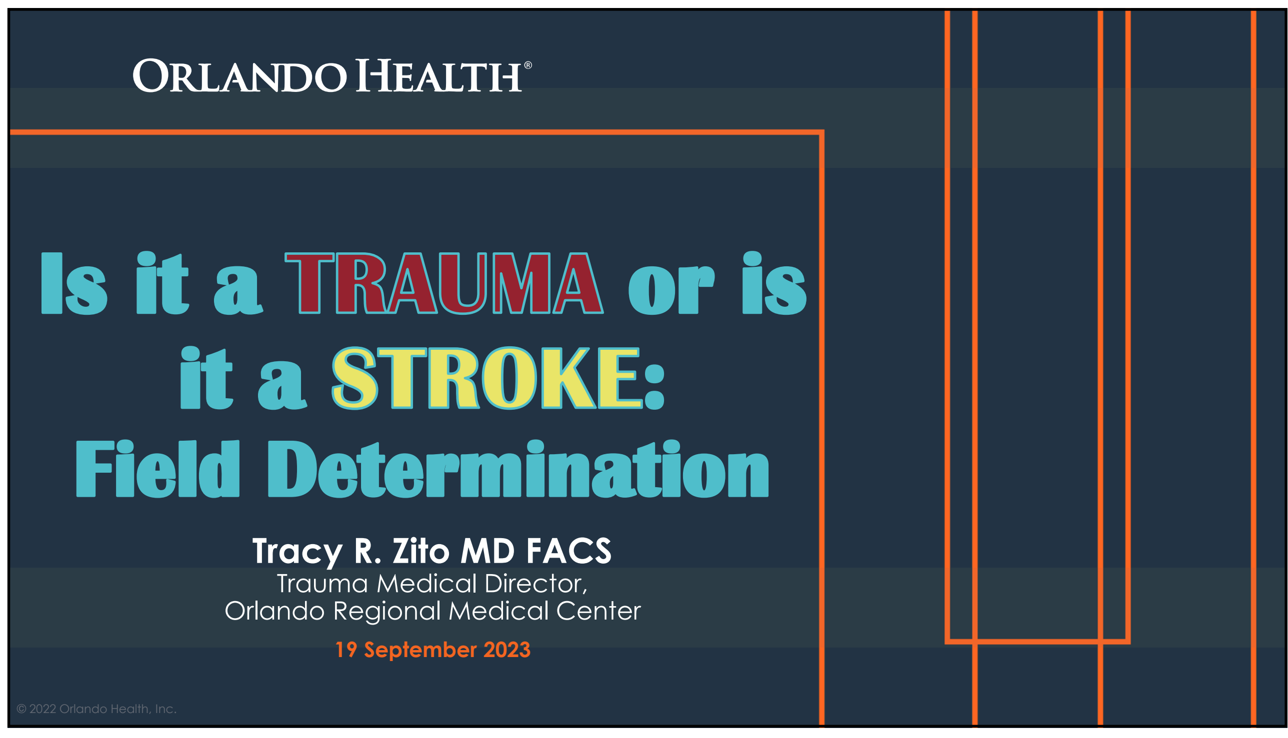

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Our Mission

To improve the health and quality of life of the individuals and communities we serve.

2

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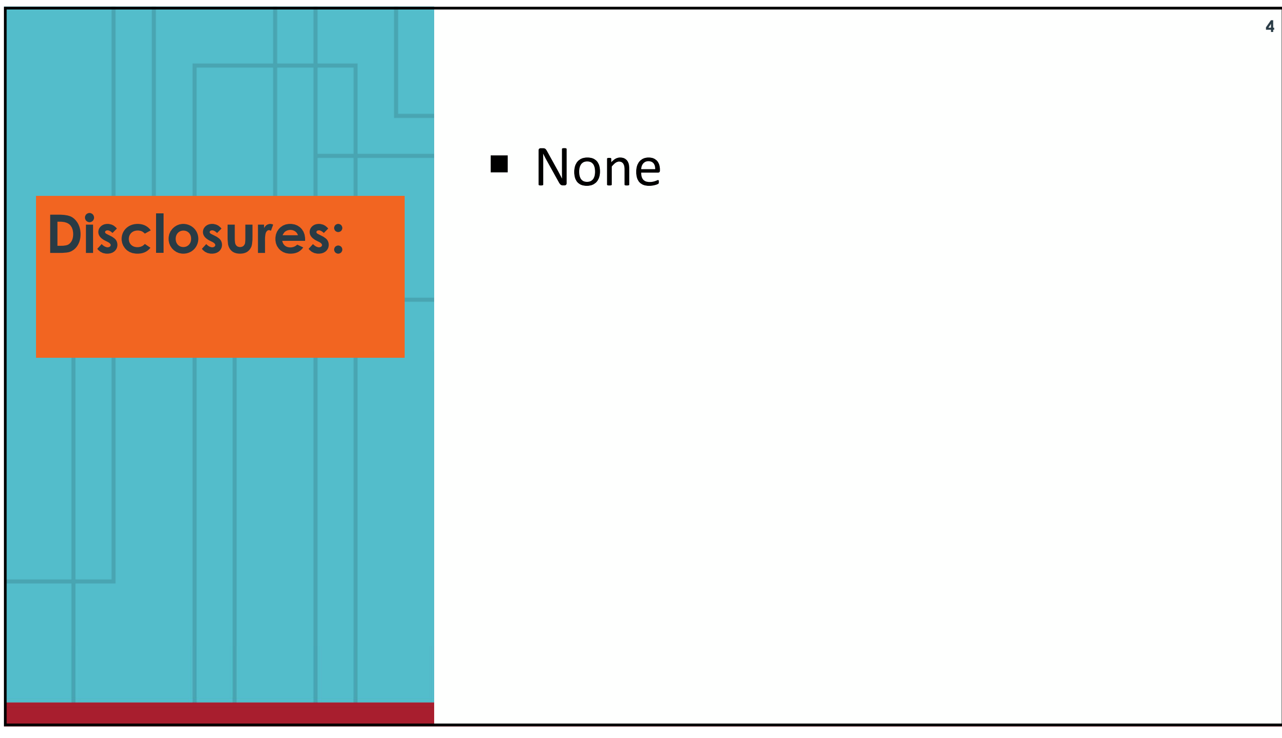

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- Understand the overlapping symptoms and signs of stroke and traumatic brain injury
- Review the resources required for both stroke and trauma evaluation and treatment including basic element differences between trauma centers and stroke centers
- Gain a knowledge base of best practice for protocol development

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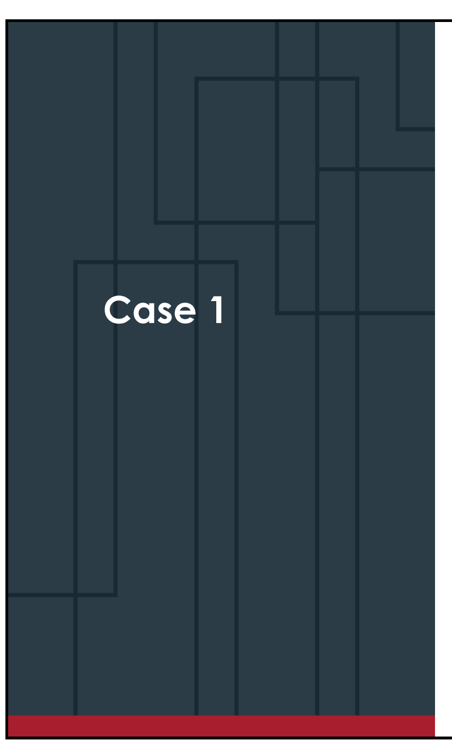

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Pre-hospital: 80 yo M on Plavix for prior TIA Per pt's wife, pt was acting normal then he all of a sudden collapsed and couldn't get up off the ground.

- Airway patent
- Breathing depth and rate normal
- Palpable radial pulses bilaterally
- GCS 9 pupils were PERRL pt had right-sided weakness No noted head trauma
- no abnormalities of the abdomen but vomited several times, given 4mg Zofran.
- Pt stroke alerted.

- **ER:**
  - Airway with sig resp secretions and RR 32 with O2sats 94% on NRB – Pt RSI intubated immediately and sedated with propofol
  - GCS 9, BP 131/127, HR 68.
  - Per protocol – directly to CT for Stroke protocol

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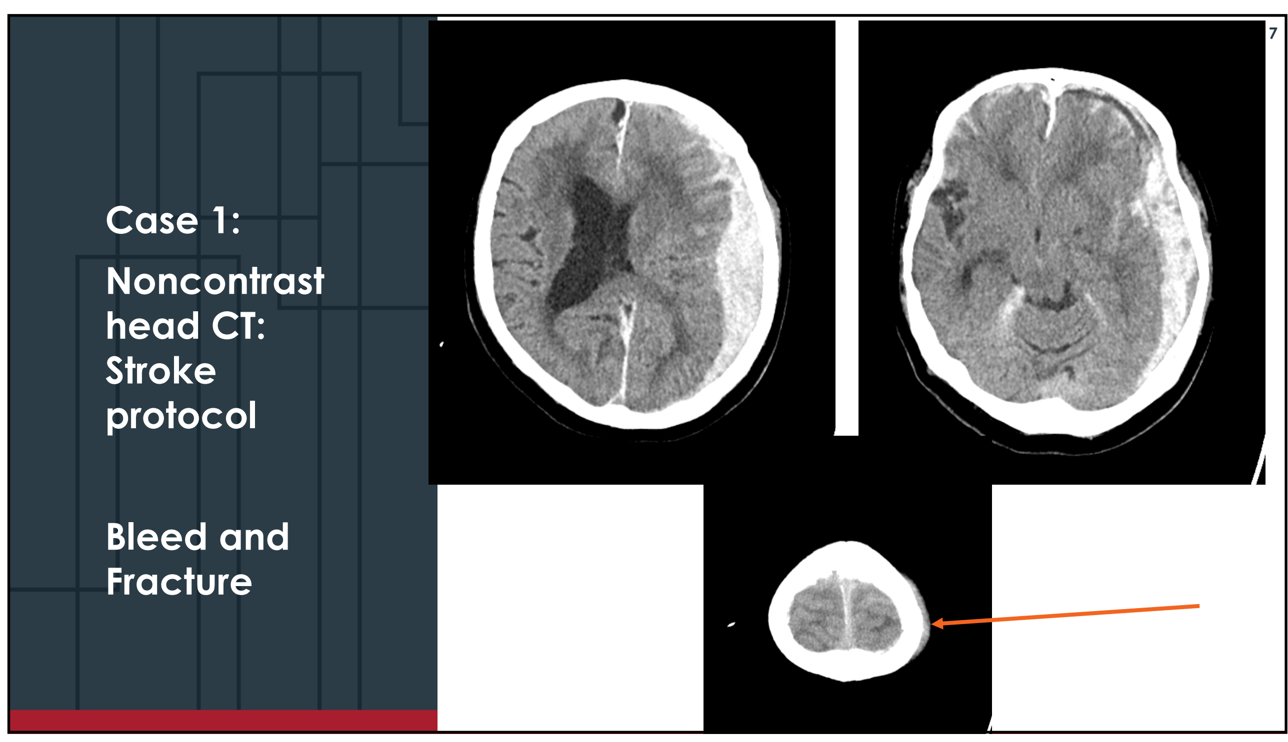

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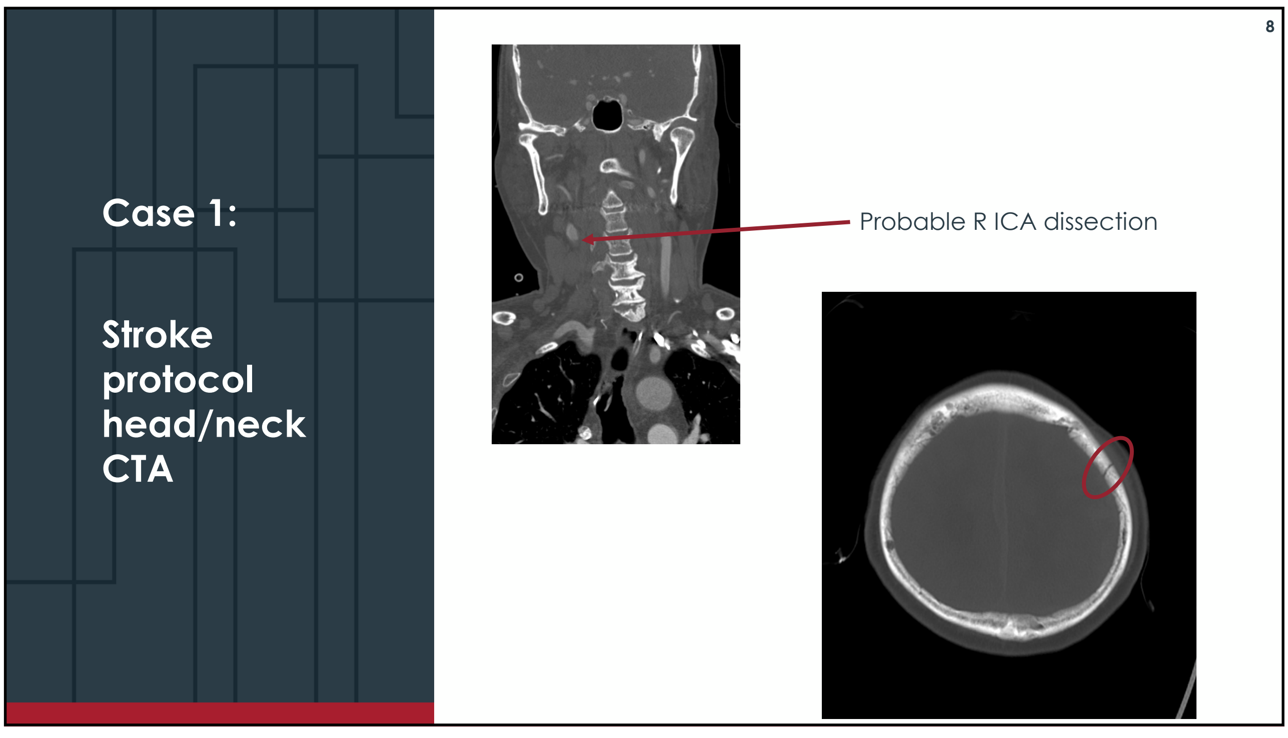

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- Pt's CT head showing a large subdural with 9mm shift as well as a skull fracture suggesting traumatic etiology.
- Trauma Alert called
- Given desmopressin for the history of Plavix use
- TEG MA low at <40 and Plavix platelet function low indicative of inhibition of platelet reactivity.
- platelets given
- To ICU, progressed to brain death

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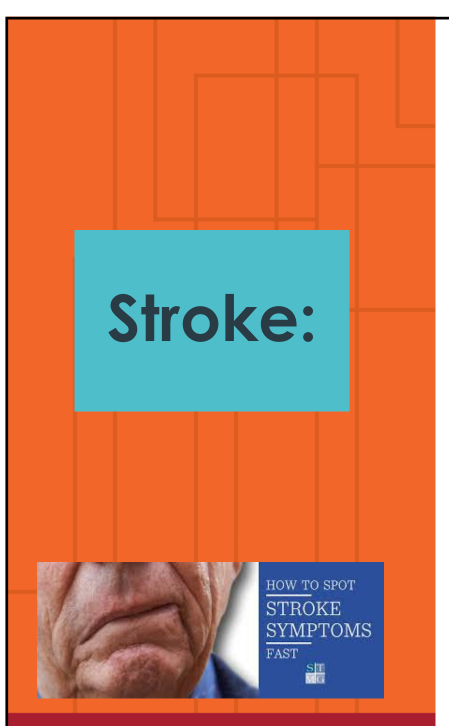

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- **Definition:** Loss of blood flow to part of the brain
- **Causes:**
  - Blockage (Ischemic)
  - Rupture (Hemorrhagic)
- **Signs and Symptoms**
  - B E F A S T
  - complete paralysis of 1 side of the body
  - being or feeling sick
  - dizziness
  - confusion
  - difficulty understanding what others are saying
  - difficulty swallowing (dysphagia)
  - a sudden and very severe headache resulting in a blinding pain unlike anything experienced before
  - loss of consciousness

10

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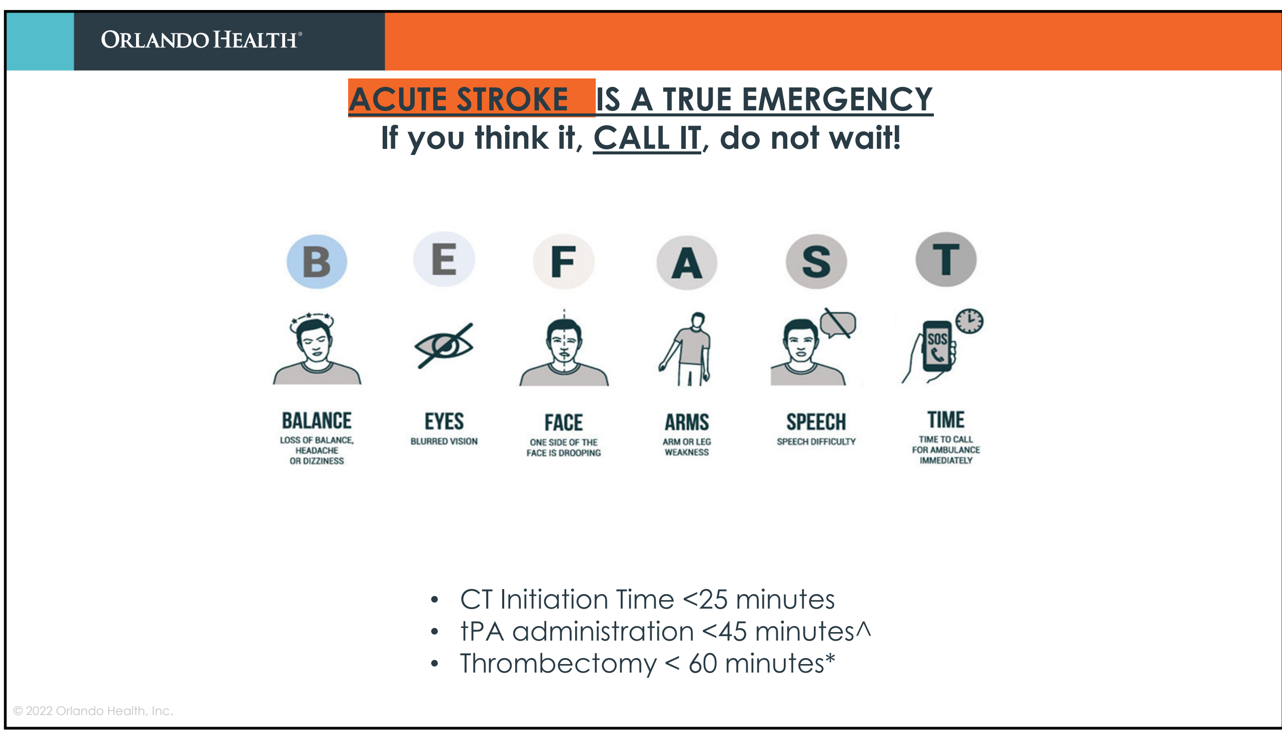

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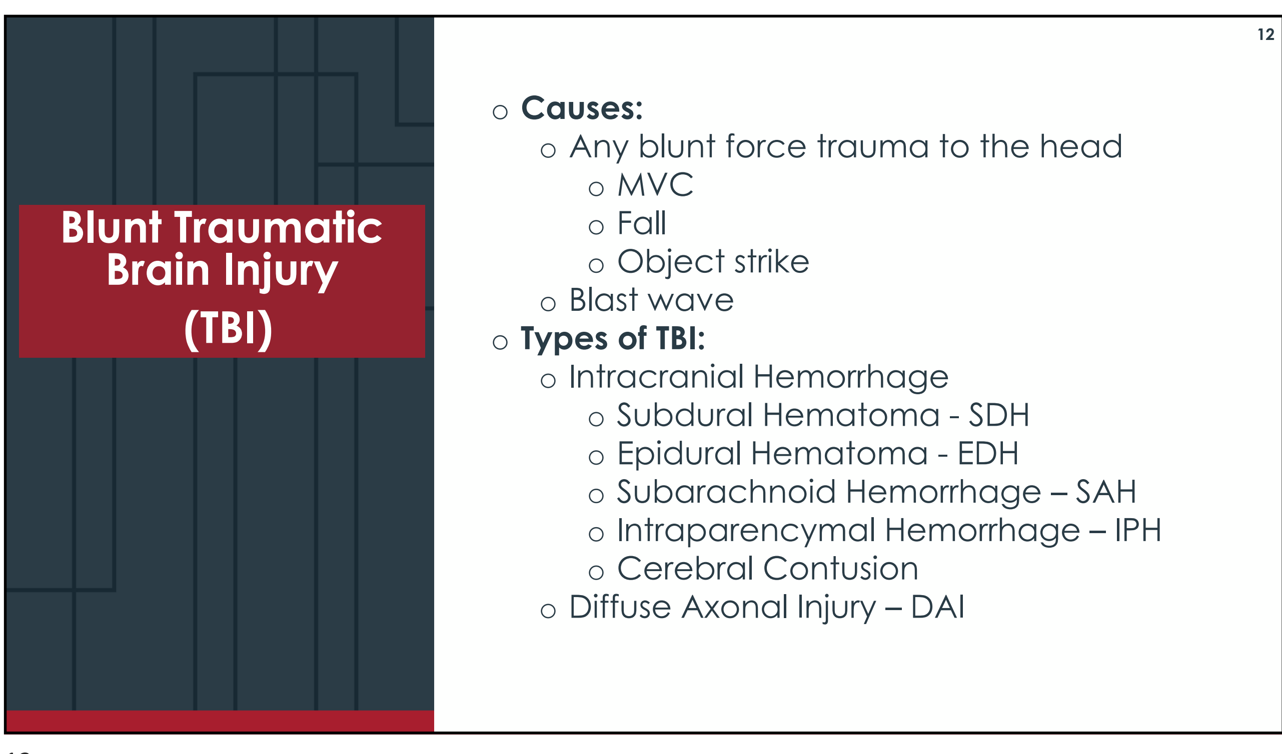

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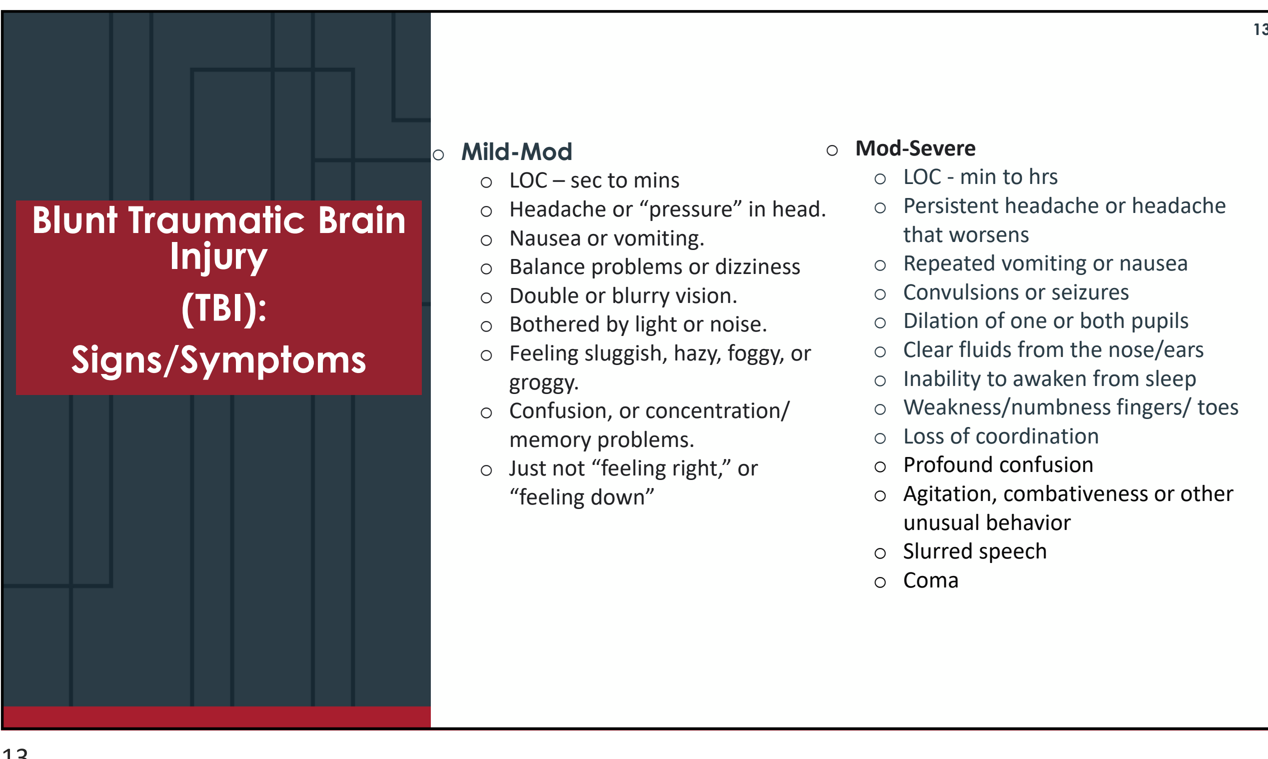

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Stroke and Trauma… Well….

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- **Stroke**
  - Loss of balance
  - Headache
  - Blurred vision
  - Facial droop
  - Arm or leg weakness
  - Speech difficulty
  - complete paralysis of 1 side of the body
  - being or feeling sick
  - dizziness
  - confusion
  - difficulty understanding what others are saying
  - difficulty swallowing (dysphagia)
  - a sudden and very severe headache resulting in a blinding pain unlike anything experienced before
  - loss of consciousness
- **Mild-Mod TBI**
  - Headache or "pressure" in head.
  - Nausea or vomiting.
  - Balance problems
  - Dizziness
  - Double or blurry vision.
  - Bothered by light or noise.
  - Feeling sluggish, hazy, foggy, or groggy.
  - Confusion, or concentration or memory problems.
  - Just not "feeling right," or "feeling down"
  - Loss of consciousness- seconds to a few minutes
- **Mod-Severe TBI**
  - Loss of consciousness minutes to hours
  - Persistent headache or headache that worsens
  - Repeated vomiting or nausea
  - Convulsions or seizures
  - Dilation of one or both pupils of the eyes
  - Clear fluids draining from the nose or ears
  - Inability to awaken from sleep
  - Weakness or numbness in fingers and toes
  - Loss of coordination
  - Paralysis
  - Profound confusion
  - Agitation, combativeness or other unusual behavior
  - Slurred speech

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Stroke and Trauma… Well….

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- Stroke
  - Loss of balance
  - Headache
  - Blurred vision
  - Facial droop
  - Arm or leg weakness
  - Speech difficulty
  - complete paralysis of 1 side of the body
  - being or feeling sick
  - dizziness
  - confusion
  - difficulty understanding what others are saying
  - difficulty swallowing (dysphagia)
  - a sudden and very severe headache resulting in a blinding pain unlike anything experienced before
  - loss of consciousness

- Mild-Mod TBI
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  - Nausea or vomiting.
  - Balance problems
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  - Agitation, combativeness or other unusual behavior
  - Slurred speech

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Stroke and Trauma… Well….

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- **So if not signs and symptoms, how do you tell the difference?**
  - **Mechanism?**
    - **Fall**
    - **Found down**
    - **Unknown**
    - **Driver MVC (esp single vehicle)**
  - **Pt's history?**
    - **Prior CVA**
    - **Anticoagulants**
    - **New Afib**
- **.3-5.7% trauma patients present with symptoms of CVA**

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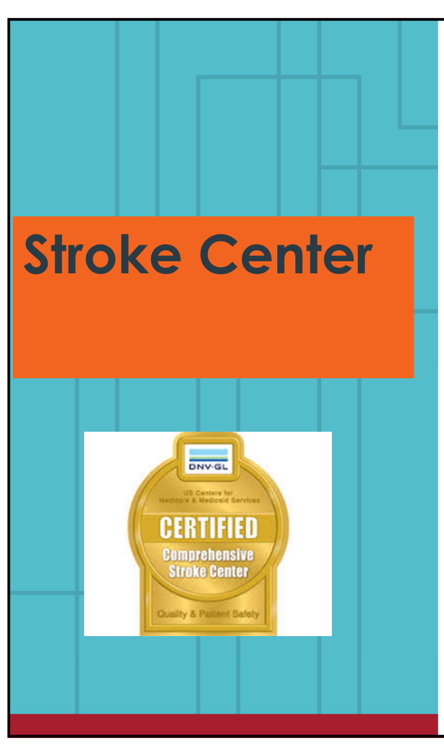

- **Joint Commission: Stroke Center Certification:**
  - Acute Stroke Ready Hospital (ASRH)
  - Primary Stroke Center (PSC)
  - Thrombectomy-Capable Stroke Center (TSC)
  - Comprehensive Stroke Center (CSC)
- **What do they get you?**
  - Increased capability Regimented protocols including
    - Evaluation on arrival
    - Priority CT scanning
    - Coordination of care from prehospital to rehab/home
  - Stroke Teams, expedited care – Focus on saving brain
  - From PSC on – TPA
  - From TSC on – Thrombectomy/Neurointerventional capability
  - CSC with research requirements

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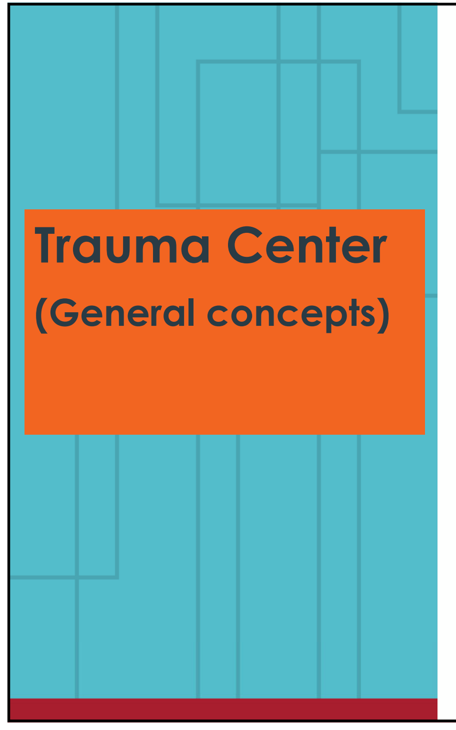

- **American College of Surgeons: Committee on Trauma Verification Levels**
  - Level V
  - Level IV
  - Level III
  - Level II
  - Level I
- **What do they get you?**
  - Increased capability
  - Regimented protocols/Guidelines
  - Trauma team, expedited care- Focus on life/limb threatening injuries
  - Coordination of care from prehospital to rehab/home
  - Level I and II
    - Team to receive pt on arrival
    - Prioritization of imaging
    - Resuscitation needs (esp blood and products)
    - Etc…

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Stroke and Trauma… Well….

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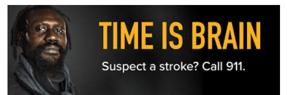

- **What's the problem?**
  - **Stroke treatment –**
    - **Early recognition**
    - **Expedited treatment**
    - **Time is Brain**
    - **thrombolysis/ thrombectomy & neurointerventional treatment**
  - **Major Trauma –**
    - **Early recognition**
    - **Expedited treatment**
    - **Surgery/interventional rad treatment**
  - **Intracranial hemorrhage/major trauma –thrombolysis contraindicated**
  - ****Calling a stroke a trauma or a trauma a stroke**
    - **Can lead to delayed recognition of injury**
    - **Can lead to delayed workup for stroke**
      - **2019 Madhok et. al showed TTA for the found down got their CTs in a timely or more timely manner than stroke alert – Level I urban hospital**
      - **2006 U Penn – no delay in CT head doing trauma eval for those with potential stroke**
    - **Potential delayed treatment**

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Pre-hospital: 84 yo F PMHx of DM (no anticoagulants or antiplatelet meds) pt found down for unknown amt of time. Per son, suspect pt fell overnight- on side of bed

- **Ground EMS:**
  - Unresponsive with radial pulse, sonorous respirations
  - Covered in vomit and urine
  - Pupils 5 and minimally reactive.
  - C-collar & LBB placed.
  - Given 1.5L NS
  - Attempted intubation x2 unsuccessful - Placed iGel
  - Vitals: BP 89-150 syst, HR 109-130s, GCS 5-3.
  - **TRAUMA ALERT**

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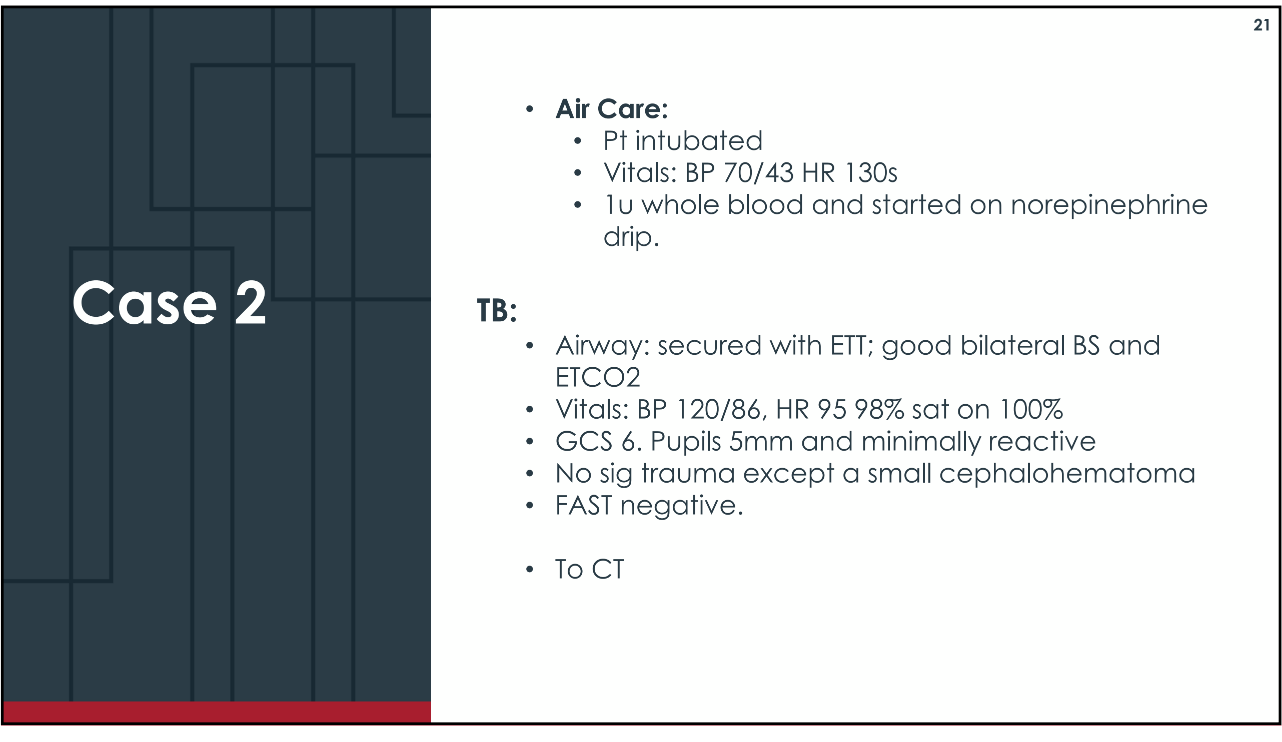

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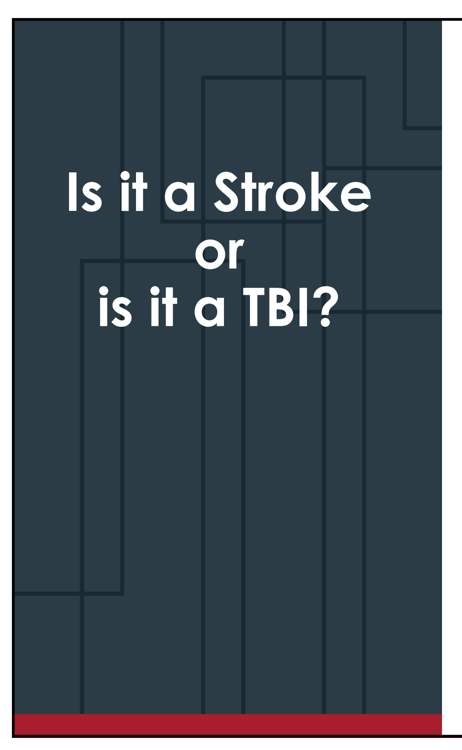

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- Do we have to decide prehospital?
  - Default to trauma alert?
  - Default to stroke alert?
  - Call it as both?
  - Create a combined alert?

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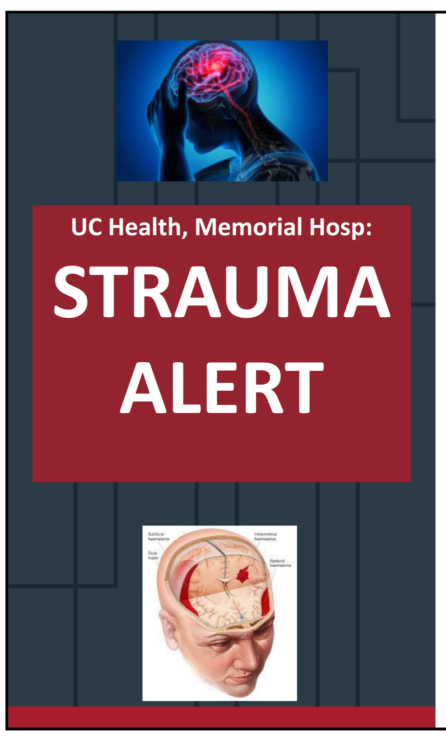

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STRAUMA activation
Signs of stroke < 24-hour onset
and
Signs of trauma

- **Signs of trauma**
  - Deformity
  - Contusion
  - Abrasions/bruising,
  - Penetrating mechanism
  - Perforation
  - Burns
  - Tenderness
  - Laceration
  - Swelling

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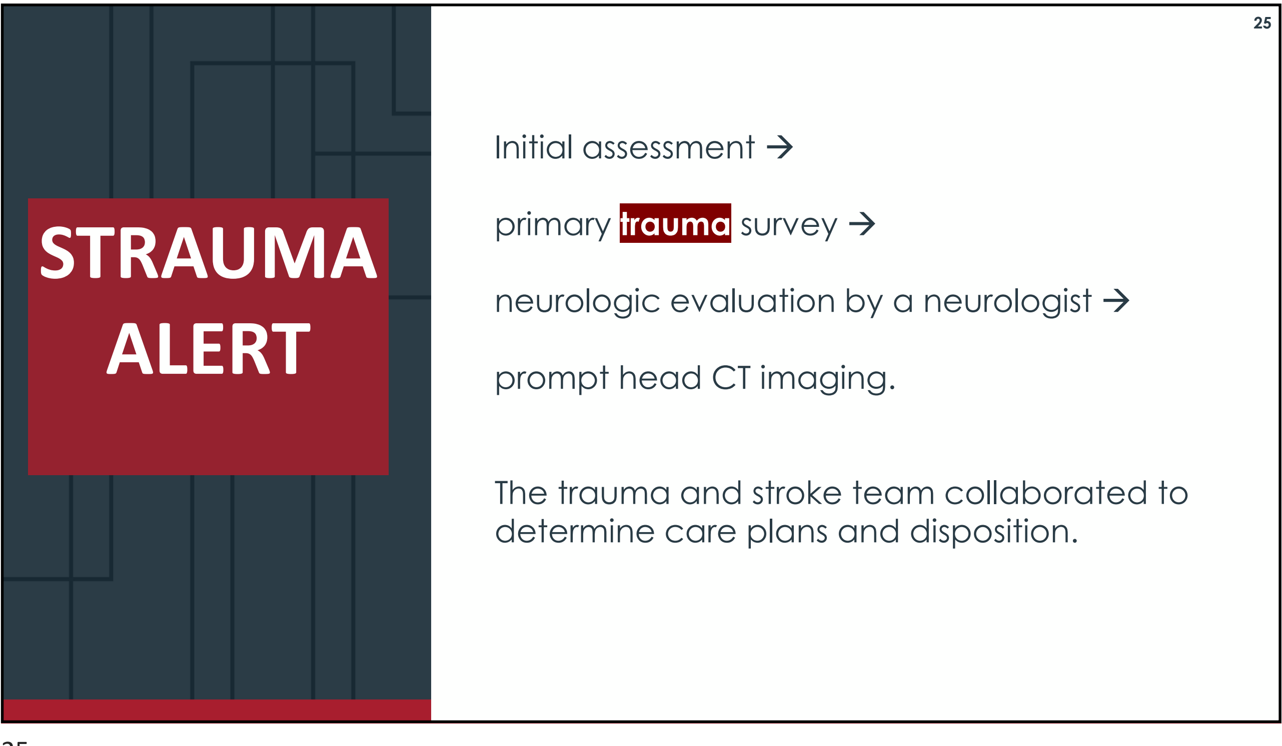

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STRAUMA ALERT

Lee et al 3

Signs of Stroke:
LKW<4.5 hrs: +BE FAST exam, vertigo, or ataxia
LKW 4.5-24 hrs: +BE FAST with +VAN, Vertigo or ataxia with impaired LOC, unilateral weakness, quadraparesis, dysarthria, dysphagia, dysmetria, disconjugate gaze, diplopia, cross sensory loss to sharp

UCHealth Memorial Central STRAUMA CPG

Stroke Alert/Full Trauma (STRAUMA) Activation
Signs of Stroke < 24 Hours onset and *SIGNS* of trauma

Signs of Trauma:
Deformity
Contusion
Abrasions
Penetrating/Perforation
Burns/Bruising
Tenderness
Laceration
Swelling

Hemodynamically UNSTABLE patient

Follow ATLS guidelines to guide patient resuscitation, and complete focused primary survey. Collaborate with Neurologist/Telestroke on "Disability" assessment and NIH Stoke Scale

Obtain IV access, labs, portable CXR and *Pelvic XR*, *FAST* exam

As soon as stable, obtain Stat Head CT to evaluate ischemic vs. ICH

Trauma Surgeon and Neuro Team/Telestroke will collaborate to determine patient disposition and care plan.

For Admitted patients with *significant* traumatic injuries: Admit patient to Trauma ICU to SCC, with Neurology consult

For Admitted patients with *minor or no* traumatic injuries: Admit patient to Medicine, with Neurology consult. Trauma Services consult as requested

Hemodynamically STABLE patient

Complete focused primary survey. Collaborate with Neurologist/Telestroke on "Disability" assessment

Obtain IV access, labs, and portable CXR (no further imaging), NIH Stroke Scale

Door to CT with goal time of *<20 min*! Trauma Surgeon and Neurologist/Telestroke will collaborate in CT to determine patient disposition and care plan.

For Admitted patients with *significant* traumatic injuries: Admit patient to Trauma ICU to SCC, with Neurology consult

For Admitted patients with *minor or no* traumatic injuries: Admit patient to Medicine, with Neurology consult. Trauma Services consult as requested

Figure 1. STRAUMA activation pathway.

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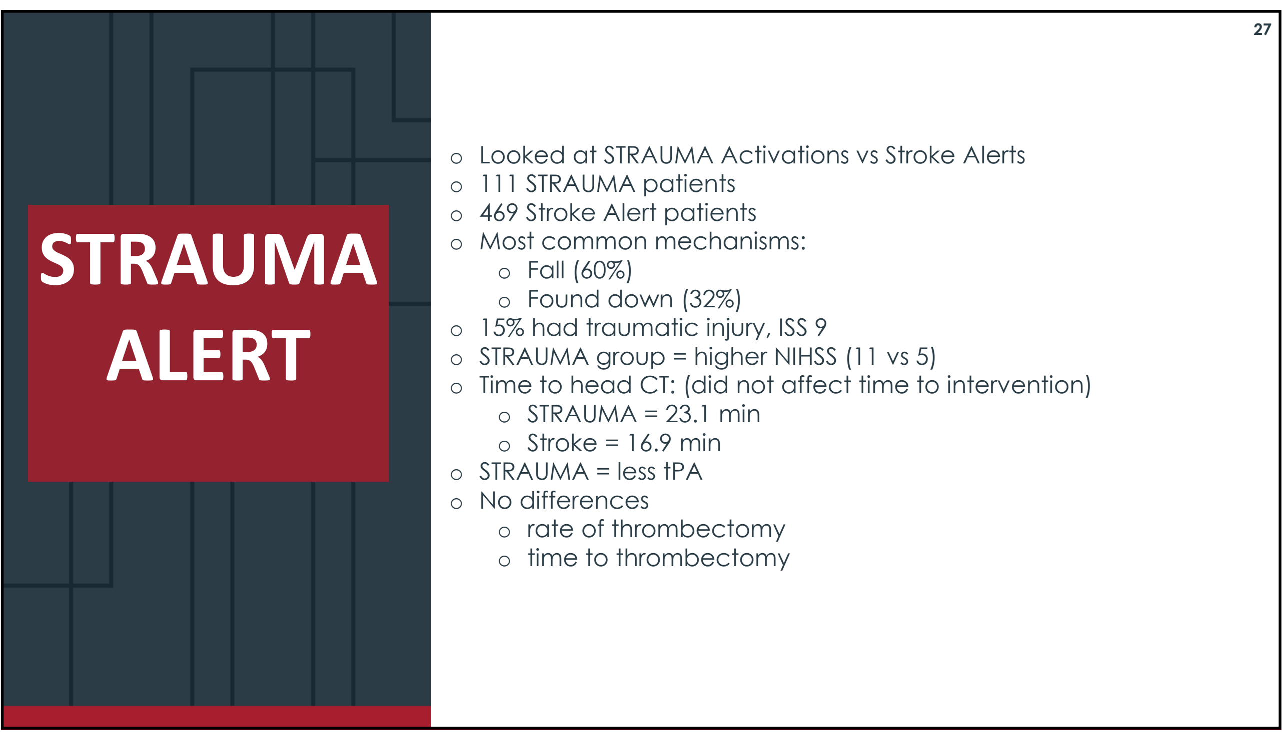

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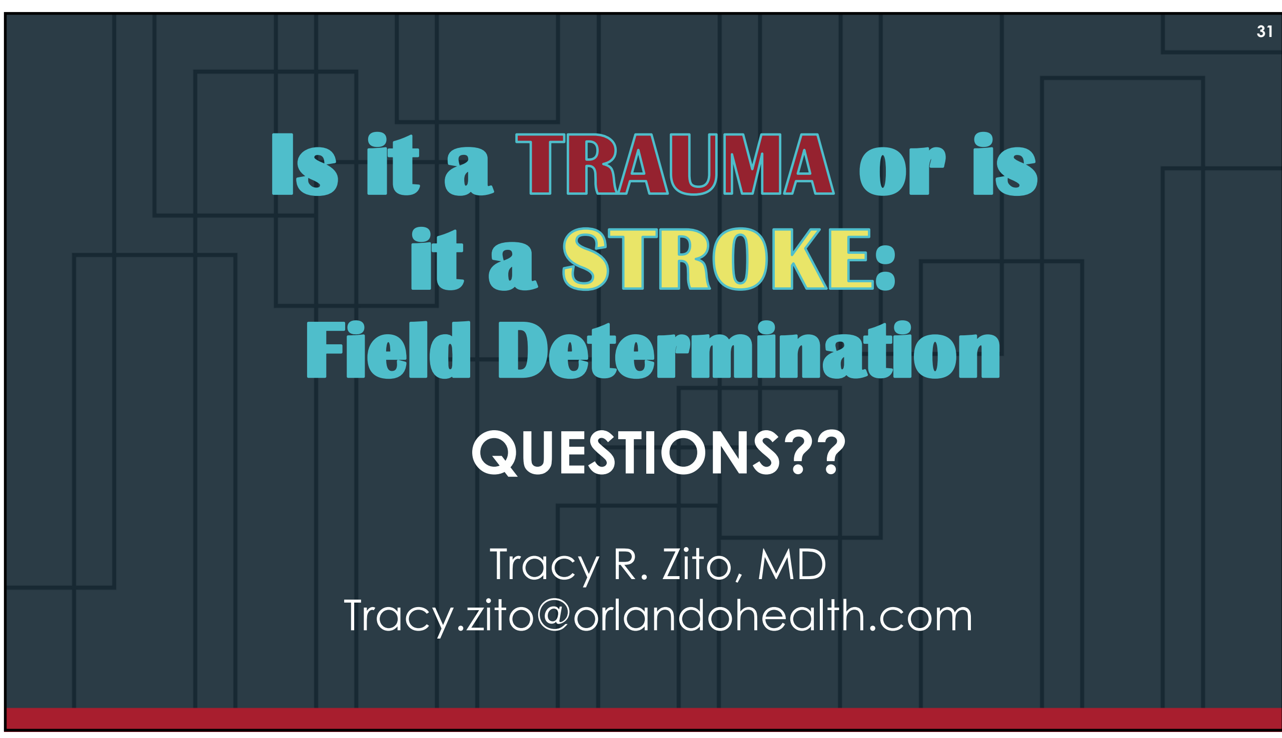

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