



HOW TO PARTNER WITH YOUR EMS AGENCY TO OPTIMIZE STROKE CARE

Presenters



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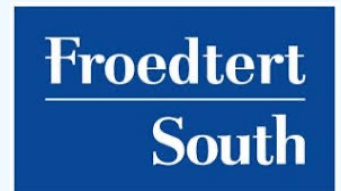
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Disclosures

- NONE



**Emergency
Medicine**

UNIVERSITY OF CENTRAL FLORIDA



*So Dr. Falco,
What do you feel are key elements of the EMS
and hospital partnership?*

EMS/Hospital Partnership

- Hospitals should participate in EMS education as part of Stroke Center certification & communicate protocols, process, outcomes
 - Rapid, accurate identification of stroke signs and symptoms (use a scale)
 - Facilitate transfer of stroke victims to nearest appropriate hospital rapidly and safely.
 - Early Pre-notification of a possible stroke in route.
 - Encourage family members to come to the hospital for additional information and decision-making processes.

Communication is the Key Element

- Reliably identify time of “last seen normal”/time of onset.
- Obtain a reliable list of medications. Especially blood thinners
- Administer a Pre-hospital Stroke Scale
- Provide the receiving hospital with a brief verbal report of information gathered at the scene.
 - Did they have recent surgery, recent stroke, past head bleed,
 - Symptoms: seizure activity?
- Rapid glucose assessment. Treat hypoglycemia which is a stroke mimic.
- Blood pressure management: DO NOT treat unless BP > 220/110 mmHg
- Protect paralyzed limbs, elevate head of bed, oxygen saturation > 94%
- Contact receiving hospital with "Neuro/Stroke Alert"- scene time < 15 min

So Dr. Banerjee,

*Can you give us an idea of the important role
EMS plays in the triage of acute stroke patients?*

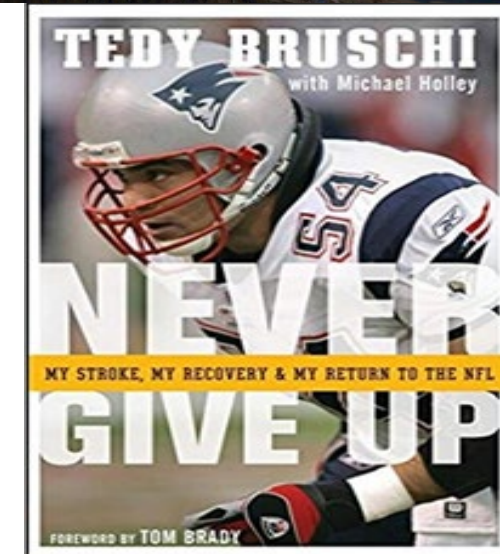
EMS Tasks... Right Time, Right Patient Right Place

- Last known time at baseline : alteplase v MT < 3 hours or < 24 hours ?
Last Known Normal time is different from the time of stroke onset !
- Is it a LVO / Wake Up stroke / SAH / Is the patient eligible for t-PA?
- Contact # of a family member
 - ▶ Neurologists are hesitant to give alteplase if exact time of onset or medications are NOT available!
- What is the disability of patient prior to the stroke ? ... Rankin Score...CSC triage mRS < 4 ?
- Are you transporting to a REAL Stroke Center? CVA Bypass ?
 - ▶ Remember... **NO DATA = NO PATIENTS !!!!!**



Prehosp Emerg. Care. 2016 Nov-Dec;20(6):729-736

- EMS Transports ~ 50% of ALL strokes patients
- Stroke recognition by EMS is associated with faster:
 - ▶ Door-to-physician time
 - ▶ Door-to-CT time
 - ▶ Greater odds of receiving thrombolysis
- EMS MUST take stroke patients to the right place in the right time!
- EMS taking severe strokes → PSC → CSC worsens outcomes
 - ▶ MT rates dropped by 2.5% for every 1 minute delay of transfer time
 - ▶ Every 3 minute transfer delay = 1% lower chance of a good MT outcome



Dr. Falco,

*Could you give us an example that illustrates this
conundrum?*

EMS conundrums

SCENARIO 1

- Paramedic Bob picks up Estelle, Bob misses clues to an LVO, brings Estelle to a stroke ready or primary stroke center. Estelle eventually transferred to comp center and gets thrombectomy... what's the impact?

SCENARIO 2

- Paramedic Bob picks up Estelle, Bob thinks it's an LVO and drives say 14 minutes past a stroke ready or primary stroke center to the comp center. Turns out Estelle didn't have an LVO and now wasted those 14 mins when she could've had alteplase initiated... what's the impact?

Hospital Designation based on Assessment

- Treatment options: caveat: if evidence of a Large Vessel Occlusion defer to a Comprehensive Stroke Center if available in all cases.
- Less than 4.5 hours: best situation, can be candidate for alteplase and endovascular therapy,
- Between 4.5-24 hours - potential candidates for endovascular therapy. Expedite to a Comprehensive Stroke Center if available. Primary/Stroke ready hospitals: needs protocols for transfer out within 60 minutes of arrival to a Comprehensive center.

*Dr. Banerjee,
Why does EMS look for LVOs?*

Why does EMS look for Large Vessel Occlusions?

- Most devastating form of acute ischemic stroke as it causes the most significant long term neurologic deficit and disability
 - ▶ LVO = ~ 20% of Ischemic strokes
- LVO's require endovascular intervention NOT just alteplase
 - ▶ 90% failure rate with alteplase
- How to screen for LVO?

Stroke Scale	Sensitivity	Specificity	PPV	NPV	LVO Screen
C-STAT	77%	84%	0.65	0.75	YES ?
CPSS	88%	63%	0.88	0.63	NO
LAMS	57%	84%	0.87	0.61	YES
RACE	55%	87%	0.29	0.93	YES
VAN	67%	77%	0.74	0.90	YES

Stroke Scale Deficiencies?

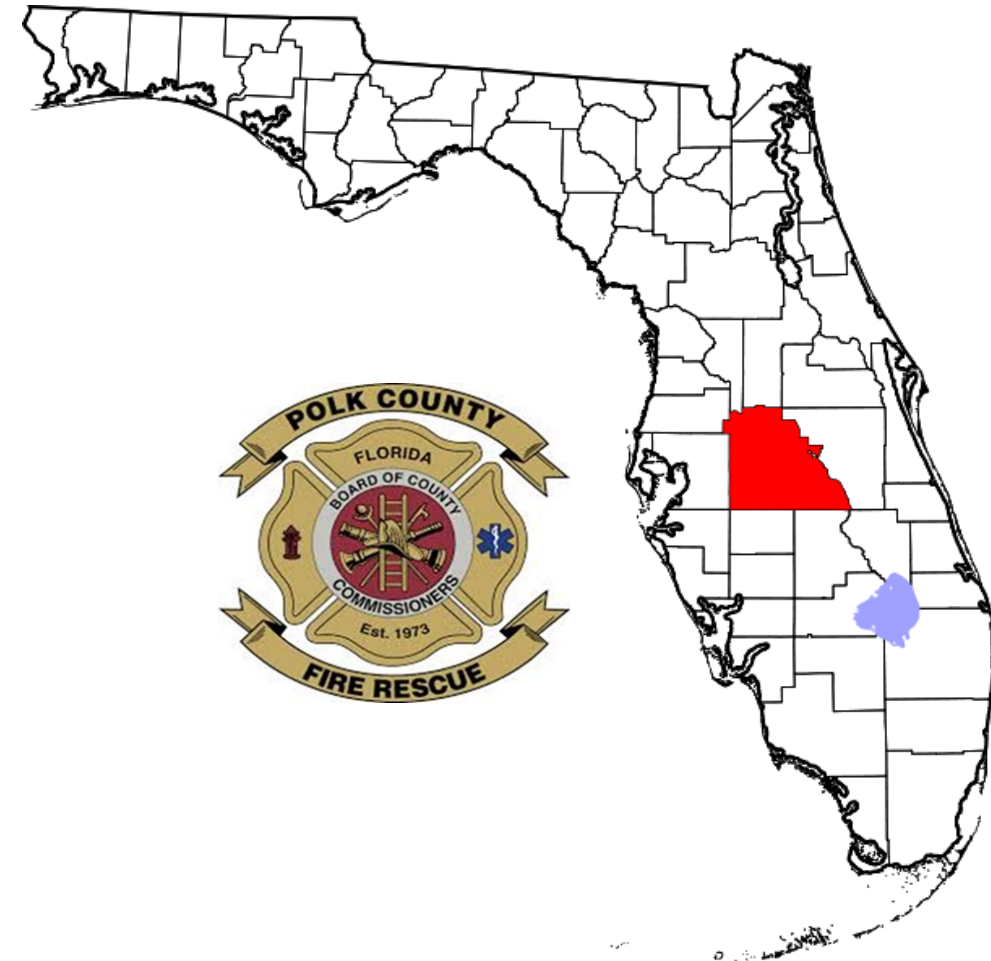
- VAN misses CVA without motor deficits
- LAMS only tests motor deficits
- RACE is not easy to perform accurately by PM
- C-STAT is not specific for LVO
- If the P-EMT can't accurately reproduce the test...



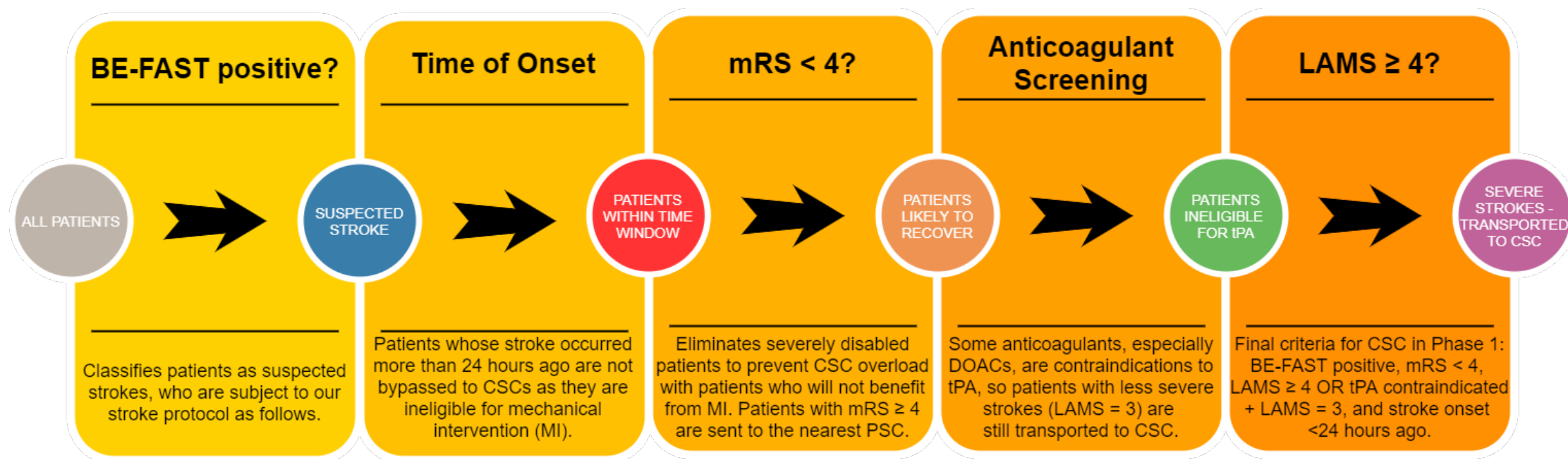
- None of the Stroke Scales are great... ALL MISS LVO Strokes!
 - ▶ No scale predicts LVO with both high sensitivity and high specificity
- We still poorly evaluate other strokes
 - ▶ Sudden AMS strokes / SAH / Posterior circulation strokes / Wake Up strokes?
- Hospitals need to perform as REAL stroke centers with optimal diagnostic imaging, patient centered aggressive stroke care...BUT... until that time occurs
- EMS needs to find a more accurate way of communicating severe stroke patients to our hospitals, neurologists and IR...

So Dr. Banerjee, given that no prehospital scale is perfect and that acute stroke triage is such high stakes, can you tell us your approach at PCFR?

- 105th Largest County in the US - 2010 square miles
 - ▶ Population 725,000 – Top 20 fastest growing in the USA
- 39th largest fire department in the US
 - ▶ 4th largest in Florida
- 100,028 calls in Polk County
 - ▶ 76,459 EMS transports
- 5 hospitals – 1 CSC, 1 TSC, 2 PSCs, 1 stroke receiving
- Integrated 911 – Medical priority dispatch
 - ▶ ~ 900 pre-hospital providers



PCFR stroke protocol



Stead TG, Banerjee PR, Ganti L. Large Vessel Occlusion Identification Through Prehospital Administration of Stroke Scales: A County-wide Emergency Medical Services Prospective Research Protocol. Cureus. 2019 Oct 17;11(10):e5931. doi: 10.7759/cureus.5931. PMID: 31788388; PMCID: PMC6858264.

PCFR Subarachnoid Hemorrhage Protocol Patient > 15 year Old

- Witnessed Sudden LOC during exertion
- PLUS any 2 of the following:
 - SBP \geq 160 or DBP \geq 100
 - Sudden “thunderclap headache” instant pain
 - Limited neck flexion or neck pain on examination
 - New onset seizure
 - Sudden onset of nausea / vomiting

= POSITIVE for SAH protocol → transport to CSC

Ottawa Subarachnoid Hemorrhage (OSAH) rule

100% sensitive, 7-15% specific: JAMA 2013, Am J Emerg Med 2015

In alert patients >15yo with a new severe nontraumatic headache peaking <1hr, get a “CT HEAD” for SAH if there are any high risk features:

Collapse (LOC)

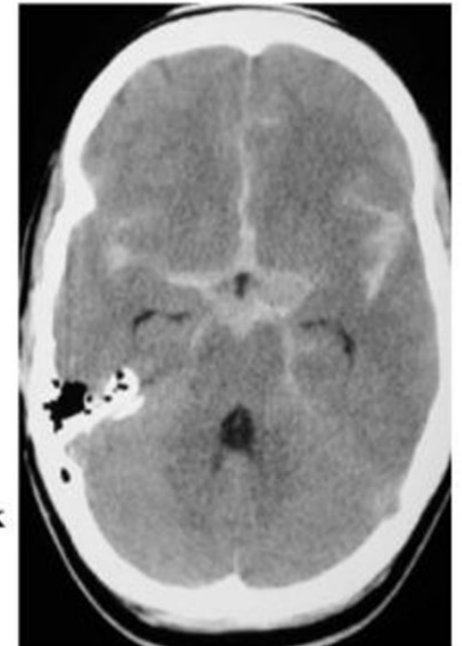
Thunderclap

Hurt neck (neck pain)

Exertional

Age 40

Decreased flexion/stiff neck



Dr. Banerjee,

*Are there any tools or apps that can aid in
expediting stroke care?*

Why Pulsara Came About

- One of our local hospitals were having unacceptable D2B times > 90 min and Door to CT times > 45 min for > 6 consecutive months ... facing Stroke and STEMI bypass
 - ▶ D2B times consistently > 100 min
 - ▶ Worst E2B times in our system!
 - ▶ Delayed Cardiology response...NO communication
- Stroke patient care times were also struggling so Pulsara was initiated
 - ▶ 2017 Averages : D2CT times = 45 min, D2Thrombolytics = 134 min
- Pulsara added for Stroke / STEMI patients as a communication tool to expedite patient care

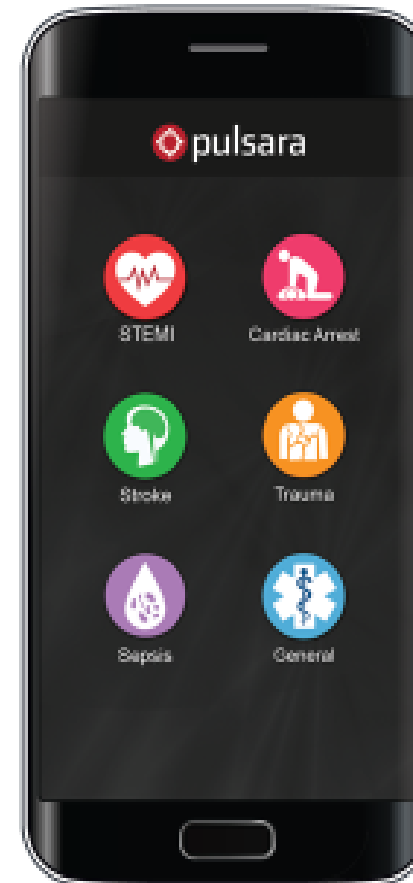


What is Pulsara?

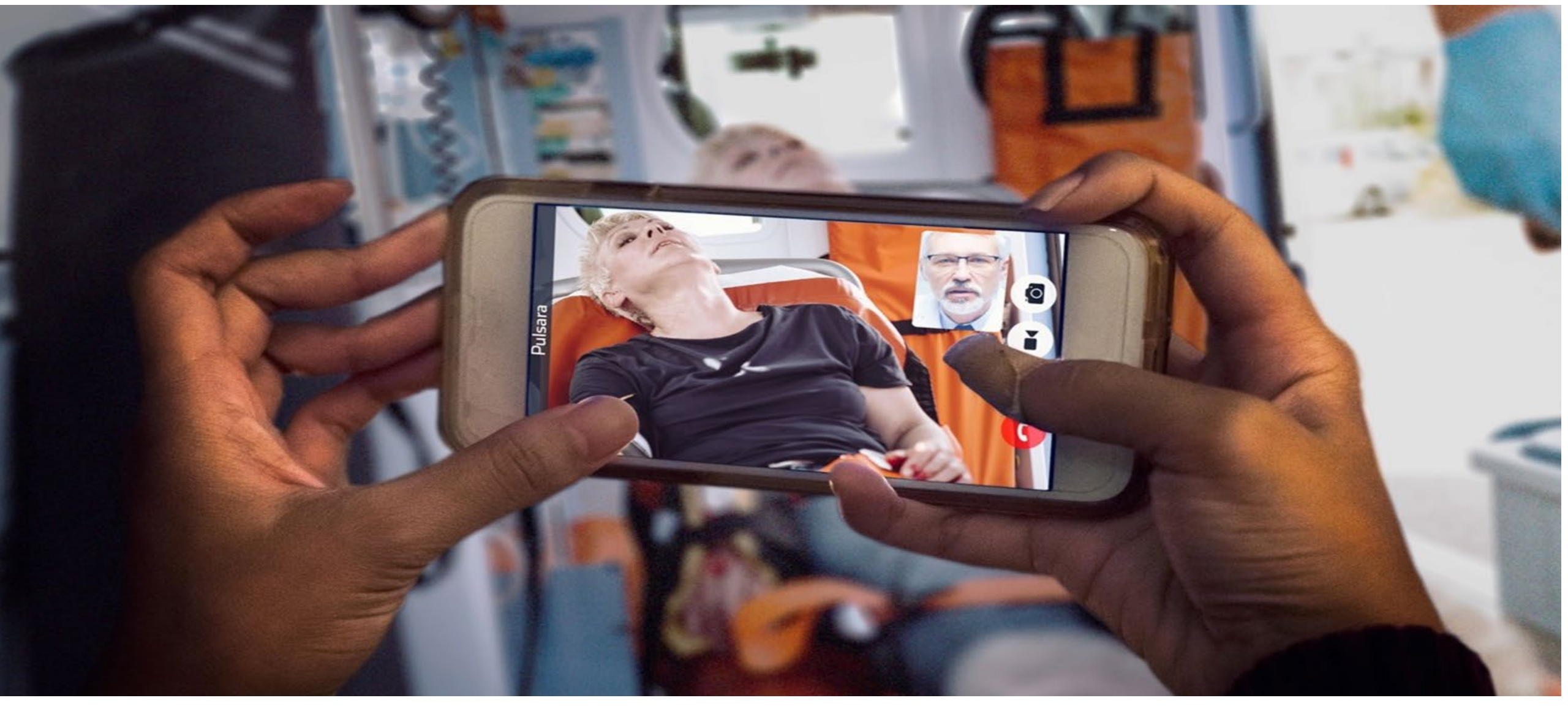
Prehospital Package **FREE** to EMS AND Hospitals

- STEMI
- Stroke
- Cardiac Arrest
- Trauma
- Sepsis

- Pre-Registration for Your Patients ⊕
- Decrease Turnaround Times ⊕
- Image Captures ⊕
- Time Sensitive Emergency Specific Workflows ⊕
- Team Messaging/Chat ⊕
- Vital Signs and Labs ⊕
- Notifications and Alerts ⊕
- 24/7 Customer Service ⊕



- ⊕ Eliminate ECG Transmission Costs
- ⊕ Reduce False Activations
- ⊕ Universal Clock
- ⊕ Improve Prehospital Hand Off Communications
- ⊕ Audio Clips
- ⊕ ETA using GPS
- ⊕ Performance Data for QA/QI
- ⊕ HIPAA Compliant



- STEMI D2B dropped from 70.6 to 55.3 minutes
 - ▶ **Dropped by 15.3 minutes** : Mission Lifeline

- 2019 Averages : Stroke D2CT times = 37 min
 - ▶ **Dropped by 8 minutes**

- Stroke D2Thrombolytics = 75 min
 - ▶ **Dropped by 59 minutes**



*Dr. Falco,
Could you give us the 8 Ds
of stroke systems of care?*

Stroke Systems of care: Team Approach

8 Ds of Stroke Care:

- **Detection:** Rapid recognition of stroke symptoms.
- **Dispatch:** Early activation of EMS/triage
- **Delivery:** Rapid EMS management and transport to a hospital providing acute stroke care.
- **Door:** Immediate ED triage to a high acuity bed/straight to CT if stable .
- **Data:** time-critical assessments and results (CT, laboratory, etc.)
- **Decision:** Timely expert treatment plan.
- **Drug/Device:** Timely delivery of medication: BP meds, t-PA, post-admission meds, endovascular therapy, etc.
- **Disposition:** Rapid admission/transfer to appropriate care unit.

Dr. Banerjee,

What would you say is the bottom line?

Bottom Line

- Engage with surrounding hospitals...good / bad / or otherwise...
 - ▶ CEO relationships are vital!
- Data = Patients...doesn't make you friends at first...
- Research verifies quality of work and areas of improvement for EMS
- Push hospitals to advance their practices and improve patient care
 - ▶ The world is run by people who make \$10 / hr. ...and they change
- Integrate with EPCR and hospital data base
- Bottom line ... Don't be a hospital advocate be a patient advocate !



Questions?

Thank You