Stroke Alert Activation in the Field

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Disclosure:

- Taryn Dugan: Nothing to disclose
- Jorday Kelly: Nothing to disclose

Objective:

- **Explain latest updates and options for Ischemic and Hemorrhagic stroke management and standards of care.**

Introduction

- About Me
- Stroke Alert Criteria
- Case Study

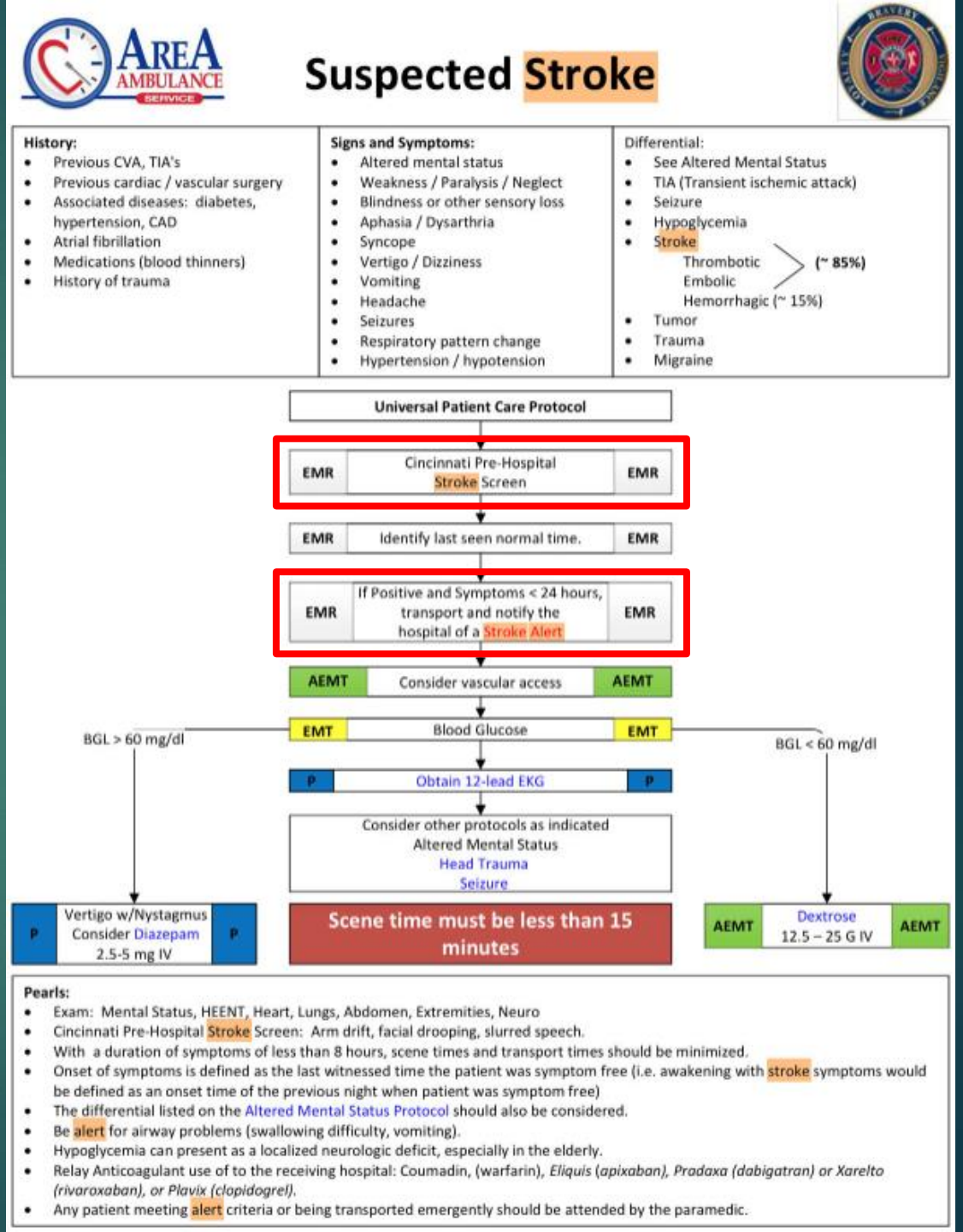
About Me

- "Ambulance Driver" – 2003
- EMT – 2004
- Paramedic (Paramedic Specialist when that was a thing) – 2006
- ADN – 2019
- BSN – 2022
- Currently the program director for the Area Ambulance Training Center (AATC)

Stroke Alert Criteria

- Area Ambulance Service Covers 911 service for Cedar Rapids, Marion, and several surrounding communities, (roughly 250,000 citizens).
- Alert Criteria for:
  - Suspected STEMI
  - Trauma injuries
  - Stroke

Stroke Alert Criteria



Stroke Alert Criteria

- Cincinnati Pre-Hospital Stroke Screening – Specifics we teach our new people
  - Facial Droop
    - "give me a big smile and show your teeth"
  - Pronator Drift
    - "hold your palms up like you're hold a tray, now close your eyes and keep your arms where they are for 10 seconds"
  - Speech
    - "repeat this phrase for me, 'you can't teach an old dog new tricks'"
  - Paramedics are taught that a stroke alert patient needs a large bore IV site at the AC or higher for the purposes of administering contrast.

Stroke Alert Criteria

- If the patient fails any of the three tests, AND the symptom onset is in the last 24 hours, a “stroke alert” is called to the ER that the patient chooses.

Stroke Alert Criteria

- What we are met with at both emergency departments
  - Physician, nurse, and other staff meet us at the doors to the ambulance garage.
  - Physician will do a quick NIH scale.
  - While the physician is assessing if time allows, labs will be drawn, and the patient is being registered.
  - If the physician agrees with the stroke alert activation, the patient goes to CT on the ambulance cot and then is transferred over to the CT table.
  - Ambulance crew leave the ED from the radiology department

Stroke Alert Criteria - Highlights

- The current set up allows for quick transport to CT for initial head CT for the suspected stroke patient
- Ambulance crew is not held for a long period of time, preventing them from returning to service
- Most (~ 98%) of the patients we bring to the ED's in Cedar Rapids have the stroke alert confirmed by the physician, and the patient goes directly to the CT table.

Case Study

- 05:04:05
  - 911 call for a 55-year-old male, possible stroke.
- 05:11:24
  - Marion Fire Department E2 (ALS Unit) arrives on scene
- 05:12:48
  - AAS Unit arrives on scene

Case Study

- Significant other reports global aphasia, and loss of motor coordination that is new this morning, just prior to the time of the 911 call.
- Patient does have left sided facial droop, but this is residual from previous stroke.
- During the patient encounter pt can hoarsely speak 1 or 2 words, but not clearly, and not able to put phrases together.
- MFD has obtained baseline vitals, blood glucose, and identified a stroke alert prior to the arrival of AAS

Case Study

- Vitals and treatment –
  - Hypertensive, confirmed with manual blood pressure of 180/100
  - Heart Rate: 80's
  - SpO2: within normal limits
  - Respirations: within normal limits
  - Blood glucose: 103mg/dL
  - 18g IV lock in the left AC
  - ECG: sinus rhythm

Case Study

- 05:23:54
  - AAS unit leaves the scene transporting emergent
- 05:27:00
  - AAS unit calls stroke alert to St. Luke's ED
- 05:39:03
  - AAS unit arrives at St. Luke's ED to deliver the patient to the ED staff
- 05:47:44
  - AAS unit has transferred care and returns to service

Case Study - Highlights

- The scene was 9.2 miles from St. Luke's ED in morning traffic patterns.
- The time between the 911 call and delivery to the hospital was 34 minutes, 58 seconds
- On scene time for transporting crew was 11 minutes, 6 seconds
- MFD had baseline vitals, blood sugar and a stroke identified in 3 minutes, 8 seconds.
- AAS crew gave St. Luke's a 12 minute heads up that a stroke alert was coming in.

Conclusion

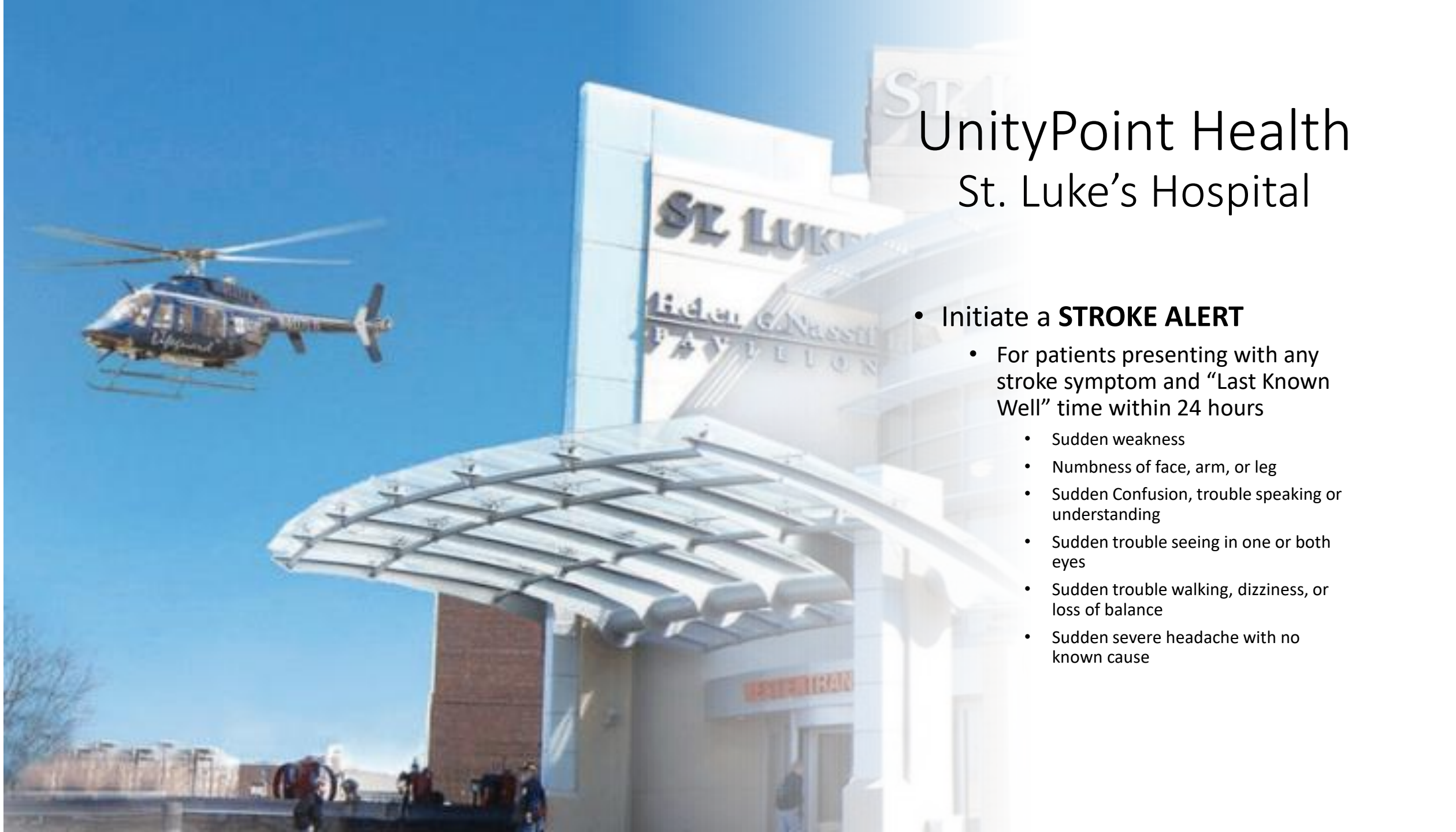
- In this area, fire departments (volunteer and full-time), first responders, and EMS crews are well versed in the importance of time when a stroke is suspected.
- We train and educate our providers to limit scene time, and to identify stroke symptoms early.
- The emergency departments at both hospitals are just as dedicated and we work well together to move these patient quickly to CT so that treatment can start.

Iowa Stroke Symposium

Jordan Kelly

BSN, PM, CFRN, FP-C, CMTE
LifeGuard Program Manager

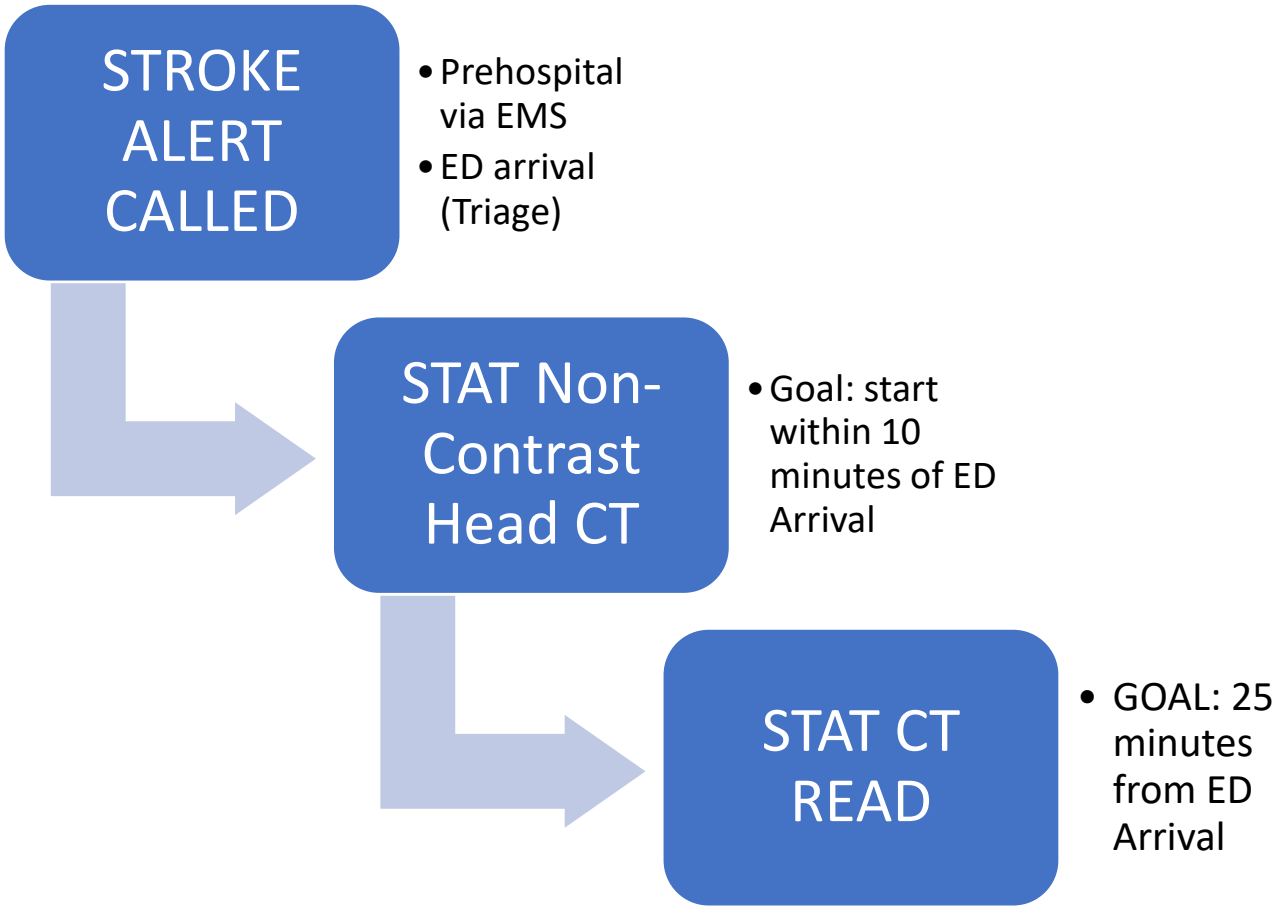
- 2004 – Volunteer ‘Gopher’ Boy
- 2007 – EMT
- 2009 – Paramedic
- 2012 – Flight Paramedic
- 2018 – Nursing
- 2021 – Flight Program Manager



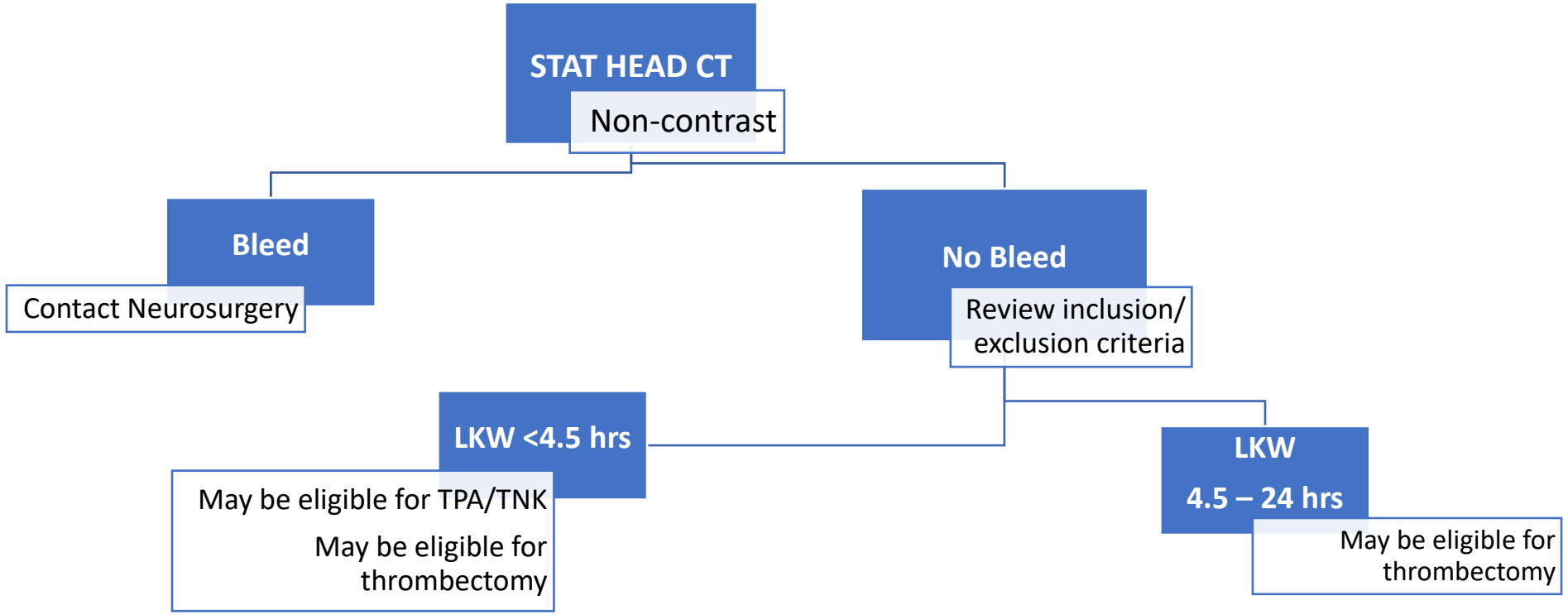
UnityPoint Health
St. Luke's Hospital

- Initiate a **STROKE ALERT**
  - For patients presenting with any stroke symptom and "Last Known Well" time within 24 hours
    - Sudden weakness
    - Numbness of face, arm, or leg
    - Sudden Confusion, trouble speaking or understanding
    - Sudden trouble seeing in one or both eyes
    - Sudden trouble walking, dizziness, or loss of balance
    - Sudden severe headache with no known cause

Stroke Alert Process



Clinical Decision-Making Pathway

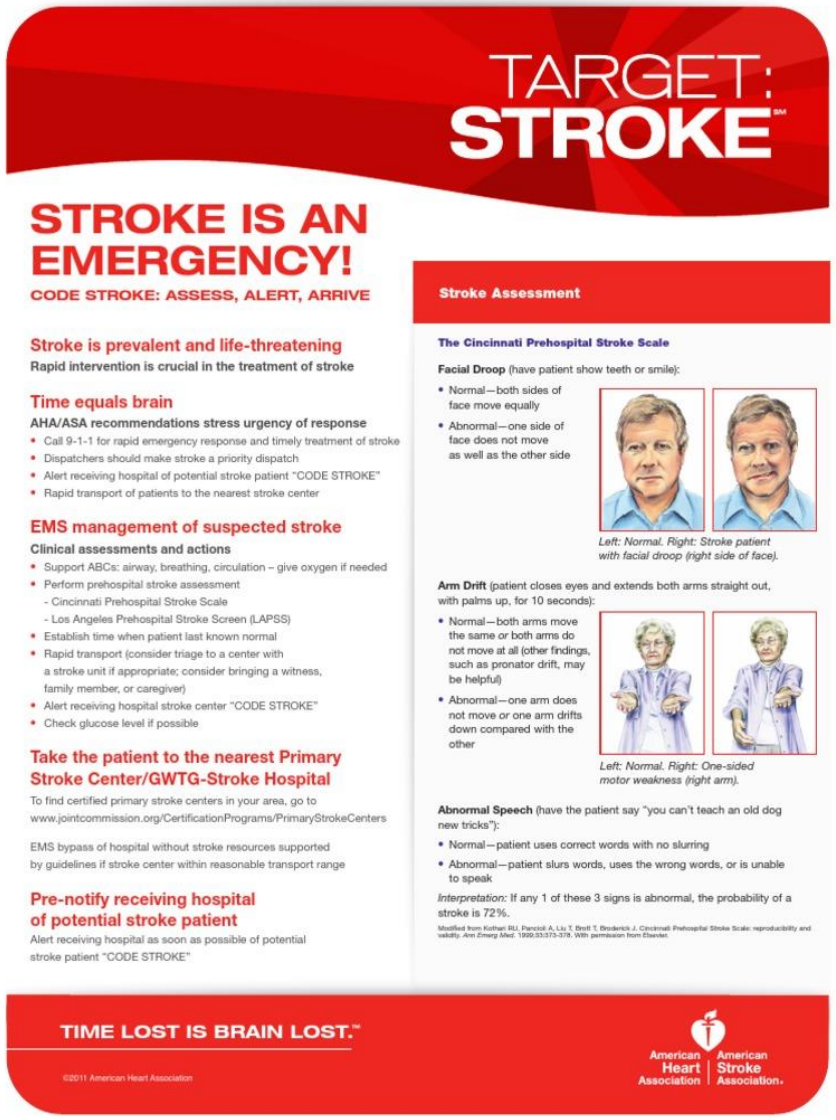


Stroke Alert

- Cincinnati Stroke Scale
  - Facial Droop
  - Arm Drift
  - Slurred or Inappropriate Speech

  - Interpretation:
    - Positive if one is abnormal
    - 72% probability of a stroke

- Head CT without contrast is indicated



TARGET: STROKE℠

STROKE IS AN EMERGENCY!

CODE STROKE: ASSESS, ALERT, ARRIVE

Stroke is prevalent and life-threatening

Rapid intervention is crucial in the treatment of stroke

Time equals brain

AHA/ASA recommendations stress urgency of response

- Call 9-1-1 for rapid emergency response and timely treatment of stroke
- Dispatchers should make stroke a priority dispatch
- Alert receiving hospital of potential stroke patient "CODE STROKE"
- Rapid transport of patients to the nearest stroke center

EMS management of suspected stroke

Clinical assessments and actions

- Support ABCs: airway, breathing, circulation – give oxygen if needed
- Perform prehospital stroke assessment
  - Cincinnati Prehospital Stroke Scale
  - Los Angeles Prehospital Stroke Screen (LAPSS)
- Establish time when patient last known normal
- Rapid transport (consider triage to a center with a stroke unit if appropriate; consider bringing a witness, family member, or caregiver)
- Alert receiving hospital stroke center "CODE STROKE"
- Check glucose level if possible

Take the patient to the nearest Primary Stroke Center/GWTG-Stroke Hospital

To find certified primary stroke centers in your area, go to www.jointcommission.org/CertificationPrograms/PrimaryStrokeCenters

EMS bypass of hospital without stroke resources supported by guidelines if stroke center within reasonable transport range

Pre-notify receiving hospital of potential stroke patient

Alert receiving hospital as soon as possible of potential stroke patient "CODE STROKE"

Stroke Assessment

The Cincinnati Prehospital Stroke Scale

Facial Droop (have patient show teeth or smile):

- Normal—both sides of face move equally
- Abnormal—one side of face does not move as well as the other side

Left: Normal. Right: Stroke patient with facial droop (right side of face).

Arm Drift (patient closes eyes and extends both arms straight out, with palms up, for 10 seconds):

- Normal—both arms move the same *or* both arms do not move at all (other findings, such as pronator drift, may be helpful)
- Abnormal—one arm does not move or one arm drifts down compared with the other

Left: Normal. Right: One-sided motor weakness (right arm).

Abnormal Speech (have the patient say "you can't teach an old dog new tricks"):

- Normal—patient uses correct words with no slurring
- Abnormal—patient slurs words, uses the wrong words, or is unable to speak

Interpretation: If any 1 of these 3 signs is abnormal, the probability of a stroke is 72%.

Modified from Kothari RU, Pancioli A, Liu T, Brott T, Broderick J. Cincinnati Prehospital Stroke Scale: reproducibility and validity. *Ann Emerg Med.* 1999;33:373-378. With permission from Elsevier.

TIME LOST IS BRAIN LOST.™

American Heart Association | American Stroke Association

VAN - Large Vessel Occlusion (LVO) Screening

- Weakness + 1 = Positive
- CTA with Perfusion study is indicated

Vision

- Visual disturbance – field cut, double, blurry or blind

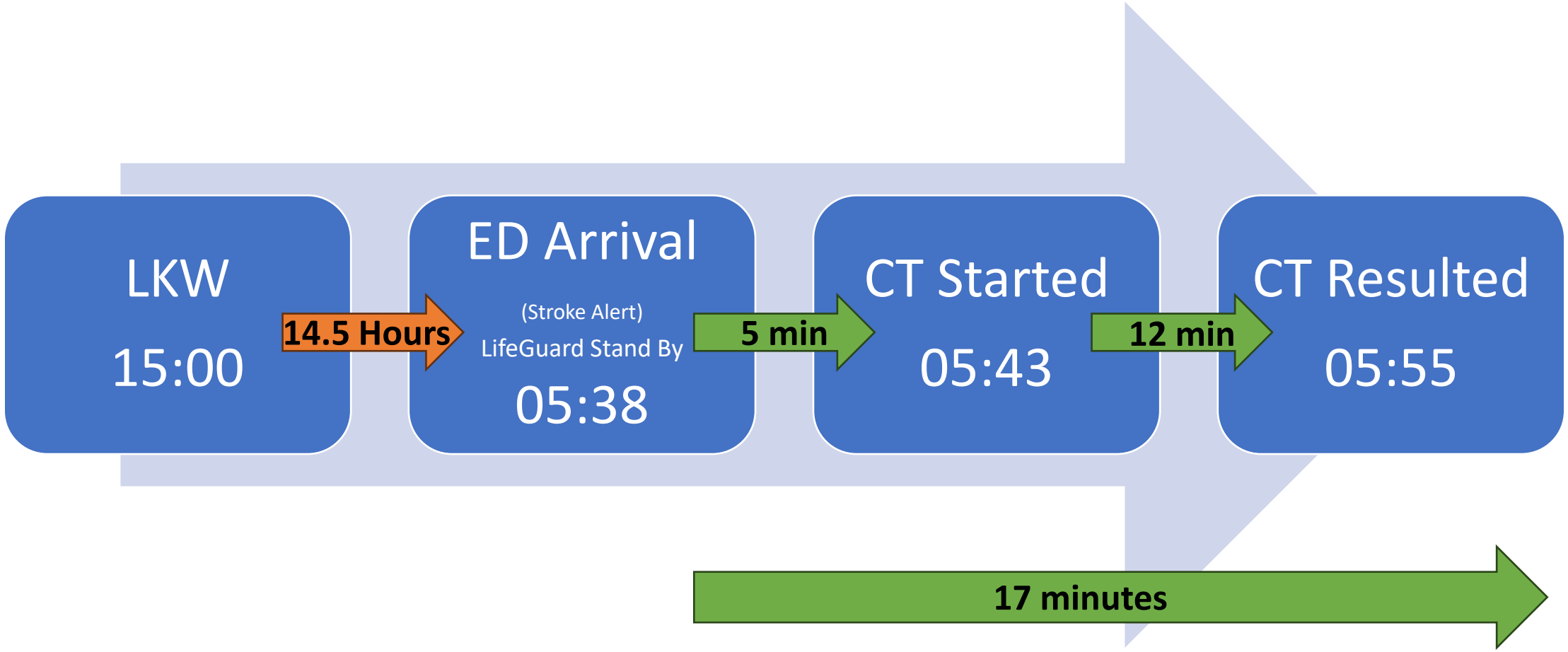
Aphasia

- Inability to speak or understand

Neglect

- Gaze to one size or ignoring one side

Timeline

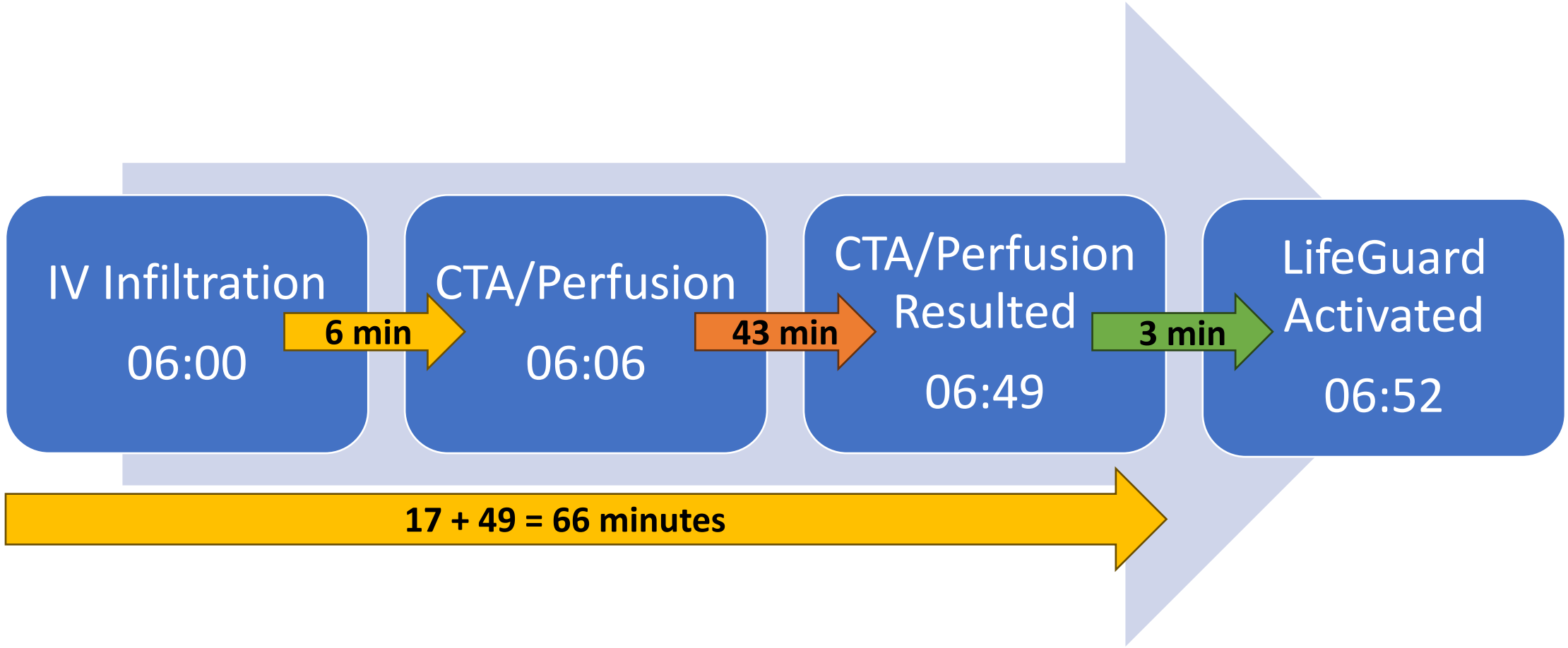

LKW
15:00
14.5 Hours
ED Arrival
(Stroke Alert)
LifeGuard Stand By
05:38
5 min
CT Started
05:43
12 min
CT Resulted
05:55
17 minutes

CT Head without contrast

IMPRESSION:

1. New hypodensity in the left ACA distribution with loss of gray-white junction suspicious for infarct.
2. Chronic infarcts and chronic small vessel ischemic changes are again noted is detailed above.
3. Right sphenoid sinus disease with air-fluid level. Correlate for evidence of acute sinusitis.

Timeline


IV Infiltration
06:00
6 min
CTA/Perfusion
06:06
43 min
CTA/Perfusion Resulted
06:49
3 min
LifeGuard Activated
06:52
17 + 49 = 66 minutes

CT Angiography Head Neck W WO Contrast w Perfusion

IMPRESSION:

1. There is a matched defect on CBV and CBF in the left ACA distribution suggesting infarct.
2. Increased Tmax within the anterior left MCA distribution with penumbra-like pattern.
3. Occlusion of the left M1 segment. This was patent in 2019.
4. The left A1 segment is occluded. Distal reconstitution, perhaps through the anterior commuting artery.. More distal occlusion at the A2 segment is seen.
5. CBF <30% (estimated infarct core): 9 mL
6. Mismatch ratio: 15
7. Mismatch volume: 126 mL
8. Chronic occlusion of the right MCA, similar in appearance to 2019.

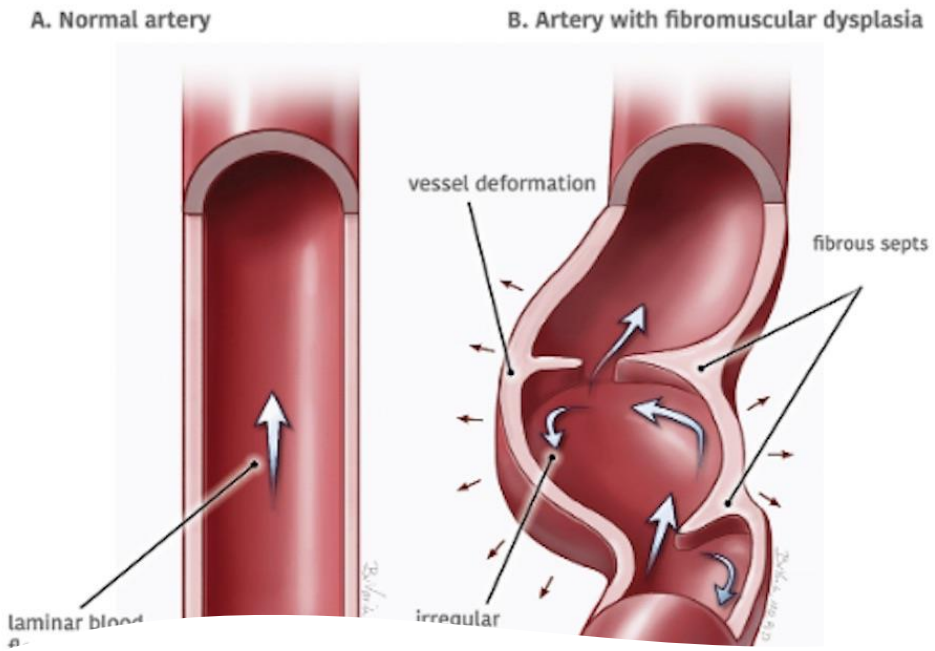
History and Physical

History

- 55-year-old male (86.2 KG 190 lb)
- Extensive Medical History
  - Aneurysm
  - Subarachnoid Hemorrhage (2011)
  - Frontal Lobectomy
  - Prior Strokes
  - Fibromuscular dysplasia (FMD)

Physical Exam

- Complete aphasia
- Ataxia/inability to walk
- HEENT
  - Right Facial Droop (Residual from prior CVA)
  - Pupils 3 mm PERRLA
- Neurological
  - Aphasia
  - Slurred Speech
  - Moves all extremities on command
  - Equal push/pull and bilateral grip strength



NIH Stroke Scale

NATIONAL INSTITUTES OF HEALTH STROKE SCALE (NIHSS)

Item	Title	Responses and Scores
1a.	Level of consciousness	0—alert 1—drowsy 2—obtunded 3—coma/unresponsive
1b.	Orientation questions (2)	0—answers both correctly 1—answers one correctly 2—answers neither correctly
1c.	Response to commands (2)	0—performs both tasks correctly 1—performs one task correctly 2—performs neither
2.	Gaze	0—normal horizontal movements 1—partial gaze palsy 2—complete gaze palsy
3.	Visual fields	0—no visual field defect 1—partial hemianopia 2—complete hemianopia 3—bilateral hemianopia
4.	Facial movement	0—normal 1—minor facial weakness 2—partial facial weakness 3—complete unilateral palsy
5.	Motor function (arm) a. Left b. Right	0—no drift 1—drift before 10 seconds 2—falls before 10 seconds 3—no effort against gravity 4—no movement
6.	Motor function (leg) a. Left b. Right	0—no drift 1—drift before 5 seconds 2—falls before 5 seconds 3—no effort against gravity 4—no movement
7.	Limb ataxia	0—no ataxia 1—ataxia in 1 limb 2—ataxia in 2 limbs
8.	Sensory	0—no sensory loss 1—mild sensory loss 2—severe sensory loss
9.	Language	0—normal 1—mild aphasia 2—severe aphasia 3—mute or global aphasia
10.	Articulation	0—normal 1—mild dysarthria 2—severe dysarthria
11.	Extinction or inattention	0—absent 1—mild loss (1 sensory modality lost) 2—severe loss (2 modalities lost)

Scoring range is 0-42 points. The higher the number, the greater the severity.

Score	Stroke Severity
0	No stroke symptoms
1-4	Minor stroke
5-15	Moderate stroke
16-20	Moderate to severe stroke
21-42	Severe stroke

American Stroke Association. A division of the American Heart Association.

- 1b – Orientation – **2**
- 7 – Limb Ataxia – **2** (present in 2 limbs)
- 9 – Language – **2** (severe aphasia)
- 10 – Articulation – **2** (severe dysarthria)
- **Total NIHSS Score = 8 (Moderate Stroke)**

Routine Follow Up

Patient had routine follow up CTA with Perfusion at UIHC in the morning of the LKW.

Clinical Decision Making

Coincidental CTA/Perfusion at UIHC for follow up at ~10 am on day of LKW

New LVO

Left MCA stroke with penumbra.

Completed infarct in the left ACA distribution.

Discussion with Radiologist at St. Luke’s

Thrombolytic Inclusion/Exclusion Criteria

Inclusion	Exclusion
18 years of age or greater	Current or history of intracranial hemorrhage
Signs and symptoms of stroke within 4.5 hours LKW	Active internal bleeding
Head CT Negative for hemorrhage	Intracranial conditions that may increase the risk of bleeding (neoplasms, AV malformations, aneurysms)
	Taking direct thrombin inhibitors or direct factor Xa inhibitors
	And more….

Clinical Decision Making

Discussion with St. Luke's Neurology

Review of patient's thrombolytic candidacy

Review of Patients Thrombolytic Candidacy

Definitive contraindications to systemic thrombolytics

- LKW greater than 4.5 hours
- History of intracranial hemorrhage
- Presence of intracranial conditions that may increase the risk of bleeding (aneurysms)

Thrombectomy?

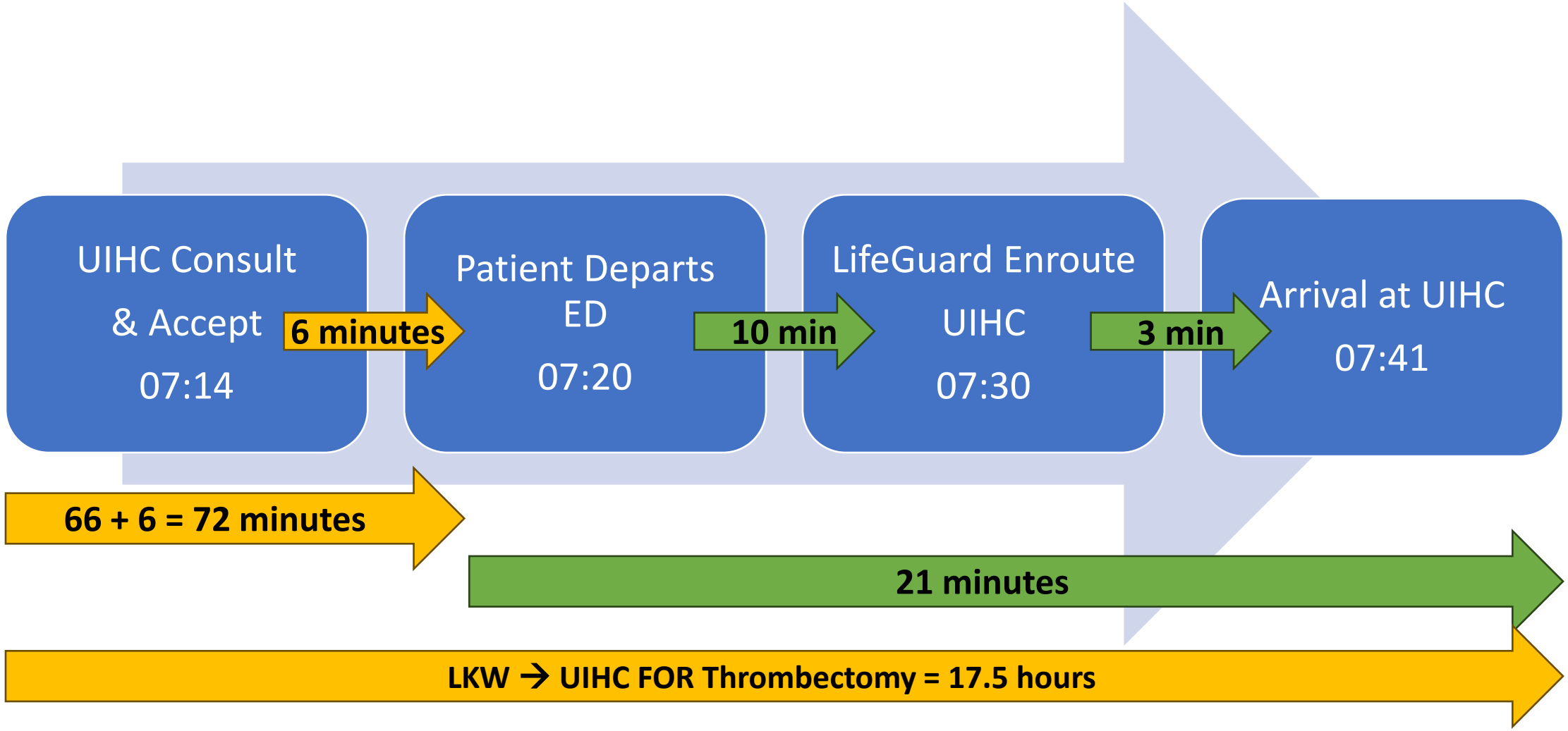
Patient remains a candidate for thrombectomy

Clinical Decision Making

Discussed case with the University of Iowa Stroke Team

Transfer and Transportation arranged to UIHC

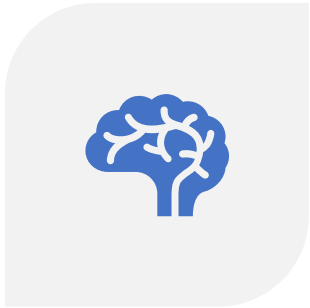
Timeline


UIHC Consult & Accept 07:14
6 minutes
Patient Departs ED 07:20
10 min
LifeGuard Enroute UIHC 07:30
3 min
Arrival at UIHC 07:41
66 + 6 = 72 minutes
21 minutes
LKW → UIHC FOR Thrombectomy = 17.5 hours

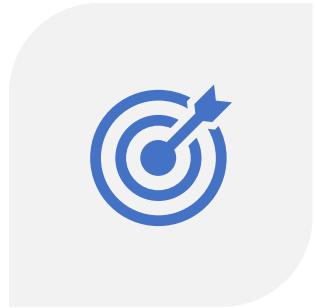
Key Points for Successful Stroke Pathways

PUBLIC EDUCATION ON SIGNS AND SYMPTOMS OF STROKE

COLLABORATION WITH EMERGENCY MEDICAL SERVICES CREWS



CLEAR STROKE ALERT CRITERIA



FOCUS ON CONTINUOUS QUALITY IMPROVEMENT

Questions