KANSAS

KANSAS INITIATIVE FOR STROKE SURVIVAL

A PROJECT BY AND FOR KANSANS

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Hyperacute Stroke Management

“First Tuesdays” Lecture Series

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Introduction and Goal of "First Tuesdays"

- Didactic lecture series as part of the Kansas Initiative for Stroke Survival (KISS)
- Updates in Practice and FAQ's on Acute Stroke Care
- 30 minutes for questions/discussion

Overview

- EMS: prenotification, potential LVO
- H&P: Exam (NIHSS), confirm last known well, confirm contraindications (especially any use of anticoagulation)
- Vitals
- Labs: glucose, PT/INR in patients using warfarin, troponin (do not delay thrombolytic)
- Imaging: CT, CTA, +/- CTP, CXR

EMS Prenotification

- Large retrospective study on over 370,000 patients from April 2003 – March 2011: EMS prenotification occurred in 67% of total cases.
- Prenotification was associated with better **door-to-imaging time (26 minutes vs 31 minutes)** and door-to-needle time (78 minutes vs 80 minutes).
- Will help **direct EMS to CT scanner**

Lin et al, *Circulation* 2012

Streamline EMS handoff

EMS Stroke Agency___________________

t-PA Drug Window is up to 4.5 hours

Intracranial Intervention Window is up to 24 hours

Last Seen Well/Onset			**AM PM**	**Weight**	
Name				**Loaded cot**	**KG**
DOB		S/S#		**Empty cot**	**KG**
Allergies		Blood Sugar		**Pt Wt**	**KG**

Patient History (Circle if Any)			
Stroke/TIA	CAD/CABG		A-Fib
Diabetes	Kidney	COPD	Smoker
Home Blood Thinners (Circle if Any)			
Aspirin	Coumadin (warfarin)		Pradaxa (dibigatran)
Eliquis (apixaban)	Xarelto (rivaoxaban)		Plavix (clopidogrel)
Effient (prasugrel)	Brilinta (ticagrelor)		

Mental Status	**✓ if Abnormal**	
Level of Consciousness (A V P U)	☐	
Speech (repeat "You can't teach an old dog new tricks") **Aphasia** = wrong words or no speech **Dysarthria** = slurred speech	☐	
Questions (age, month)	☐	
Commands (close, open eyes)	☐	
Cranial Nerves	**R**	**L**
Facial Droop (show teeth or smile) Abnormal = one side does not move as well as the other	☐	☐
Visual Fields (4 quadrants)	☐	☐
Horizontal Gaze (follow finger side to side)	☐	☐
Limbs	**R**	**L**
Motor – Arm (close eyes and hold out both arms) Abnormal = arm can't move or drifts down	☐	☐
Motor – Leg (open eyes and lift each leg separately)	☐	☐
Sensory – Arm (close eyes and touch, pinch)	☐	☐
Sensory – Leg (close eyes and touch, pinch)	☐	☐
Coordination – Arm (finger to nose) **(ataxia)**	☐	☐
Coordination – Leg (heel to shin) **(ataxia)**	☐	☐

V.S. Pulse	**R/R**	**B/P**	**ETCO2**	**Sat**

Family Contact #	

F.W.E.D. Red Pod	417.347.6656	F.W.E.D. Charge Nurse	417.347.3373

* E D M *

01.70000.71600.CLOP.0007.0516 Pg. 2 of 2

EMS handoff to hospital staff including if LVO screen positive

Standardizes EMS to RN/MD Handoff

Slide courtesy of Dr. Lechtenberg

Imaging selection: CT vs CTA vs CTP

- Immediate door to CT scanner for suspected acute stroke.
- CTA can often be obtained on initial arrival as long as IV thrombolytic is not delayed.
- CTP if it will be over 6 hours from last seen well at time of potential endovascular thrombectomy (variable capability)

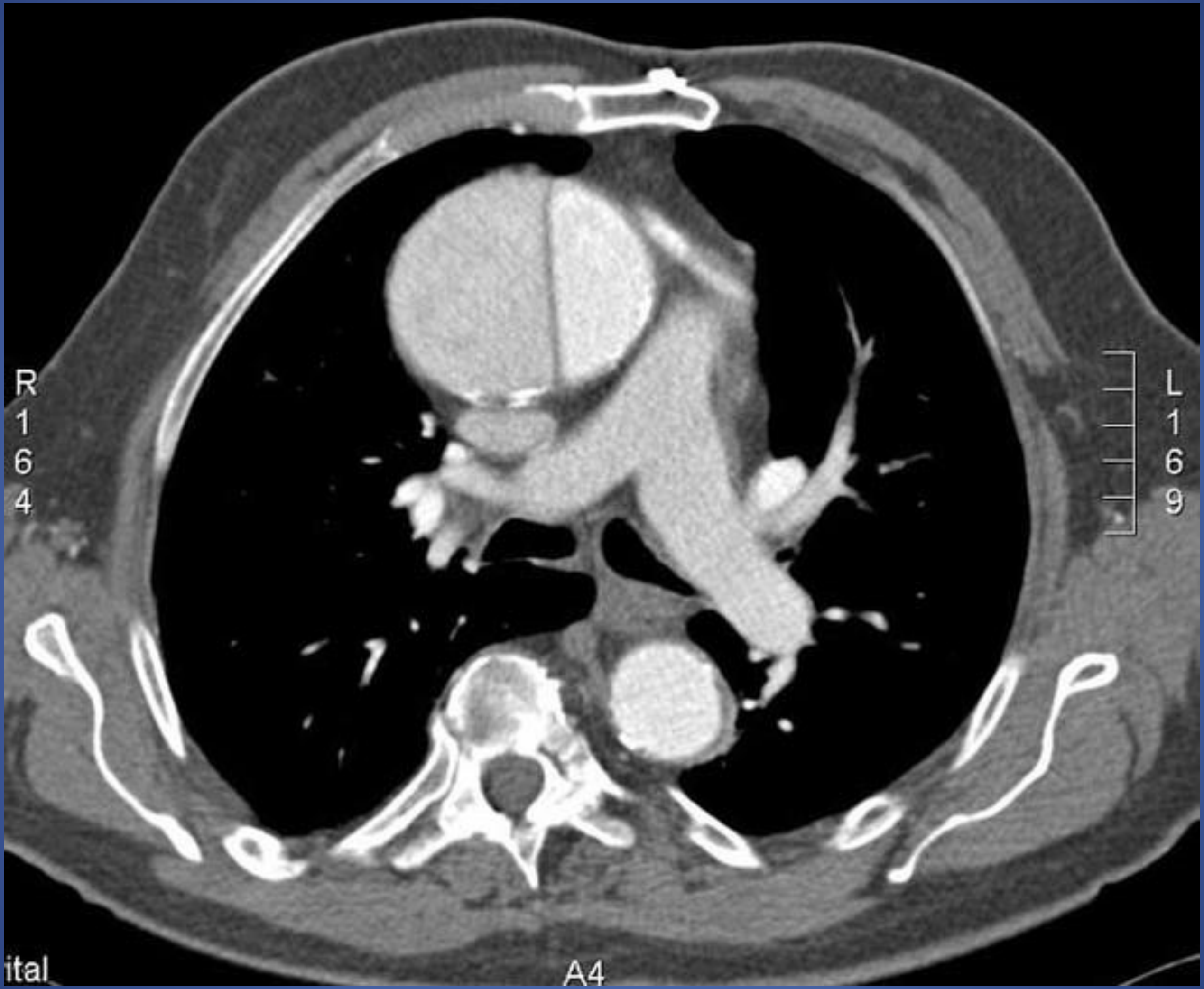
CT brain without contrast

- Required for all patients presenting to ED with stroke-like symptoms
- Required prior to giving IV tPA to rule out hemorrhage
- Can also see early signs of stroke (developing hypodensity) or signs of LVO (hyperdense vessel)
- EMS/triage → straight to CT is best

Bell & Jones, *Radiopaedia* https://radiopaedia.org/articles/intracerebral-haemorrhage?lang=us

CTA chest

- Required for all patient with consideration of thrombolytic if complaining of **chest pain** or other signs of aortic dissection prior to giving tPA
- Aortic dissection can extend to carotids and cause a stroke



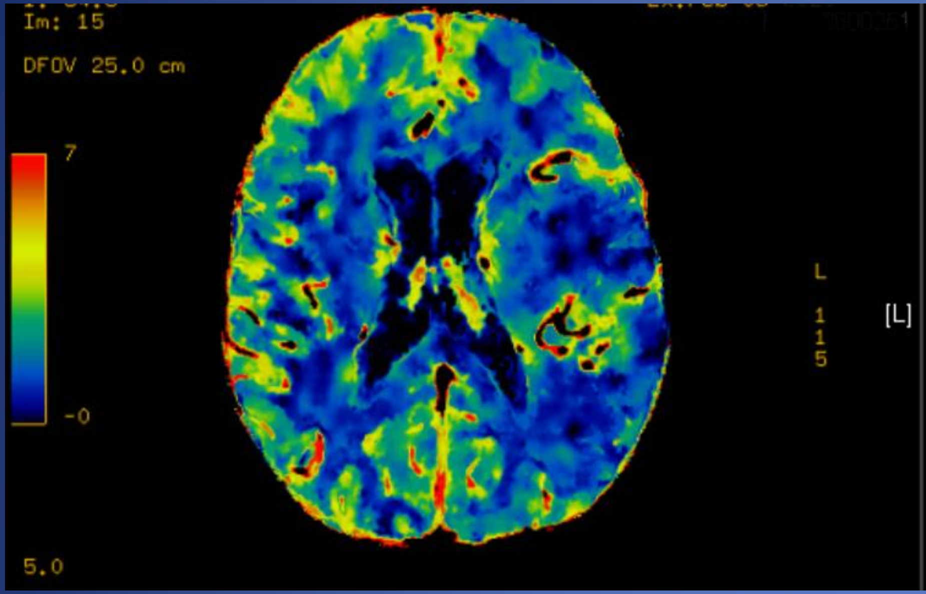
Vadera & Gaillard, *Radiopedia* https://radiopaedia.org/articles/aortic-dissection?lang=us

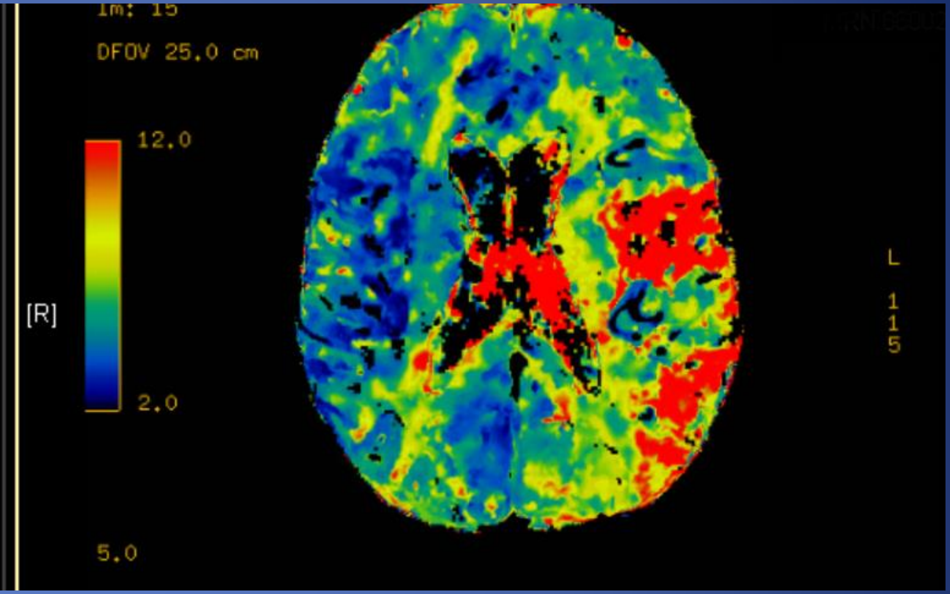
CT angiogram head and neck with contrast

- Required for all patients **acutely** if an LVO is suspected (higher NIHSS, hemispheric syndrome, basilar syndrome), but do not delay thrombolytic to get CTA if they are still a candidate.
- Vessel imaging with CTA or MRA required for all patients with suspected stroke or TIA during hospitalization
- Looking for large vessel occlusion to decide on thrombectomy: **intracranial ICA, A1*, M1 or M2*, P1*, basilar**

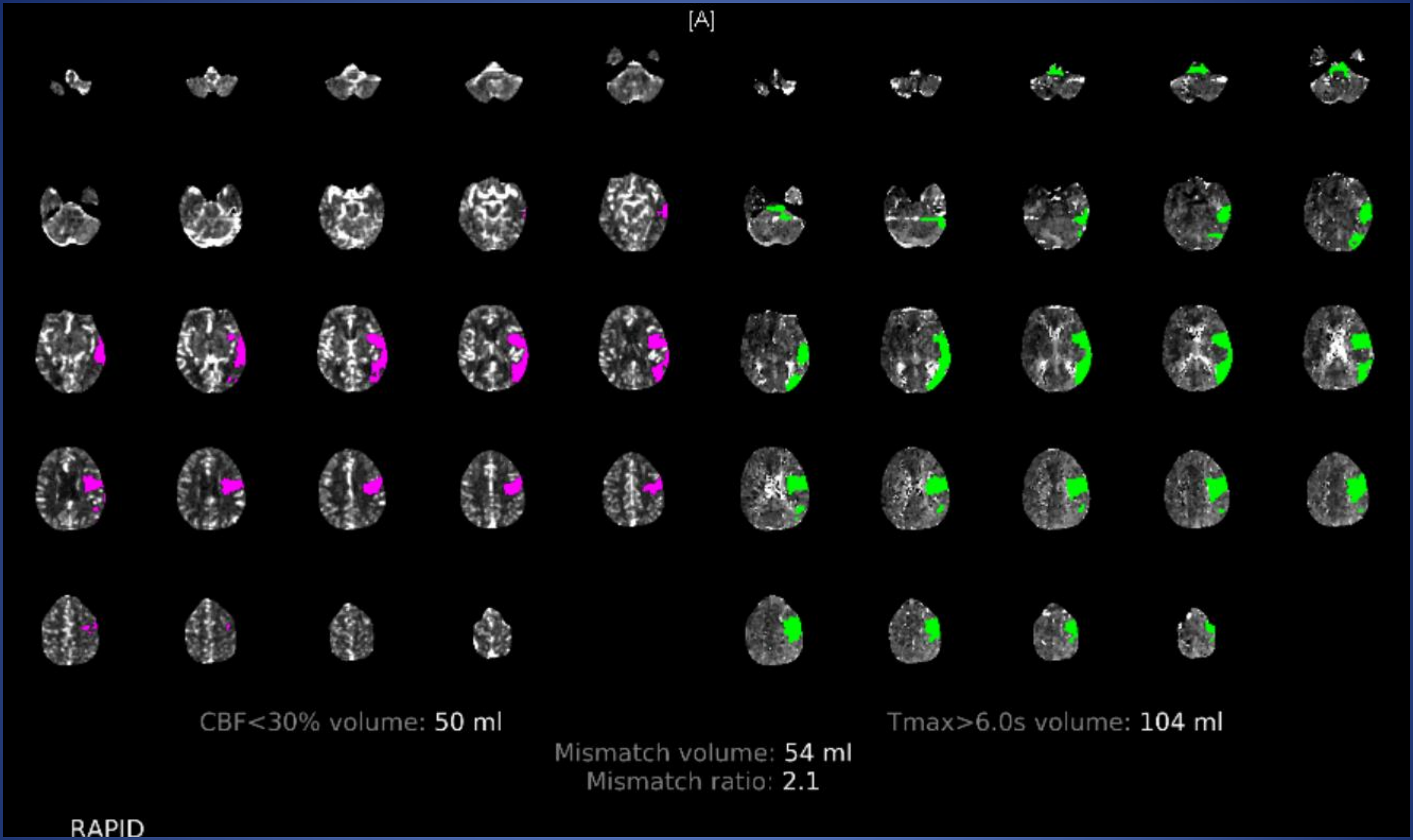
CTP with contrast

- Required for all patients **acutely** who have LVO and **if last seen well (lsw) 6-24 hours**
  - **If lsw less than 6 hours prior to potential thrombectomy time, likely do not need CTP to decide on EVT**
  - **If transfer time to thrombectomy capable hospital is ≥ 2 hours, consider deferring CTP at sending**
- CT perfusion is used to find a **mismatch** between ischemic core (area already damaged) and ischemic penumbra (area at risk of damage).



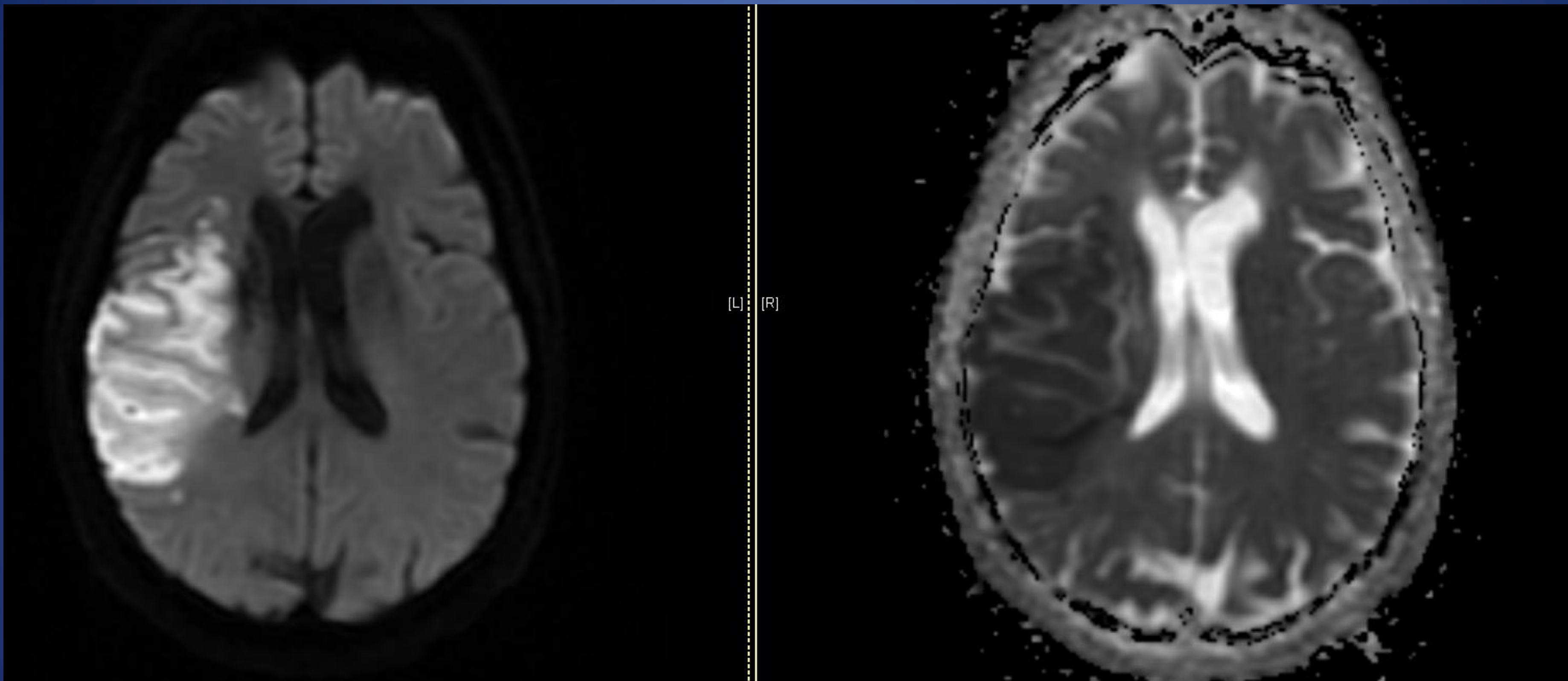


CBV **Tmax**


[A]
CBF<30% volume: 50 ml
Tmax>6.0s volume: 104 ml
Mismatch volume: 54 ml
Mismatch ratio: 2.1
RAPID

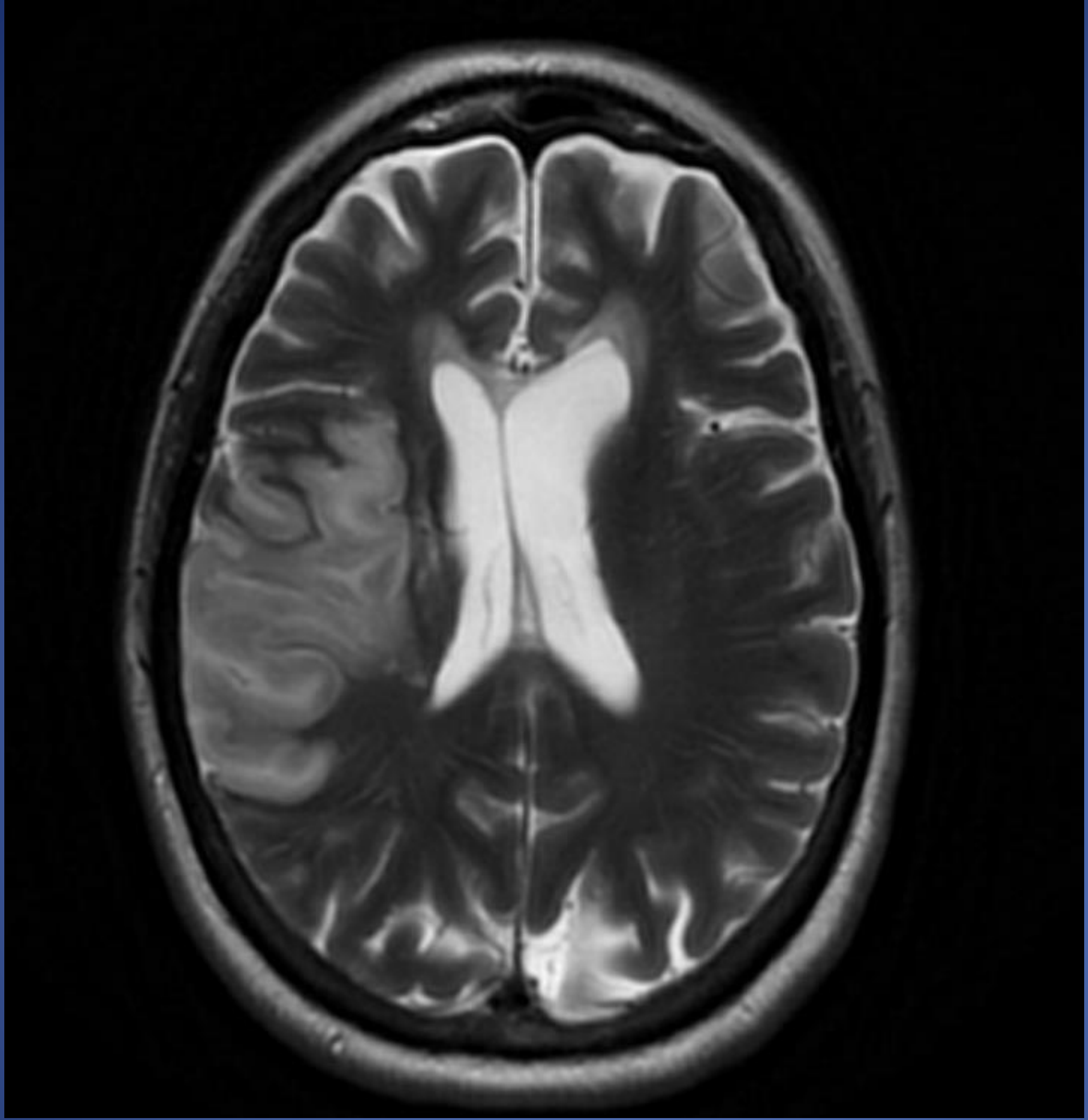
MRI brain without contrast

- Required for most patients with suspected stroke/TIA while hospitalized
- Should **not** be completed in ED in most cases, especially prior to deciding on acute interventions
- Special cases where **acute** MRI is helpful:
  - If severe reaction to contrast (anaphylaxis), use MRA/MRP instead of CTA/CTP to evaluate for intervention
  - Wake up stroke and no LVO: Can look for diffusion/FLAIR mismatch to decide whether to give thrombolytic
- Most sensitive to diagnose stroke, but may be negative in hyperacute period
- Can get without contrast
- Diagnosis of acute stroke = **hyperintensity in DWI** with corresponding **hypointensity in ADC**

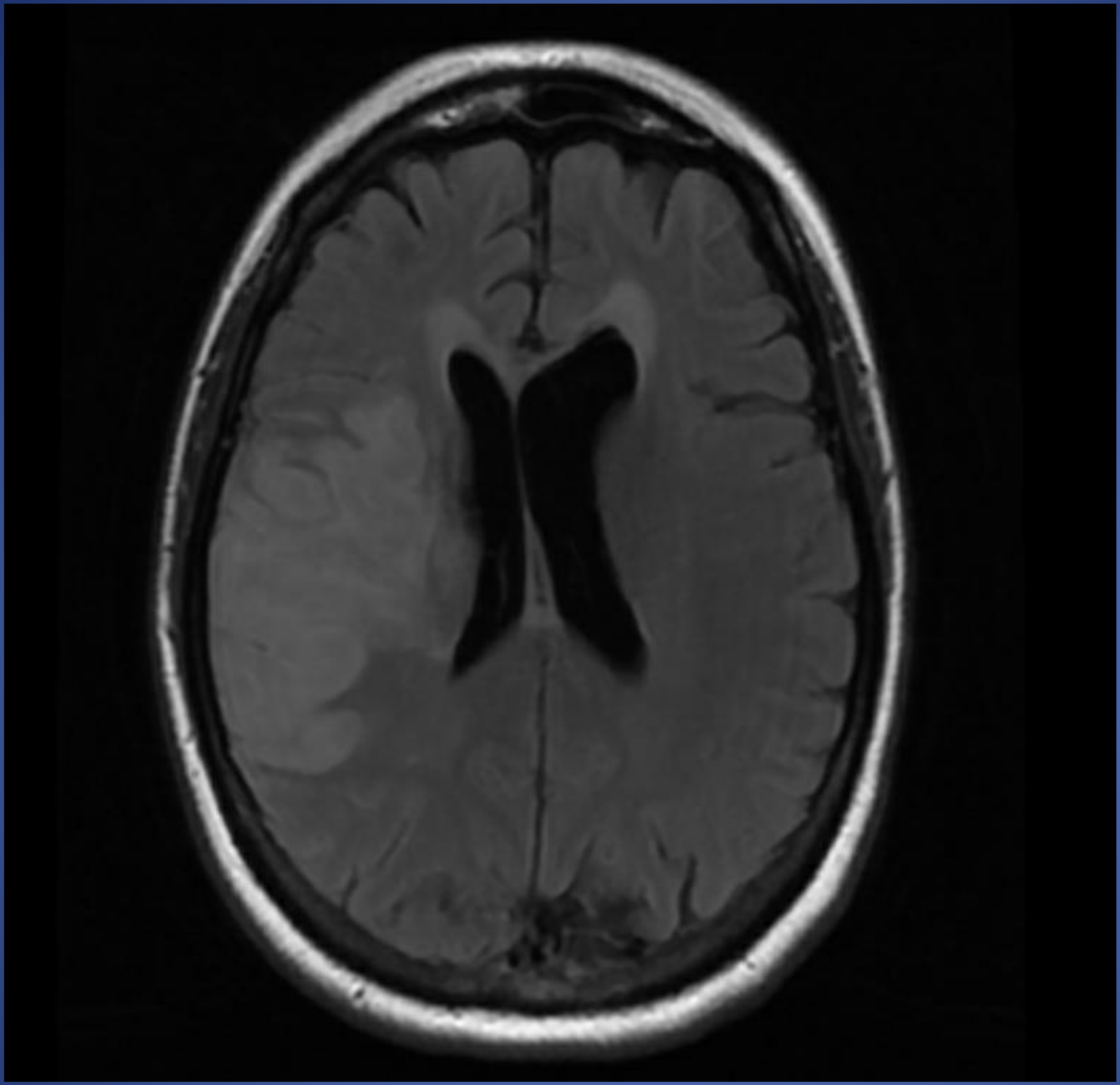


DWI (Diffusion weighted imaging)

ADC (Apparent diffusion coefficient)



T2

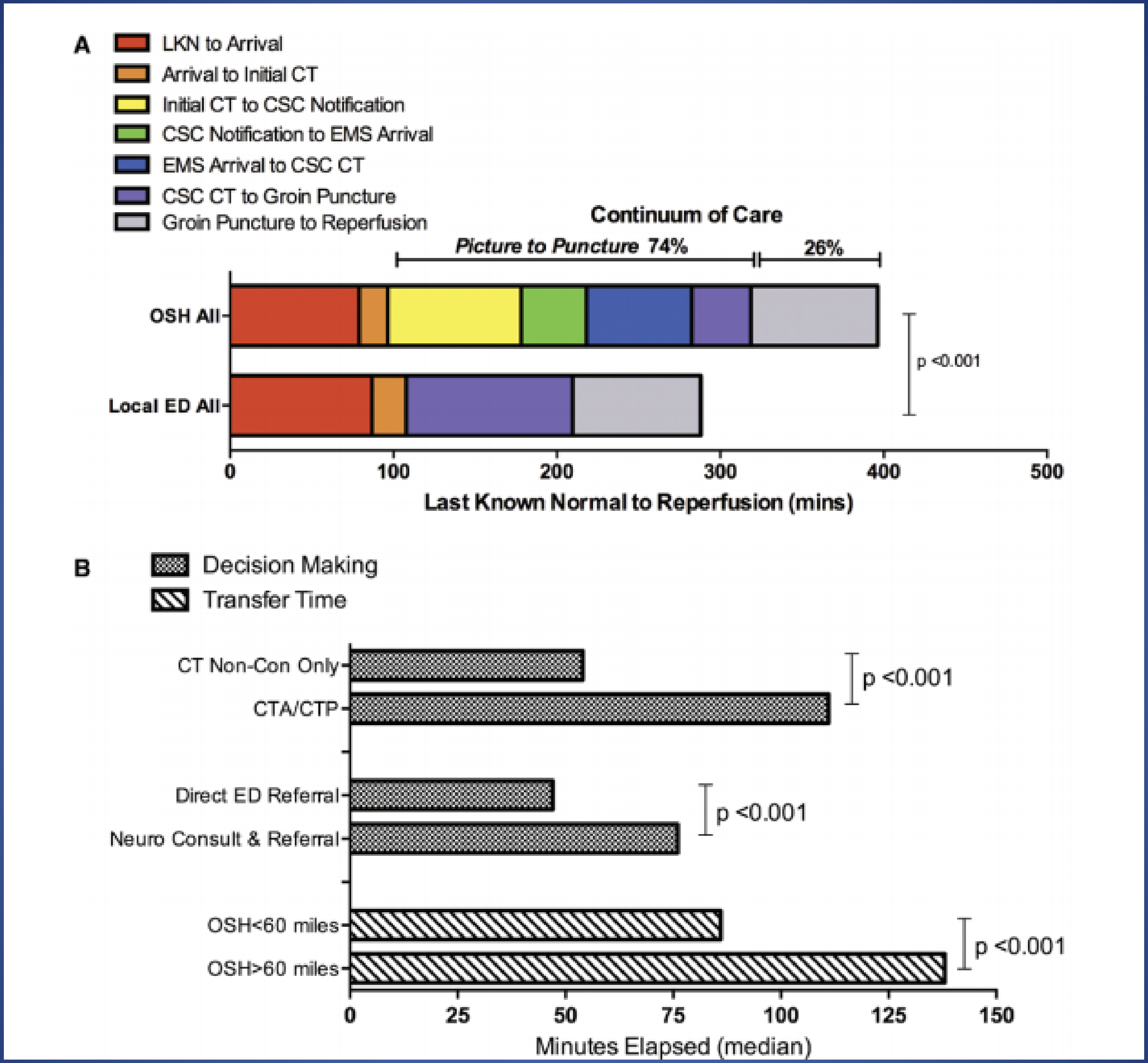


FLAIR (Fluid attenuation inversion recovery)

Special considerations for rural/critical access hospitals with lower volumes

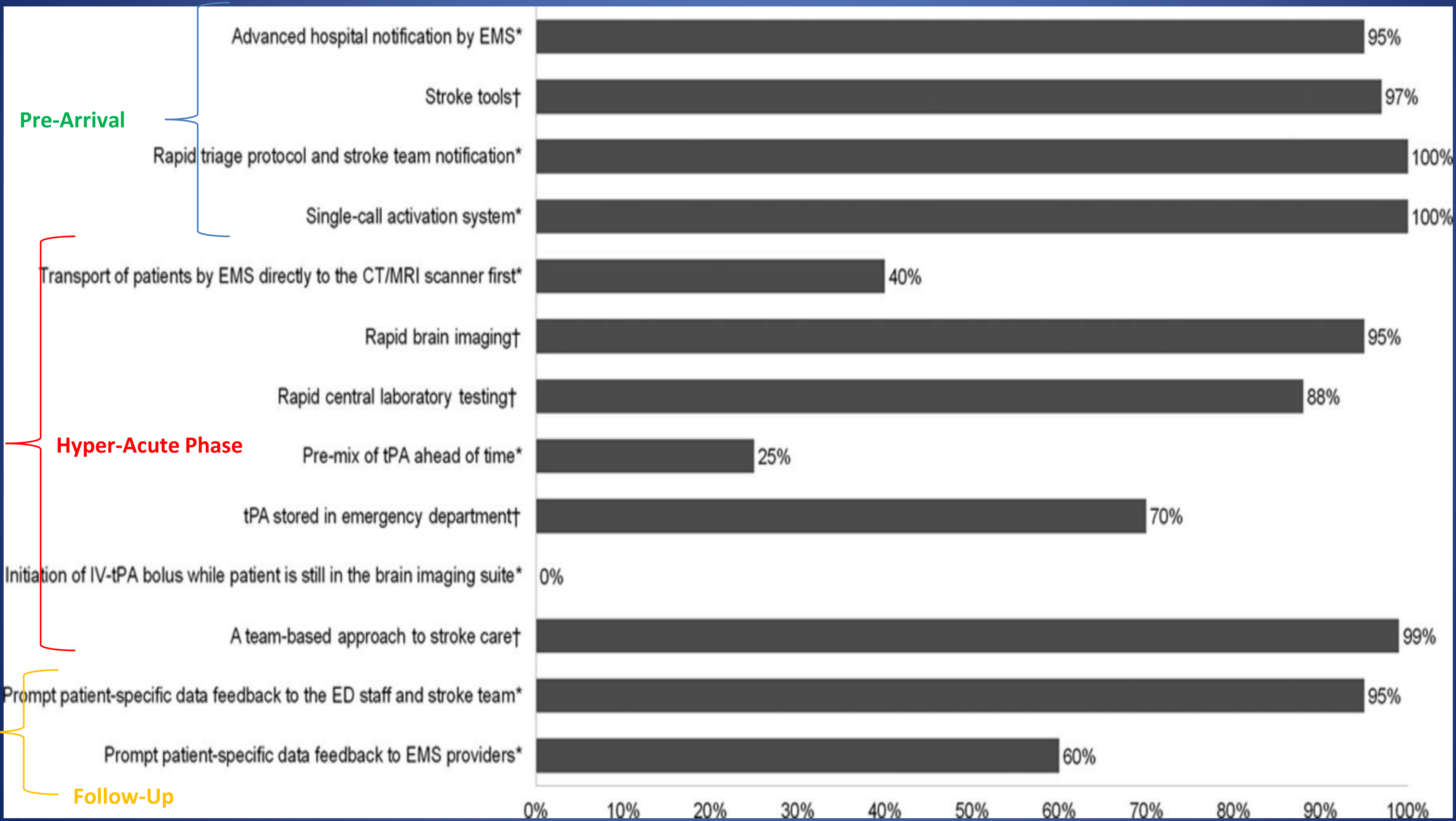
- Ensure readily accessible site protocols for stroke care and rapid imaging transfer
- Perform mock stroke codes/simulation exercises
- Maintain partnerships with hub stroke centers
- Develop standardized protocols for transfers, taking into account circumstances (air vs ground, live map of traffic/weather)
- Improve door-in-door-out time protocols

Zachrison et al, *Stroke* 2024



Sun et al, *Stroke* 2013

Best Practices



Slide courtesy of Dr. Lechtenberg

- Thrombolytic in the scanner in between CT and CTA

Table 2. Factors Associated With DTN time in Univariable- and Multivariable-Adjusted Analyses, Including HASTE Interventions (Table view)

Independent Variable	N	Univariable Analysis		Multivariable Analysis			
		Median DTN time, min	*P* Value	% Decrease in DTN time	95% Confidence Interval	*P* Value	Mean Decrease in DTN time,* min
Sex							
Female	169	48	0.109	0.51	−9 to 9	0.909	0.30
Male	181	43					
Age (per year)	…	…	…	−0.10	−0.37 to 0.17	0.469	−0.06
Time, days	…	…	…	−0.03	−0.05 to -0.01	0.003	−0.02
Location treatment administered							
Stroke unit	65	62		−30	−47 to −15	<0.001	−18
ED bay	200	47	0.0001	Reference	…	…	…
CT/imaging area	63	29		32	23 to 39	<0.001	19
Stretcher to CT							
Yes	24	28	<0.0001	30	16 to 42	<0.001	18
No	325	48					
Patient registered as unknown							
Yes	132	40	<0.0001	12	3 to 20	0.013	7
No	208	53					
STAT stroke page							
Yes	136	40	<0.0001	11	1 to 20	0.032	6
No	213	51					

Kamal et al, *Circulation* 2017

EMS Transport Out

- Call EMS early for suspected transfer or encourage EMS who brought patient to facility to wait around to transfer
  - *“Waste gas not brain”*

- *Protocol to Manage Hypertension in Field, Post-Alteplase Care*

DURING INFUSION / POST INFUSION / TRANSPORT PREPARATION:

☒ Monitor Vital Signs every 15 minutes.

- Keep **SBP <180mmHg, DBP <105 mmHg**, (stop tPA if unable to maintain SBP <180 or DBP <105 constantly with Antihypertensive agents)
  - Labetalol 10 mg IVP (may repeat x 1). (Hold for HR < 60)
  - Nicardipine gtt. 5 mg/hr to max of 15 mg/hr
- Keep SBP > 100: May try NS 500ml IVF bolus as an initial option
- Monitor Neuro Checks every 15 minutes.
- If sudden change in baseline mental status, acute headache, or vomiting, STOP t-PA infusion. Call Med Control

☒ Monitor for Adverse Reactions e.g. Angioedema (may follow anaphylactic management or protocol) or Hemorrhagic Complications (Abdominal and/or flank pain, hemoptysis, hematemesis, shortness of breath /rales/rhonchi) STOP tPA infusion; Call Medical Control

CAUTIONS

- NO Anticoagulation or Antiplatelet Therapy for 24 hours
- No Foley insertion/re-insertion, central venous line placement or arterial puncture at a non-compressible site for at least 24 hours after tPA
- Avoid insertion of nasogastric tube for 6-8 hours after tPA administration

☒ Send copy of CT Head Scan (do not delay transport-report can be faxed)

☒ Send patient records with documentation of allergies, current medications, past medical history (can be faxed)

**all that is needed is the EMTALA paperwork with patient—DO NOT DELAY TRANSFER FOR COPY OF RECORDS

☐ Telephone order from Dr. ______________________________

Nursing signature/RAV: ____________________ Date: ______________ Time: ____________

Provider Signature: ____________________ Date: ______________ Time: ____________

PATIENT IDENTIFICATION

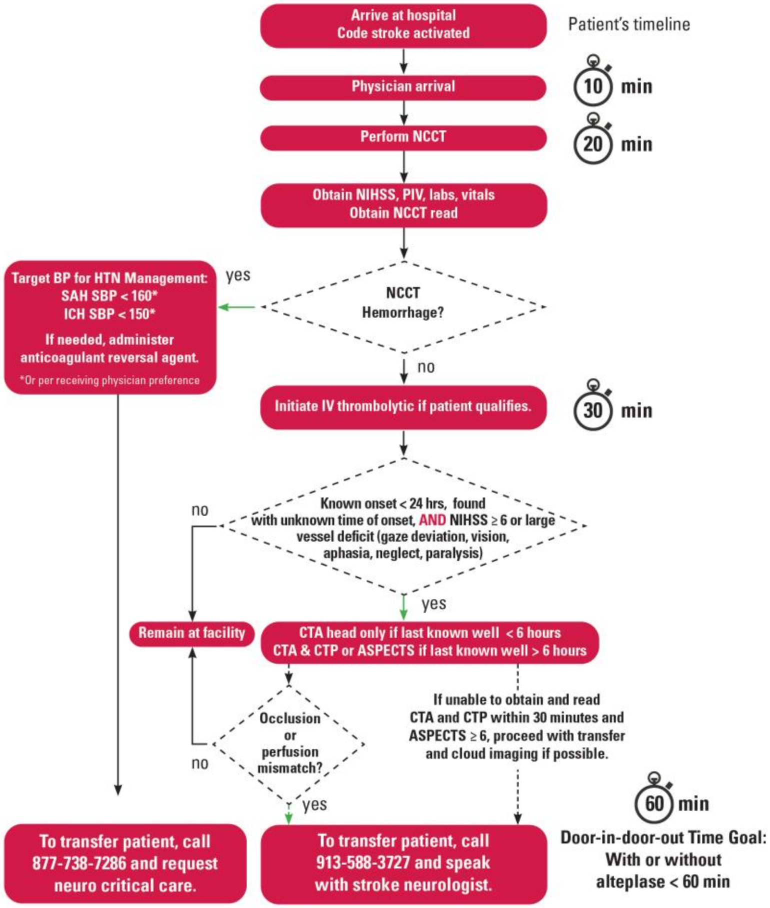
TEMPLATE

Slide courtesy of Dr. Lechtenberg

THE UNIVERSITY OF KANSAS HEALTH SYSTEM

Stroke Care Workflow

Follow this guide for timely treatment and transfer



For more information

KansasHealthSystem.com/Stroke

Sources: American Heart Association/American Stroke Association; ENLS SAH and ICH guidelines; and The University of Kansas Health System

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Questions?

- Call for help anytime!
- KU BAT phone: 913-588-3727
- http://www.kissnetwork.us/
- sslavin2@kumc.edu