



**KANSAS INITIATIVE
FOR STROKE SURVIVAL
INC**
A Project By & For Kansans

Regional Stroke Care

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KISS Map
<http://www.kissnetwork.us/>



- Non-Emergent Stroke Ready**
 - Not attested (either through KISS or Care Collaborative) on capability to perform basic stroke care
- Emergent Stroke Ready**
 - Self-attested facility that can give IV alteplase, has 24/7 CT scanner, acute stroke expertise (via Telestroke if needed)
- Acute Stroke Ready Facility**
 - Same as Emergent Stroke Ready above but is certified by credentialing body
- Primary Stroke Center**
 - All functions of Acute/Emergent Stroke Ready plus have stroke unit, stroke coordination, stroke service and continuum of inpatient care
- Thrombectomy-capable Facility**
 - Level between Primary and Comprehensive - Can perform endovascular therapy procedures 24/7
- Comprehensive Stroke Center**
 - All PSC functions, participate in latest research, provide in house 24/7, plus neurosurgeon, neuro-endo-vascular and full spectrum of hemorrhagic stroke care

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Current State of KISS

- 2 Comprehensive Stroke Centers
- 14 Primary Stroke Centers
- 1 Acute Stroke Ready Hospital
- 80 Emergent Stroke Ready Hospitals*
- Total hospitals in Kansas: 126 (77% participation in KISS)
- 58/83 Critical Access Hospital are in KISS (69% participation)
- 10 Counties do not have a hospital: Bourbon (now have ER), Chase, Doniphan, Elk, Gray, Linn, Osage, Wabaunsee, Wallace and Woodson
- Goal is 100% participation

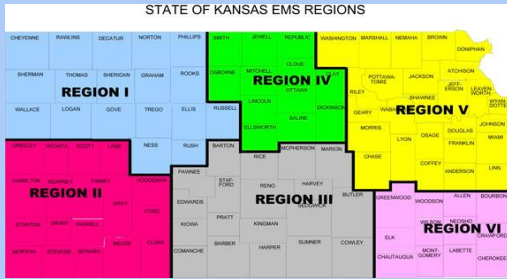
* Self attested

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Know Your Region

- Are you going to:
 - Prepare to transport to nearest hospital to stabilize patient
 - Prepare to transport to nearest **Emergent Stroke Ready Hospital/Acute Stroke Ready Hospital**
 - Prepare to transport to nearest **Primary Stroke Center**
 - Prepare to transport to nearest **Comprehensive Stroke Center**

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EMS Region I Emergent/Acute Stroke Ready

- Cheyenne County Hospital
- Citizens Medical Center
- Decatur HealthCare System
- Goodland Regional Medical Center
- Gove County Hospital
- Graham County Hospital
- Grisell Memorial Hospital
- Logan County Hospital
- Ness County District Hospital
- Norton County Hospital
- Phillips County Hospital
- Rawlins County Hospital
- Rooks County Health Center
- Rush County Memorial Hospital
- Russell Regional Hospital
- Sheridan County Health Complex
- Trego County-Lemke Memorial Hospital

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**EMS Region I
Primary Stroke Center**

- HaysMed-The University of Kansas Health System

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**EMS Region II
Emergent/Acute Stroke Ready**

- Greeley County Hospital
- Wichita County Health
- Scott County Hospital
- Kearny County Hospital
- Stanton County Hospital
- Bob Wilson Memorial/Grant County Hospital
- Satanta District Hospital
- Western Plains Medical Center
- Minneola District Hospital
- Ashland Health Center
- Morton County Health System
- Southwest Medical Center

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**EMS Region II
Primary Stroke Centers**

- St. Catherine Hospital

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**EMS Region III
Emergent/Acute Stroke Ready**

- Anthony Medical Center
- Ascension Via Christi St. Joseph
- Ascension Via Christi St. Theresa
- Clara Barton Hospital
- Edwards County Hospital
- Harper District Hospital
- Hospital District No. 1 of Rice Co.
- Kansas Medical Center
- Lindsborg Community Hospital
- Pratt Regional Medical Center
- Pawnee Valley Community Hospital
- South Central Kansas Medical Center
- St. Luke Hospital and living Center (Marion)
- Susan B Allen Memorial Hospital
- University of Kansas Health Systems- Great Bend Campus
- Wesley Woodlawn Hospital
- William Newton Hospital

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**EMS Region III
Primary Stroke Centers**

- Hutchison Regional Medical Center
- Wesley Medical Center

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**EMS Region IV
Emergent/Acute Stroke Ready**

- Osborne County Memorial Hospital
- Lincoln County Hospital
- Smith County Memorial Hospital
- Memorial Hospital
- Herington Municipal Hospital
- Cloud County Health Center
- Republic County Hospital
- Ottawa County Health Center
- Mitchell County Hospital Health System
- Clay County Medical Center
- Ellsworth County Medical Center

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**EMS Region IV
Primary Stroke Centers**

- Salina Regional Medical Center

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**EMS Region V
Emergent/Acute Stroke Ready**

- | | |
|--------------------------------|------------------------------------|
| • Anderson County Hospital | • Mercy Regional Health Center |
| • Atchison Hospital | • Miami County Medical Center |
| • Coffey Health Systems | • Nemaha Valley Community Hospital |
| • Community Health Care System | • Newman Regional Health |
| • Cushing Memorial Hospital | • Advent Health-Ottawa |
| • Geary Community Hospital | • Sabetha Community Hospital |
| • Hiawatha Community Hospital | • Warrego City Hospital |
| • Holton Community Hospital | |
| • St. John Hospital | |

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**EMS Region V
Primary Stroke Centers**

- Lawrence Memorial Hospital
- Menorah Medical Center
- Olathe Medical Center
- Overland Park Regional MC
- Providence Medical Center
- Shawnee Mission MC
- Saint Luke's South Hospital
- Stormont Vail Medical Center
- University of Kansas St. Francis-Topeka

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**EMS Region VI
Emergent/Acute Stroke Ready**

- Wilson Medical Center - Neodesha
- Labette Health - Parsons
- Neosho Memorial Regional Medical Center - Chanute
- Via Christi Hospital - Pittsburg
- Coffeyville Regional Medical Center - Coffeyville
- Greenwood County Hospital – Eureka
- Anderson County Hospital

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**EMS Region VI
Primary Stroke Center**

- None

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**All Regions
Comprehensive Stroke Centers**

- The University of Kansas Health System
- Kansas City (Region V)
- Ascension Via Christi St. Francis – Wichita
(Region III)

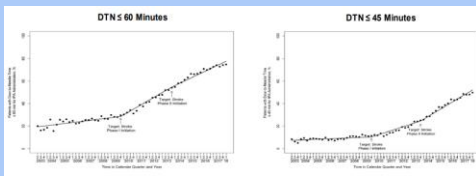
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STROKE GUIDELINES/ RECOMMENDATIONS

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Target: Stroke Timelines

- Target Stroke: Phase I (2010)
 - DTN within 60 min in 50% of eligible patients.
- Target Stroke: Phase II (2014)
 - DTN within 60 min \geq 75% of eligible patients
 - DTN within 45 min \geq 50% of eligible patients



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Are we harming people by treating faster?

Outcome	Pre-Target Stroke (n=24,365)	Post-Target Stroke Phase I (n=4,257)	Post-Target Stroke Phase II (n=74,647)	P value	Adjusted OR 95% CI (Phase I vs Pre Target Strokes)	Adjusted OR 95% CI (Phase II vs Pre Target Strokes)
In-Hospital Mortality	10.0%	8.2%	6.2%	<0.0001	0.80 (0.80-0.81)	0.72 (0.67-0.77)
Discharge Home	35.6%	41.5%	49.0%	<0.0001	1.21 (1.16-1.27)	1.36 (1.27-1.45)
Ambulatory Status Independent	41.5%	44.6%	52.7%	<0.0001	1.05 (0.99-1.22)	1.30 (1.27-1.45)
Symptomatic ICH within 36 Hours	5.7%	4.5%	3.6%	<0.0001	0.79 (0.72-0.86)	0.67 (0.61-0.73)

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Evolution of Best Practices Target: Stroke Phase III

- *Launched in 2019*
- **PRIMARY GOALS:**
 - DTN (*IV thrombolytic*) within 60 min \geq 85% eligible cases
 - Door-to-device times (*arrival to first pass of thrombectomy device*) \geq 50% eligible patients:
 - \leq 90 minutes for ED arrivals
 - \leq 60 minutes for transfers
- **SECONDARY GOALS:**
 - DTN within 45 min \geq 75% eligible patients
 - DTN within 30 minutes \geq 50% eligible patients

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Door In Door Out Data Collection

- Brain Attack Coalition (BAC) recommended transfer within 2 hours in 2013 (Alberts, 2013)
- Reporting to TJC began Jan 1, 2019 discharges
 - Tracking of:
 - Door to transfer
 - STK-OP-1b-Hemorrhagic transfer
 - STK-OP-1c- AIS: Alteplase Drip and Ship Only
 - STK-OP-1d- AIS: +LVO, eligible for EVT
 - STK-OP-1e- AIS: +LVO, NOT eligible for EVT
 - STK-OP-1f-AIS: No alteplase, -LVO, not eligible for EVT
- Hoping to get a DIDO recommendation from AHA


6/24/2021

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DIDO Research

Stroke
Volume 50, Issue 10, October 2019, Pages 2029-2034
<https://doi.org/10.1161/STROKEAHA.119.025042>



CLINICAL SCIENCES

Door-in-Door-Out Time of 60 Minutes for Stroke With Emergent Large Vessel Occlusion at a Primary Stroke Center

Philip M.C. Choi, FRACP, Andrew H. Tsoi, MD, Alun L. Pope, PhD, Shelton Leung, MD, Tanya Frost, RN, Poh-Sien Loh, FRACP, Ronil V. Chandra, FRANZCR, Henry Ma, PhD, Mark Parsons, PhD, Peter Mitchell, FRANZCR, and Helen M. Dewey, PhD

Conclusion: A median DIDO time of $<$ 60 minutes can be achieved at a primary stroke center.

6/24/2021

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REGIONAL STROKE CARE GUIDELINES

6/24/2021

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2019 Stroke Guidelines

<p>3. Patients with a positive stroke screen or who are strongly suspected to have a stroke should be transported rapidly to the closest healthcare facilities that are able to administer IV alteplase.</p>	I	B-NR	Recommendation reworded for clarity from 2013 AHA Guidelines. See Table 102 in annex table Supplement 1 for original wording.
<p>The 2013 recommendation referred to initial emergency care as described elsewhere in the guidelines, which specified administration of IV alteplase at the site of care. The current recommendation is unchanged in intent but updated to make this clear.</p>			
<p>4. When several IV alteplase-capable hospitals exist within a defined geographic region, the benefit of bypassing the closest to bring the patient to one that offers a higher likelihood of rapid care, including thrombectomy, is uncertain.</p>	IIIb	B-NR	New recommendation.
<p>5. Effective prehospital procedures to identify patients who are eligible for IV thrombolysis and have a strong probability of large vessel occlusion (LVO) stroke should be developed to facilitate rapid transport of patients potentially eligible for thrombectomy to the closest healthcare facilities that are able to perform mechanical thrombectomy.</p>	IIIb	C-EO	New recommendation.

LEVEL OF EVIDENCE	LEVEL OF RECOMMENDATION
<p>Level 1</p> <ul style="list-style-type: none"> Randomized controlled trial Systematic review of randomized controlled trials Meta-analysis of randomized controlled trials Randomized controlled trial with low risk of bias Randomized controlled trial with moderate risk of bias Randomized controlled trial with high risk of bias 	<p>Level A</p> <ul style="list-style-type: none"> High quality evidence from a Level 1 study High quality evidence from a Level 2 study High quality evidence from a Level 3 study High quality evidence from a Level 4 study High quality evidence from a Level 5 study
<p>Level 2</p> <ul style="list-style-type: none"> Randomized controlled trial with low risk of bias Randomized controlled trial with moderate risk of bias Randomized controlled trial with high risk of bias 	<p>Level B</p> <ul style="list-style-type: none"> High quality evidence from a Level 2 study High quality evidence from a Level 3 study High quality evidence from a Level 4 study High quality evidence from a Level 5 study
<p>Level 3</p> <ul style="list-style-type: none"> Randomized controlled trial with moderate risk of bias Randomized controlled trial with high risk of bias 	<p>Level C</p> <ul style="list-style-type: none"> High quality evidence from a Level 3 study High quality evidence from a Level 4 study High quality evidence from a Level 5 study
<p>Level 4</p> <ul style="list-style-type: none"> Randomized controlled trial with high risk of bias 	<p>Level D</p> <ul style="list-style-type: none"> High quality evidence from a Level 4 study High quality evidence from a Level 5 study
<p>Level 5</p> <ul style="list-style-type: none"> Randomized controlled trial with very high risk of bias 	<p>Level E</p> <ul style="list-style-type: none"> High quality evidence from a Level 5 study

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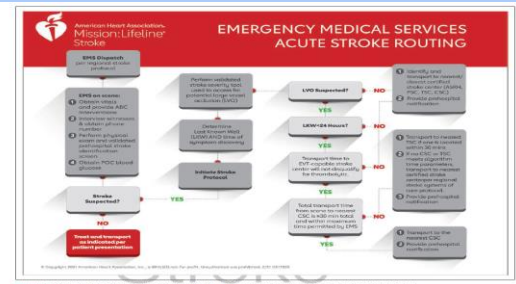


Figure 1. Mission: Lifeline Stroke Emergency Medical Services (EMS) Acute Stroke Routing Algorithm. ABC indicates airway, breathing, and circulation; EMT, emergency medical technician; PCC, comprehensive stroke center; EVT, endovascular therapy; LVO, large vessel occlusion; POC, point of care; PSC, primary stroke center; and TSC, thrombectomy-capable stroke center. Reprinted from the American Heart Association with permission. Copyright © 2021.

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Develop SSOC

- Regions should all develop a region-specific stroke system of care by all local stakeholders with consideration and integration of all regional stroke resources
- Stroke advisory committee should include:
 - Regional EMS (including Air)
 - EMS medical directors
 - Hospitals of all certification levels
 - Patient advocacy groups
 - Professional/Medical Societies
 - Local/State Govt & policymakers
- Group should:
 - Develop and implement feasible local prehospital destination plans for EMS, interhospital collaborations and discussions tailored to geography and local resources
 - Require data collection and reporting of evidence based measures with benchmarks and performance feedback (see next slide)
 - Prehospital records should be incorporated into stroke registries to enhance total system performance assessment
 - Incorporate new national quality measures when they are released
 - Participate in public education about stroke

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Best Practices for 911 Stroke Screening

- Call centers should utilize specific screening protocols for potential stroke patients
- Groups should utilize QI processes to review screening and dispatch and review the final clinical hospital diagnosis
- Dispatchers should have annual stroke education training requirements to maintain knowledge and proficiency

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Best Practices for EMS

- Region should harmonize & adopt consistent stroke management **protocols**, evidence-based **stroke screening tools** and **severity scales** for identifying possible LVO
- **Stroke Management education** (in conjunction with hospital partners and local EMS) should be done every year and integrated as a core care competency and should include information about interfacility transport (including of drip and ship patients)
- EMS agencies should develop and utilize **stroke destination plans** based on hospital locations & capabilities, transport times, and patient acuity
- EMS should develop uniform **prehospital stroke notification protocols** with receiving stroke hospitals
 - Direct CT transport should be encouraged

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Field Use of FAST-ED

CVA Checklist | 2018

FAST-ED indicates Field Assessment Stroke Triage for Emergency Destination. This is to be utilized in adults 18 years old with a possible Cerebral Stroke and is a screen for a Large Vessel Occlusion (LVO).

Cerebral Stroke Scale (FAST-ED) only one of the boxes below shows abnormal findings. Item assessment should include FAST-ED and Cerebral Stroke Scale (CSC) Scores for Patients Only.

Cerebral Stroke Scale

Item	FAST-ED Score	Observations
Facial Weakness/Asymmetry	0	Ask the patient to smile or show teeth or grimace.
Arm or other extremities	0	Ask the patient to raise both arms or legs symmetrically.
Speech abnormalities	0	Ask the patient to say something or give a command.
Loss of consciousness	0	Ask the patient to close eyes & hold both arms out with palms up.
Eye signs	0	Both arms raised up, 20 cm or above with eyes open.
FAST score after eye sign(s)	1	FAST score is equal to or less than the eye sign(s) score.
FAST score after eye sign(s)	2	FAST score is greater than the eye sign(s) score.
FAST score after eye sign(s)	3	FAST score is equal to or less than the eye sign(s) score.
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FAST score after eye sign(s)	14	FAST score is greater than the eye sign(s) score.
FAST score after eye sign(s)	15	FAST score is equal to or less than the eye sign(s) score.
FAST score after eye sign(s)	16	FAST score is greater than the eye sign(s) score.
FAST score after eye sign(s)	17	FAST score is equal to or less than the eye sign(s) score.
FAST score after eye sign(s)	18	FAST score is greater than the eye sign(s) score.
FAST score after eye sign(s)	19	FAST score is equal to or less than the eye sign(s) score.
FAST score after eye sign(s)	20	FAST score is greater than the eye sign(s) score.

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Appendix N- FAST-ED | 2018

FAST-ED indicates Field Assessment Stroke Triage for Emergency Destination. This is to be utilized in adults 18 years old with a possible Cerebral Stroke and is a screen for a Large Vessel Occlusion (LVO).

***FAST-ED LVO screen should be performed by a paramedic.**

Item	FAST-ED Score	Observations
Face Weakness/Asymmetry	0	Ask the patient to smile or show teeth or grimace.
Arm or other extremities	0	Ask the patient to raise both arms or legs symmetrically.
Speech abnormalities	0	Ask the patient to say something or give a command.
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Hospital Use of FAST-ED

- Example from TUKHS:
- Triage RN (walk in stroke):
 - Activate Acute Stroke Response Team for symptoms that have occurred in the past 12 hours
 - If time window is 12-24 hours of symptom onset, perform FAST-ED. If score ≥ 4 , activate Acute Stroke Response Team

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Mobile Apps

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Best Practices for EMS Transport to Stroke Centers

- EMS should prioritize hospitals that have:
 - **ED staff who can assess and treat patients** and have immediate **access to expertise**, either onsite or through Telehealth
 - **Advanced Imaging Capabilities** with rapid interpretation (onsite or teleradiology)
 - **Evidenced-Based Inpatient Stroke Care** (ability to admit to a dedicated stroke unit)
 - Patient should be transferred if initial facility does not have this capability
 - Ability to coordinate **Interfacility Transport**
 - EMS should alert initial hospital of LVO findings so hospital can prepare for transfer if not EVT capable
 - Transfer destination should reflect a patient-centered destination and hospital/corporation affiliation should not be a driving factor
 - **Rapid Access to Appropriate level of care**
 - "In general, when >1 stroke center is within close proximity from the scene, transport to the highest level of care is preferable and EMS should generally transport a patient with suspected LVO to the center with the highest level of care available if within acceptable transport times from the scene..."
- **EMS should participate in QI programs**
- **States** should require **standardized data collection** and reporting from health care entities and data should be reviewed and **research projects** should be encouraged

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Recommendations for Rural SSOC

RUCA code 4-10; <30,000 residents; limited health care resources; few nearby ASRHs or PSCs and often no CSCs/TSCs within 60 minutes ground transport

1. Area stakeholders should work together to develop prehospital response and destination plans with consideration of long transport times
 - Efforts should **prioritize ensuring tPA within 4.5 hours of LKW** and transport to **CSC/TSC** if suspected LVO
2. **Patients with suspected LVO should be routed directly to CSC if transport time past TSC does not exceed 30 minutes and max total transport time from scene does not exceed 60 min.**
 - *If no CSC within 60 min, EMS should go directly to TSC if additional transport time beyond PSC/ASRH does not exceed 30 min (and max time from scene → TSC does not exceed 60 min)*
 - **If no CSC/TSC within 60 min, EMS should go to nearest ASRH or PSC**
3. **Air transport** should be included if no CSC or TSC is available within 60 min ground transport time
 - Efforts should be made to implement advanced imaging in community hospitals in order to help identify EVT-eligible candidates and decrease overtriage (and reduce unnecessary transport times)
4. EMS destination plans should prioritize rural hospitals that have **formal agreements** with regional CSCs or TSCs
5. If >1 destination exists, EMS should transport patient to **facility that has stroke protocols in place, clear destination plans and partnerships with TSCs/CSCs in region**

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Recommendations for Suburban SSOC

RUCA code 2-3; pop1 density closer to urban core threshold; have access to CSC/TSC within 30-60 min ground transport

1. **Establish SSOC** to maximize treatment opportunities for patients needing reperfusion
2. **Communities with >1 destination option, suspected LVOs should be routed directly to CSC if transport time past nearest TSC does not exceed 30 min and max transport time from scene to CSC does not exceed 45 min**
 - *No CSC within 45 min, EMS should go directly to TSC if additional transport time past nearest PSC/ASRH does not exceed 30 min and max transport time does not exceed 45 min*
 - **If no TSC/CSC exist within 45 min of total travel time, EMS should go to nearest ASRH or PSC**
 - **If medically unstable, local protocols should contain information about diversion to closest facility**
3. **Protocols** should be in place to rapidly and efficiently care for stroke patients
4. If suburban hospital is PSC, it is appropriate for most stroke patients to be admitted for post stroke care with protocols for rapid transport to higher level of care, if needed
5. **Recurring stroke education** should be provided for staff and **QI program** developed to focus on DIDO
6. All hospitals should have an **identified regional partner** for advanced stroke care
7. Destination protocols should **prioritize hospitals that participate in regional QI program** and feedback should be provided to EMS and hospitals

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Recommendations for Urban SSOC

RUCA code 1; >50,000 residents and abundant health care resources; CSCs/TSCs within a 30 minute transport time by ground EMS

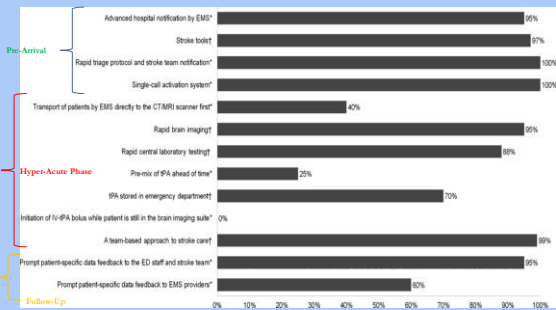
- EMS agencies should implement **simplified and actionable destination plans** that prioritize CSCs over other nearby centers for LVO within 24 hours LKW
- Areas with >1 destination option, LVO patients should be triaged directly to CSC if total transport time from scene to CSC does not exceed 30 minutes**
 - No CSC within 30 min transport time, EMS should go directly to TSC if total transport time from scene to TSC does not exceed 30 min
 - If no TSC/CSC exist within a 30 min travel time, EMS should go to nearest PSC or ASRH
- Urban communities with no CSCs/TSCs within 45 min, should adopt the recommendations for Suburban communities
- All EMS agencies in a urban area should be integrated into a cohesive stroke system of care and destination plans should be patient-centric
- Tertiary care facilities should serve as a source for **exporting best practices, assisting referring hospitals with transfer protocols and providing continuing education**
- Patient specific and systems level feedback** should be provided to all referral sites
- Stroke experts** from these areas should be included in **local/state departments of health and gov organizational efforts** to create legislative or regulatory priorities for stroke care
- Clinical trials** should be provided at facilities in urban areas

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CASE STUDY & BEST PRACTICES

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Best Practices



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Time Saving Tip Streamline EMS Handoff

EMS handoff to hospital staff including if LVO screen positive

Standardizes EMS to RN/MD Handoff

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Time Saving Tip

Hospital had stroke algorithm, suspected ischemic stroke order set that was initiated upon arrival

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Case #1- Exam Findings

- Exam:** BP: 160/82, HR 45, HR irregular.
- MS:** Awake, alert
- Speech:** Dysarthria, no aphasia.
- CN:** Gaze deviation to right, left facial droop.
- Motor:** Flaccid on left.
- Sensory:** neglect on left, sensory loss on left.
- NIHSS: 18**
- PMH:** Nephrolithiasis, breast cancer in 1980's
- Social:** Avid walker, no tobacco, few drinks a week
- Meds:** none
- Time saving tip:**
 - Treat blood pressure early if pt candidate for thrombolytics
 - Call CSC and transport since this is probably a LVO (LVO screening +, high NIHSS, dense MCA sign on CT).
 - Second member of the stroke team obtains PMH, meds etc

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Time Saving Tip

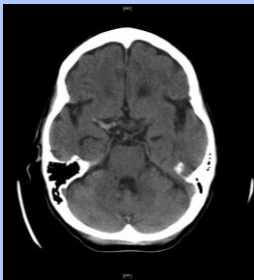
Draw Labs in the CT Scanner

- Labs recommended for alteplase decision making
 - CBC(platelets), INR, glucose
 - **Don't wait for labs except glucose if no history of bleeding diathesis or use of warfarin**
- Lab prioritize specimen from stroke activation
- Use Point of care devices when possible

Stroke 2013; Jauch, et al. AHA guidelines. 2018

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Case Study- CT head



CT Head was completed

- **Time saving tips:**

- EMS and stroke team took patient directly to CT
- CT head flagged "stroke activation" so radiologist prioritizes interpretation.

- *Results: No hemorrhage, no early changes of ischemia, dense MCA sign on right*

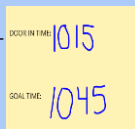
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Time Saving Tips

IV Thrombolytics

Case Study #1:

- Patient was given IV alteplase
 - 60 minutes after symptom onset
 - 45 minutes after arrival



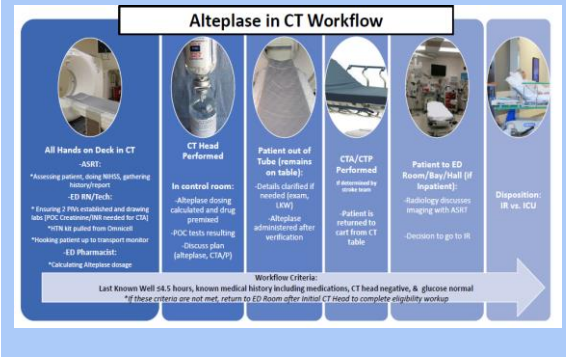
- **Time saving tips**

- Alteplase readily available
- Pre-mix alteplase
 - <https://www.activase.com/aio/dosage-and-administration/product-return.html>

-  the clock time

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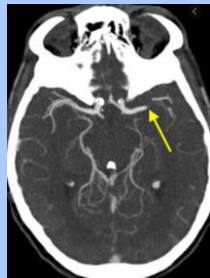
Time Saving Tip give thrombolytics in CT Scanner



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Case Study-Advanced Imaging

- Last known well was < 6 hours before so CTA Head was completed
- Right MCA occlusion seen



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Time Saving Tips Get Advanced Imaging Quickly

- CTA acquisition with interpretation by Radiology ≤ 20 min & clouded quickly
 - If not possible, consult with 24/7 stroke support line to see if it would be better option to send patient for Advanced Imaging

Use cloud-based image sharing, if available



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If unable to do Advanced Imaging, look for large vessel deficits by using NIHSS

NIH Stroke Scale as a LVO Tool		
Item	Description	Score
1a. Level of Consciousness (LOC)	Alert (or awake) awake and oriented	5
	Disoriented (Responds to voice, but not face asked)	4
	Obtunded (Responds only to deep pain or vigorous stimulus)	3
	Comatose (No response)	2
1b. LOC - Question	Both questions answered correctly	5
	One question answered correctly	4
	Neither question answered correctly	3
1c. LOC - Command	Both commands performed correctly	5
	One command performed correctly	4
	Neither command performed correctly	3
2. Best Gaze	Normal	5
	Horizontal gaze paretic (cannot look voluntarily)	4
	Vertical gaze paretic (cannot look up/down)	3
	Abnormal (cannot look in 2 or more quadrants)	2
	Fixated (cannot look beyond midline)	1
	Abnormal (cannot gaze in 2 or more quadrants)	0
3. Visual Fields	Normal	5
	Partial hemianopia superior or inferior quadrant	4
	Complete hemianopia superior or inferior quadrant	3
	Abnormal (hemianopia bilateral or partial)	2
	Blind (cannot see anything)	1
	Abnormal (cannot see in 2 or more quadrants)	0
4. Facial Palsy	Normal	5
	Minor palsy in 2/3 (upper lip, nasolabial fold)	4
	Partial palsy in 1/3 (lower lip, nasolabial fold)	3
	Complete palsy in 1/3 (lower lip, nasolabial fold)	2
	Complete palsy in 2/3 (upper lip, nasolabial fold)	1
	Complete palsy in 3/3 (upper lip, nasolabial fold)	0
5a. Motor - Right Arm	Normal (200 gPT at all)	5
	Drift (Drifts down more than 5 cm before 10 sec)	4
	Drifts to bed within 10 sec	3
	Abnormal (not at all)	2
	Complete paralysis (no movement at all)	1
	Abnormal (cannot move)	0
5b. Motor - Right Arm	Normal (200 gPT at all)	5
	Drift (Drifts down more than 5 cm before 10 sec)	4
	Drifts to bed within 10 sec	3
	Abnormal (not at all)	2
	Complete paralysis (no movement at all)	1
	Abnormal (cannot move)	0
6a. Motor - Left Leg	Normal (200 gPT at all)	5
	Drift (Drifts down more than 5 cm before 10 sec)	4
	Drifts to bed within 10 sec	3
	Abnormal (not at all)	2
	Complete paralysis (no movement at all)	1
	Abnormal (cannot move)	0
6b. Motor - Left Leg	Normal (200 gPT at all)	5
	Drift (Drifts down more than 5 cm before 10 sec)	4
	Drifts to bed within 10 sec	3
	Abnormal (not at all)	2
	Complete paralysis (no movement at all)	1
	Abnormal (cannot move)	0
7. Limb Ataxia	Normal (no ataxia, 20 g cannot move arm/leg)	5
	Minor ataxia or more than 10 sec	4
	Major ataxia (cannot move arm/leg)	3
	Abnormal (cannot move)	2
	Complete ataxia (cannot move)	1
	Abnormal (cannot move)	0
8. Sensory	Normal (no sensory loss)	5
	Partial sensory loss (cannot feel 2 or more of the following)	4
	Complete sensory loss (cannot feel any of the following)	3
	Abnormal (cannot feel any of the following)	2
	Complete sensory loss (cannot feel any of the following)	1
	Abnormal (cannot feel any of the following)	0
9. Best Language	Normal (able to use words and draw correctly)	5
	Abnormal (cannot use words and draw correctly)	4
	Abnormal (cannot use words and draw correctly)	3
	Abnormal (cannot use words and draw correctly)	2
	Abnormal (cannot use words and draw correctly)	1
	Abnormal (cannot use words and draw correctly)	0
10. Dysarthria	Normal	5
	Mild to moderate abnormal speech (some abnormal)	4
	Severe (cannot follow - none understandable)	3
	Abnormal (cannot follow - none understandable)	2
	Abnormal (cannot follow - none understandable)	1
	Abnormal (cannot follow - none understandable)	0
11. Attention & Orientation	No abnormality	5
	Abnormal (cannot follow - spatial neglect)	4
	Abnormal (cannot follow - spatial neglect)	3
	Abnormal (cannot follow - spatial neglect)	2
	Abnormal (cannot follow - spatial neglect)	1
	Abnormal (cannot follow - spatial neglect)	0
Total Score	NIHSS 2 or higher (total score), consider LVO	

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Time Saving Tips

Communicate early & often

- **EARLY** and real-time communication between transferring physician and accepting Neurologist
- Some have recommended calling transferring facility before imaging has been done to give a heads-up

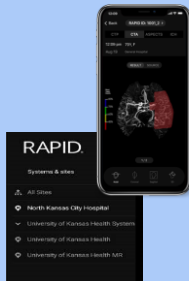


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Communication Tools

iSchemaView RAPID In-App Communication Tool

- Efficient Coordination across teams & sites:
 - Team members can message one another within the app to streamline care coordination
 - Case events and team messages are organized in centralized lists to provide quick access to patient status
 - Scan events are automatically displayed
 - Messages appear in a chronological feed
 - Time sent and sender details are included with messages



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Case Study

- Comprehensive Stroke Center was called early on when patient arrived
- Called back once Advanced Imaging was obtained
- Decision was made for Transfer
- EMS was called for transport

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Time Saving Tips

Have Consistent Handoff Tools to Streamline Report

- Accepting doctor at 24/7 stroke intervention hospital has already been called

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Time Saving Tips

EMS Transport

- 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:	
<ul style="list-style-type: none"> • Monitor Vital Signs every 15 minutes • Keep SBP < 180mmHg, DBP < 110 mmHg, (stop tPA if unable to maintain SBP < 180 or DBP < 110) constantly with <ul style="list-style-type: none"> • Antihypertensive agents if <ul style="list-style-type: none"> • Labetalol 10mg IV (may repeat x 1), (hold for HR < 60) • Nicardipine 5mg IV to max of 15 mg/hr • Keep SBP > 100. May try PO 500mg IV bolus as an initial option • Monitor Neuro Check every 15 minutes • If unable to manage, consider mental status, acute headache, or vomiting, STOP tPA infusion. Call Med Control • Monitor for Adverse Effects of: <ul style="list-style-type: none"> • Allergies (in the following methods: management or protocol on team charting) • Complications (Abdominal, arterial, back pain, hemoptysis, hematemesis, shortness of breath, chest pain) • STOP tPA infusion, Call Med Control 	
CALLIGIONS	
<ul style="list-style-type: none"> • NO Anticoagulation or Antiplatelet Therapy for 24 hours • No Foley insertion or insertion, central venous line placement or arterial puncture at a non-compressible site for at least 24 hours after tPA. • Avoid insertion of Intra-aortic Balloon Pump for 6 hours after tPA Administration 	
<ul style="list-style-type: none"> • Send copy of CT Head Scan (do not delay transport can be faxed) • Send patient records with documentation of allergies, current medications, and medical history (can be faxed) • Fax that is needed is the EMT/A/paramedic with patient—DO NOT DELAY TRANSFER FOR COPY OF RECORDS 	
<p>Telephone order from Dr. _____</p> <p>Receiving unit: _____ Date: _____ Time: _____</p> <p>Provider: _____ Date: _____ Time: _____</p> <p style="text-align: right;">TEMPLATE</p>	

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Time Saving Tip

- If using Alteplase:
 - Verify pump/setting between RN/EMS prior to departure
 - Verify if waste was removed from vial

Medication Infusion Report for EMS		
Patient Name		
Medication/Infusion Name	Dose	Time Started
Route of Administration	Volume (mL)	
Medication Preparation	Amount/Checklist of Description	
Volume of Drug (mL) at End of Run	Time Finished	
Nurses Signature		
Paramedic Signature		

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Case Study

Patient transported to CSC

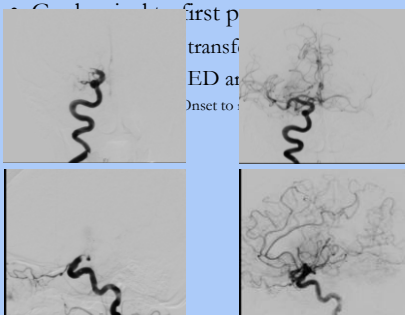
- **Door-to-departure goal:** 60 minutes.
- **Time saving tip:**
 - EMS: light and sirens, call ahead to CSC with ETA
 - CSC has team waiting (stroke team, IR team, CT tech)



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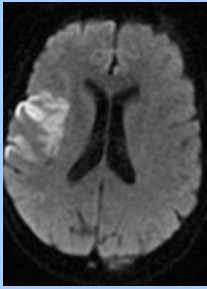
Case Study

IR Suite after CTA/CTP



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Case Study



- Onset of symptoms to revascularization = 3 hours
- MRI Head: *Acute-subacute right MCA territory infarct without hemorrhagic conversion.*

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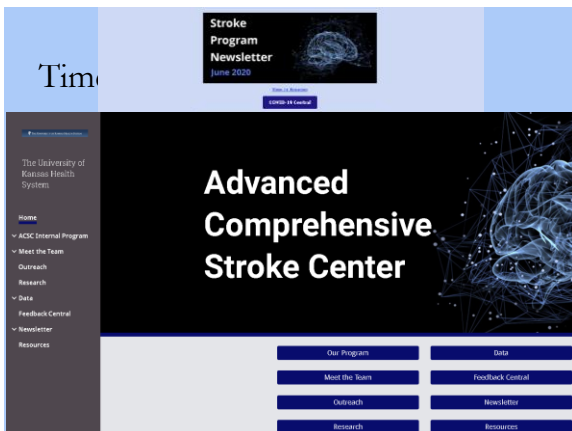
FUTURE Time Saving Tip Closing the Loop

- Internal Feedback
- External Feedback

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Time

Stroke Program Newsletter
June 2020

UNIVERSITY OF KANSAS HEALTH SYSTEMS

The University of Kansas Health Systems

Home

ACCC Internal Program

Meet the Team

Outreach

Research

Data

Feedback Central

Newsletter

Resources

Advanced Comprehensive Stroke Center

Our Programs

Data

Meet the Team

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Outreach

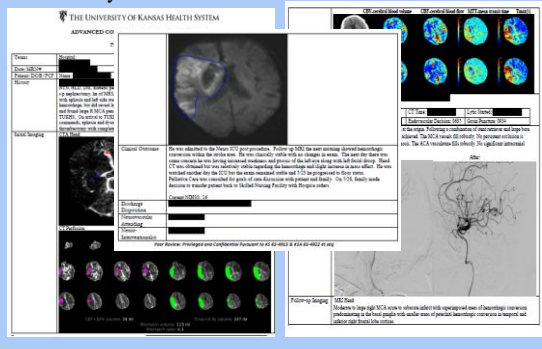
Newsletter

Research

Resources

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Timely External Feedback



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Case Study

- Post-procedure, patient was admitted to the Neuro ICU for post alteplase and post procedure monitoring
- Stroke Work up completed
 - Etiology of stroke likely cardioembolic
 - Patient noted to be in paroxysmal Afib
 - LDL 140
- Patient was started on anticoagulation and atorvastatin
- PT/OT/SLP/Rehab Medicine consulted and recommended Inpatient Rehab upon discharge
- NIHSS upon discharge: 10

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Key Points

- **Coordination** of care important on both ends, starting with EMS
- **Time goals** are important to try and meet to save neurons lost
- **Time Saving tips** can be adapted for facilities to be successful

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Questions?



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Post-Test

- 1. Get out your Phone
- 2. Log into Mentimeter

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Appendix

- Use this section if needing references and other resources

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Prehospital Stroke Management
and Systems of Care
Class I (Strong) Benefit>>>Risk

• EMS Assessment and Management

- The use of a **stroke assessment system** by first aid providers, including EMS dispatch personnel, is recommended
- EMS personnel should begin the initial management of stroke in the field. Implementation of a **stroke protocol** to be used by EMS personnel is strongly encouraged
 - Use of **EMS prehospital stroke screening tool reduced door to needle time 0.9 minutes**
- EMS personnel should provide **prehospital notification** to the receiving hospital that a suspected stroke patient is en route so that the appropriate hospital resources may be mobilized before patient arrival

AHA/ASA Stroke Guidelines 2018
Xian Target: Stroke Survey II 2017

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Prehospital Stroke Management
and Systems of Care
Class I (Strong) Benefit>>>Risk

• EMS Systems

- EMS leaders, in coordination with local, regional, and state agencies and in consultation with medical authorities and local experts, should **develop triage paradigms and protocols** to ensure that patients with a known or suspected stroke are rapidly identified and assessed by use of a validated and standardized instrument for stroke screening, such as the FAST scale, Los Angeles Prehospital Stroke Screen, or **Cincinnati Prehospital Stroke Scale**

AHA/ASA Stroke Guidelines 2018
Xian Target: Stroke Survey II 2017

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Prehospital Stroke Management
and Systems of Care
Class I (Strong) Benefit>>>Risk

- **Regional Systems of stroke care should be developed.** These should consist of the following: (a) Healthcare facilities that provide initial emergency care, including administration of IV alteplase, and (b) Centers capable of performing endovascular stroke treatment with comprehensive periprocedural care to which rapid transport can be arranged when appropriate
- Patients with a positive stroke screen and/or a strong suspicion of stroke should be transported rapidly to the closest healthcare facilities that can capably administer IV alteplase
 - In Kansas, that would be knowing your Emergent Stroke Ready Hospitals

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Prehospital Stroke Management
and Systems of Care
Class IIb (Weak) Benefit \geq Risk

➤ When several IV alteplase-capable hospital options exist within a defined geographic region, the benefit of bypassing the closest to bring the patient to one that offers a higher level of stroke care, including mechanical thrombectomy, is uncertain. Further research is needed.

AHA/ASA Stroke Guidelines 2018
Xian Target: Stroke Survey II 2017
