Mission: Lifeline Stroke Release of the Severity-Based Stroke Triage Algorithm for EMS Just the Beginning…

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American Heart Association | American Stroke Association
life is why
MISSION: LIFELINE

Thank you

* Special Thank you to:
  * Peter D. Panagos,MD,FAHA,FACEP

Department of Neurology and Emergency Medicine

Washington University School of Medicine

Barnes-Jewish Hospital

St Louis,Missouri

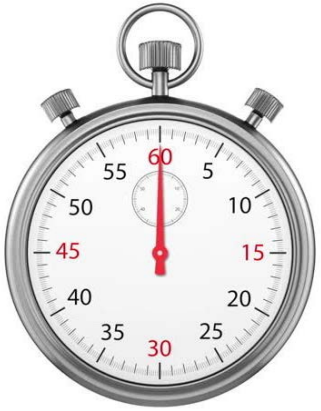
For his generous sharing of this presentation.

Thank You!

* Presented on Behalf of Numerous AHA Volunteers, Staff and Committees

Faster Stroke Treatment is Better Treatment

* Patients treated within 60 minutes experience improved outcomes, including lower in-hospital mortality and reduced long-term disability



GC Fonarow et al. JAMA. 2014;311(16):1632-1640
Saver et al. JAMA. 2013;309(23):2480-8

Growing Evidence Supporting Acute Stroke Care

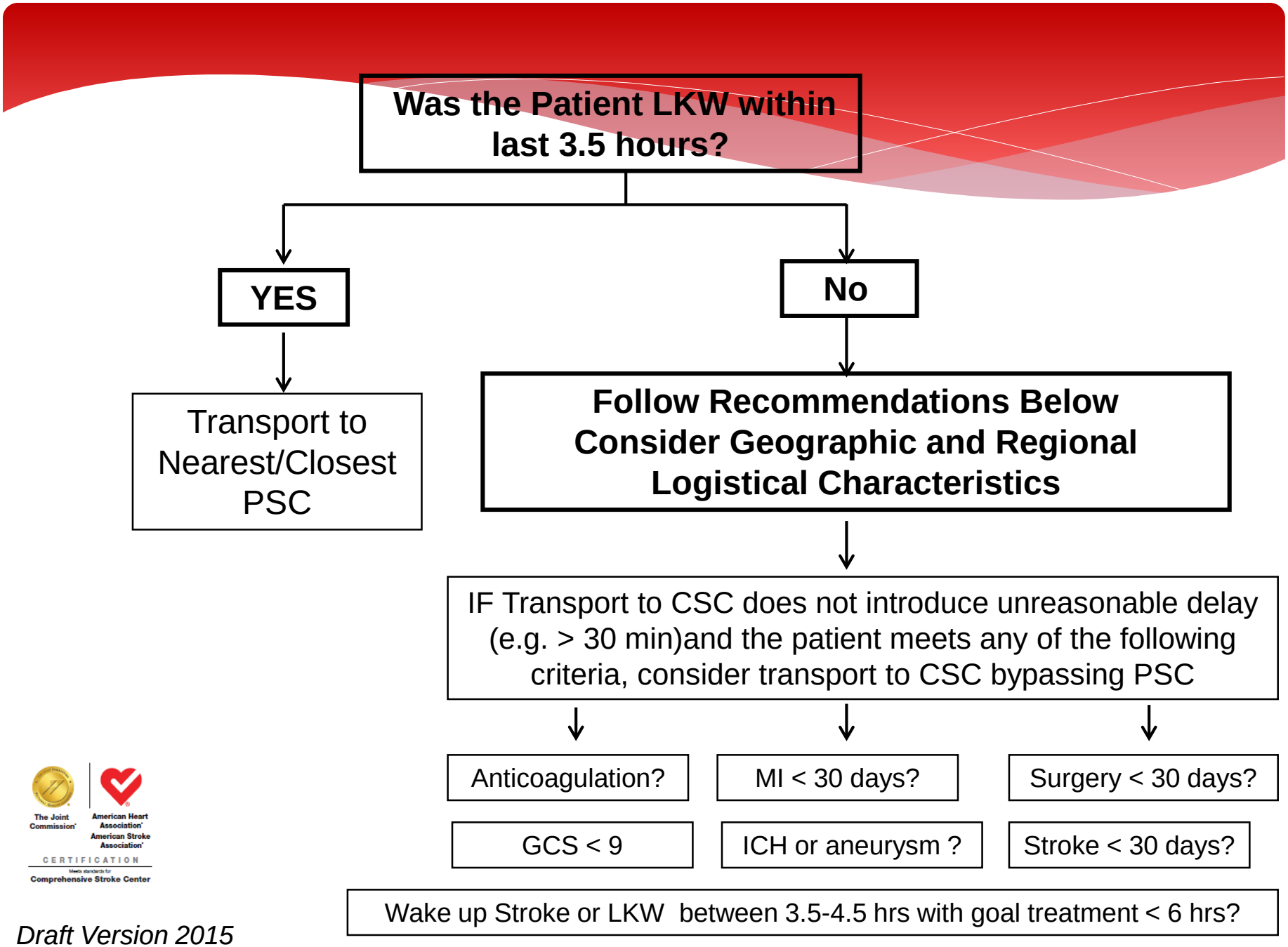
* 25% of AIS Patients May be Eligible for thrombolysis
* 10% of AIS Patients May be Eligible for Endovascular Thrombectomy (EVT)

Vanacker P, Lambrou D, Eskandari A, Mosimann PJ, Maghraoui A, Michel P. Eligibility and predictors for acute revascularization procedures in a stroke center. Stroke. 2016;47:1844–1849

Why Doesn't EMS Just Triage the Right Patient to the Right Hospital?

Last Two Decades

* We've been focused on merely attempting to identify a suspected stroke that should/must be immediately transferred to a thrombolyzing capable institution (e.g. PSC)



The Joint Commission · American Heart Association · American Stroke Association
CERTIFICATION
Meets standards for Comprehensive Stroke Center

Draft Version 2015

And Now We Ask For More

* It is a Struggle for Paramedics to clinically identify an AIS patient who is likely to have a large vessel occlusion (LVO) in either the anterior or posterior (good luck!) circulation

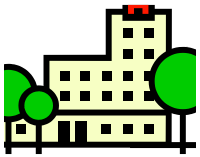
Arrival of Comprehensive Stroke Centers and Endovascular-Capable Hospitals

Pre-Hospital Triage

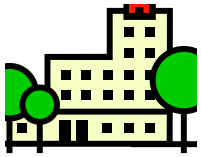
State or Regional Triage Policies

Comprehensive Center

Primary Center



Acute Stroke Ready



Basic (Level IV)

Factors:

- Distance
- Run Times
- Designation Tiers
- Availability Services
- Diversion Status
- Medical Control
- ABC stable
- Dispatch Criteria
- Public/Private EMS
- Patient Preference
- Symptom onset

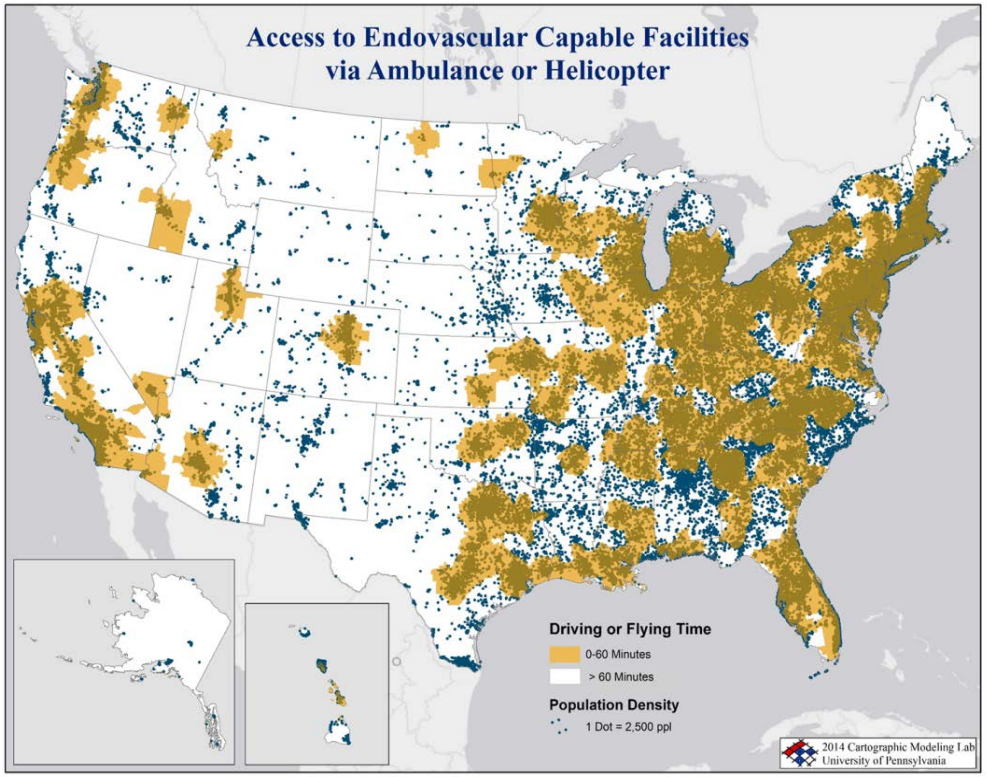
Added Challenges (2017)

- **Still** Must Identify Possible Stroke
- Transport to nonthrombolyzing hospital may **harm** patients
- Bypassing hospitals could place patient **outside** thrombolytic windows
- **No** Single Stroke Severity Tool predicts LVO is **perfect**
- **MUST** avoid missing EVT-eligible patients
- **BUT** must avoid over diagnosing Pts not EVT-eligible
- Finally, the **TRUTH** and **DATA** is evolving (e.g. ISC '17)

Access to Endovascular Therapy Disparities Still Exist

* By Ground or Air
* 56% US population have access to endovascular capable hospital

Adeoye, et al. Stroke 2014



IVT: The "New Normal"

	MR CLEAN	ESCAPE	EXTEND-IA	SWIFT PRIME	REVASCAT	IV tPA
OR good outcome at 90d (mRS 0-2)	2.16	2.6	3.8	2.75	2.1	**1.8**
NNT for good outcome*	6.1	4.2	3.2	4.0	6.4	**8.0**

* Number Needed to Treat (NNT) for One Good Outcome

Challenges/Opportunities

* Access of New Therapies to ALL Patients
* Endovascular-Capable Hospitals Are Clustered
* Inter-Hospital Transfers Are Slow
* Knowledge Gaps (e.g. EM, EMS, Neurology)
* Existing Stroke Systems of Care Working
* How to Triage Patients Appropriately and Avoid Needless Diversion from PSCs
* > 90% are Appropriate for PSCs

Formation of Mission: Lifeline Stroke August, 2015

Goals:

* Focus on Systems of Care in improving stroke care
* **Develop EMS Stroke Specific Transport/Transfer Algorithm**
* Pre-hospital Thrombolytic checklist
* Translate stroke study results to EMS Practice
* Validate/Endorse Pre-hospital LVO Stroke Severity Tool
* Pilot Pre-Act Stroke
* Lead IHI Collaborative to improve stroke processes
* Develop EMS Stroke Education Program
* Develop Pre-Hospital Stroke Standard of Care and Practice Guidelines
* Reach beyond EMS and focus on the whole system of care (Community education, TOC, Rehab etc.)
* Initiate White Papers to support M:L and it's initiatives

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M:LS Committee Members

* Acker, Joe
* Albert, Mark
* Allen, Evan D.
* Frankel, Michael
* Franklin, Christy
* Gatti, Ronald G.
* Hundley, J. Lynn
* Jauch,Ed
* Luciano, Jean
* Nash, Bradford S.
* Lugtu, James (AHA Lead)
* Gunderson, Mic (AHA)
* Travis, David (AHA)
* Panagos, Peter (Co-Chair)
* Rosamond, Wayne
* Rudnick, Eric
* Saver, Jeffrey
* Schwamm, Lee (Co-Chair)
* Summers, Debbie
* Tremwel, Margret F.
* Wages, Robert Keith
* Wolfe, Stacey
* Jollis, James
* George, Mary
* Williams, Joe (AHA)

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Process

* Assemble Diverse Committee Membership
* Listen to Constituents and Customers
* Review Existing Plans and Experience
* Recognize Evolving Data
* Awareness of Limitations and Barriers
* National representation and sampling views
* Multi-specialty collaboration
* Vetted within AHA/ASA Leadership Committees

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Severity-Based Stroke Triage Algorithm for EMS

* **What It Is:**

Evidenced-based best-practice, multi-specialty review of currently available data for EMS Stroke Triage

* **What It Is Not:**

Prescription or EXACT template to be followed word-for-word in every region

ABOUT THE SEVERITY-BASED STROKE TRIAGE ALGORITHM FOR EMS

Since the release of the endovascular trials in early 2015 demonstrating the efficacy of endovascular thrombectomy (EVT), many healthcare providers and health systems have requested guidance on developing an updated pre-hospital point-of-care triage algorithm for patients with suspected large vessel occlusion (LVO) within current stroke systems of care. In June 2015, the article "Endovascular Clot Retrieval Therapy Implications for the Organization of Stroke Systems of Care in North America" was published in the journal Stroke. The paper recommended the development or revision of EMS and interfacility transfer protocols. Since then, a variety of strategies have emerged, ranging from case-by-case decision-making to EMS policies diverting all suspected acute stroke patients regardless of severity to Comprehensive Stroke Centers (CSC).

The American Heart Association and American Stroke Association (AHA/ASA) requested that its Mission: Lifeline Stroke Committee craft a consensus algorithm that was subsequently reviewed by numerous stroke committees within the organization. This algorithm seeks to balance the benefits of rapid, early access to EVT for patients with suspected LVO with the potential harm of delayed initiation of IV alteplase. Since most patients with stroke will not be candidates for EVT, and because a robust Primary Stroke Center (PSC) network is a vital part of an effective stroke system of care, the algorithm may require tailoring to the needs of the communities that implement it, the population and hospital density, and the available healthcare resources. In addition, overcrowding is a challenge at many current urban CSCs, and the costs of care are often higher at CSCs compared to PSCs. Furthermore, the CSC criteria address many aspects of hemorrhagic stroke care that are beyond the capabilities of even a large PSC, and in some regions it may make sense for a PSC with EVT capability to be a preferred destination among all PSCs if no CSC is available nearby.

No randomized trial data exist to support a firm recommendation on the acceptable delay in arrival at a stroke center when considering re-routing a patient to a CSC. Therefore, the committee felt it was best to err on the side of caution and initially set the additional transport delay to 15 minutes. This relatively short period of time will support the implementation of the algorithm with minimal disruption to the current flow of patients, while giving time for EMS systems to become proficient in the collection and reporting of stroke screens and severity scores, capture of relevant time intervals, and reporting of re-routing cases to permit quality assurance activities and case review. As more data accumulate on the benefits and risks of specific time delay cut points, this algorithm will be updated to reflect the best evidence. In the absence of new evidence, the known decrease in good outcomes with each 15 minute delay in access to IV alteplase serves as the anchor. In rural communities or those where large distances separate stroke centers, longer delays of up to 20 - 30 additional minutes may be reasonable.

A thorough review of current guidelines and studies was conducted to help develop the algorithm. All attempts were made to base each step on current available science. Where clear scientific guidance is not available, consensus expert opinion and current practice were used. As with any algorithm, it should augment but not replace clinician judgment. The developers of the algorithm would like to provide further details on the following:

- *The term "Last Known Well" refers to the time that the patient or a witness can confirm the patient was at their baseline. The term "Time of Symptom Discovery" refers to the time at which the symptoms were first noticed. These two terms are often inappropriately used interchangeably, and so explicit capture of both will avoid confusion. Among patients with a witnessed stroke onset, these two times will be the same.*
- *The term Stroke Screening Tool refers to a simple screening method, usually less than 4 steps, that generates a binary result of positive (stroke suspected) or negative (stroke not suspected). Many patients with another cause for neurologic disability (e.g., seizure) may have a positive screen. Many agencies mandate a point-of-care blood glucose test as part of stroke screening and this should be included except when prohibited by regulation.*
- *The term Stroke Severity Scale or Tool refers to a numerical scale used to determine the severity of the neurologic deficits once a stroke is suspected in order to identify possible LVO that may benefit from EVT. There are several available tools and no single tool has been shown to be superior. Each EMS region should choose a single screening tool and severity tool for use across all EMS providers. The following are the most popular tools available:*

STROKE SCREENING TOOLS
CINCINNATI PRE-HOSPITAL STROKE SCALE (CPSS)
LOS ANGELES PRE-HOSPITAL STROKE SCALE (LAPSS)

STROKE SEVERITY TOOLS
CINCINNATI STROKE TRIAGE ASSESSMENT TOOL (CSTAT)
FIELD ASSESSMENT STROKE TRIAGE FOR EMERGENCY DESTINATION (FAST-ED)
LOS ANGELES MOTOR SCALE (LAMS)
RAPID ARTERIAL OCCLUSION EVALUATION SCALE (RACE)

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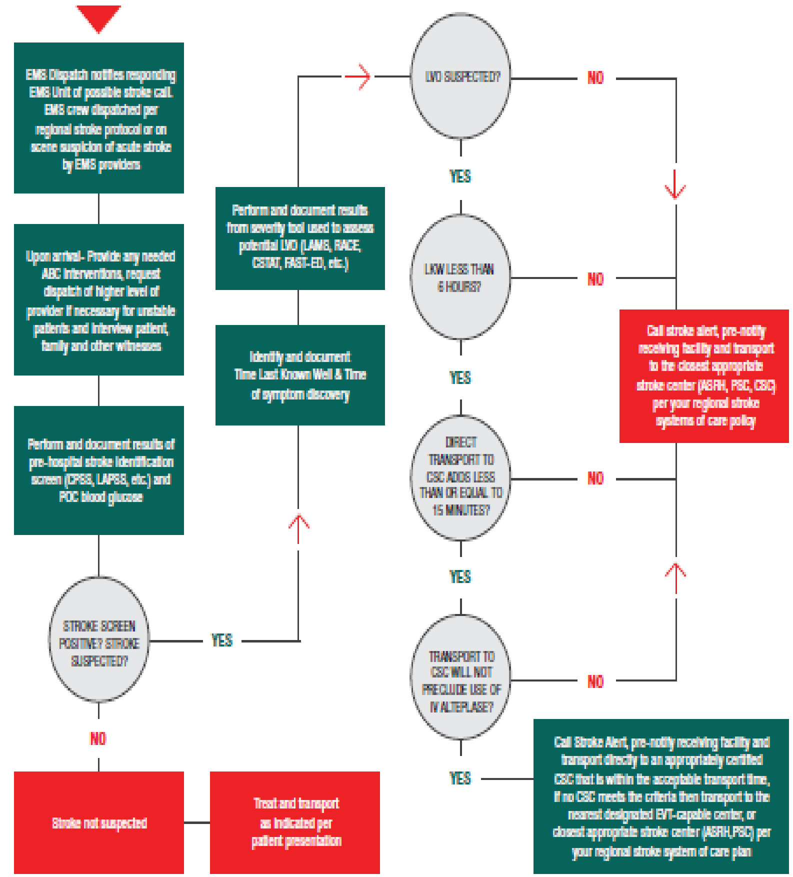
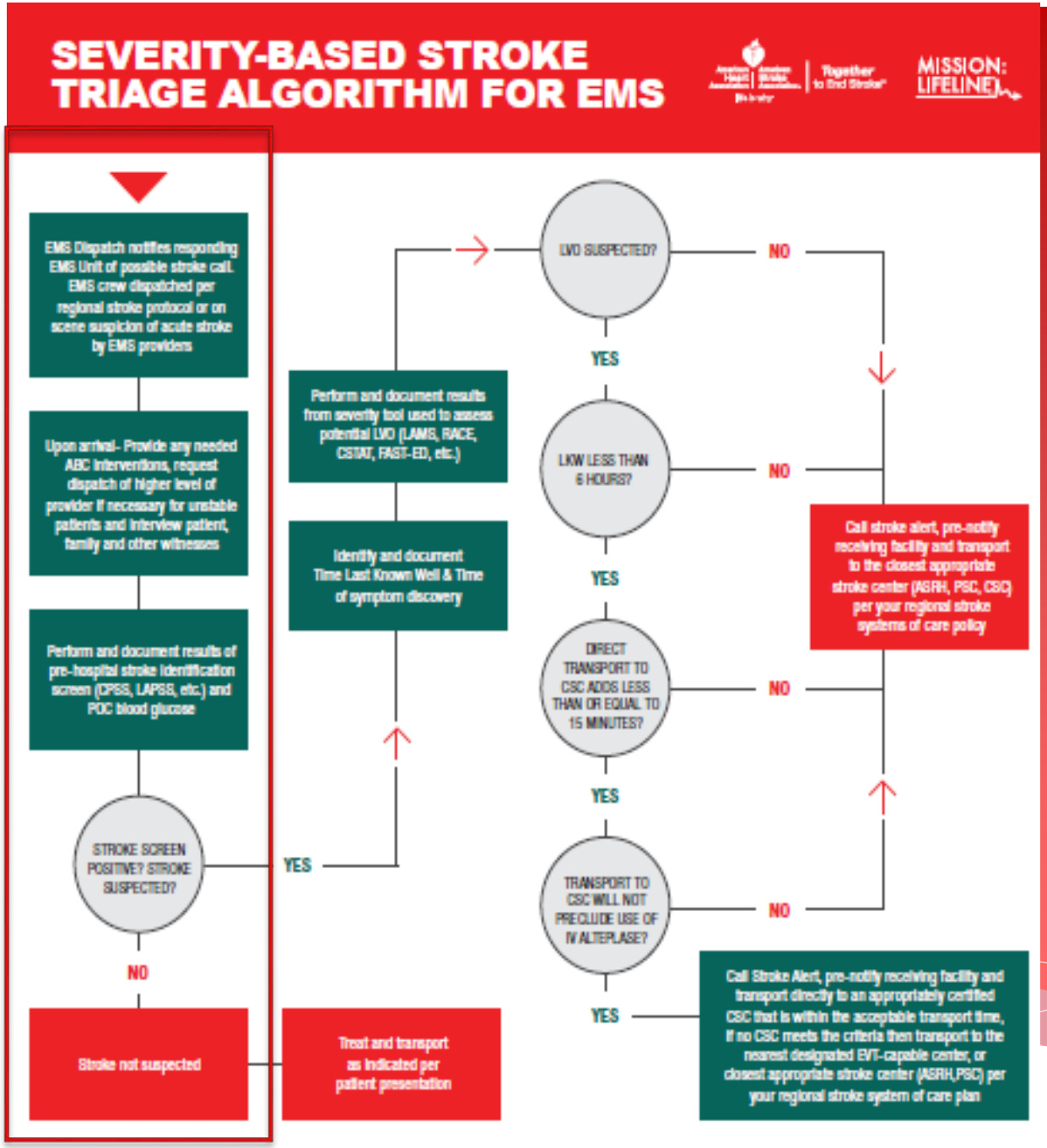
SEVERITY-BASED STROKE TRIAGE ALGORITHM FOR EMS

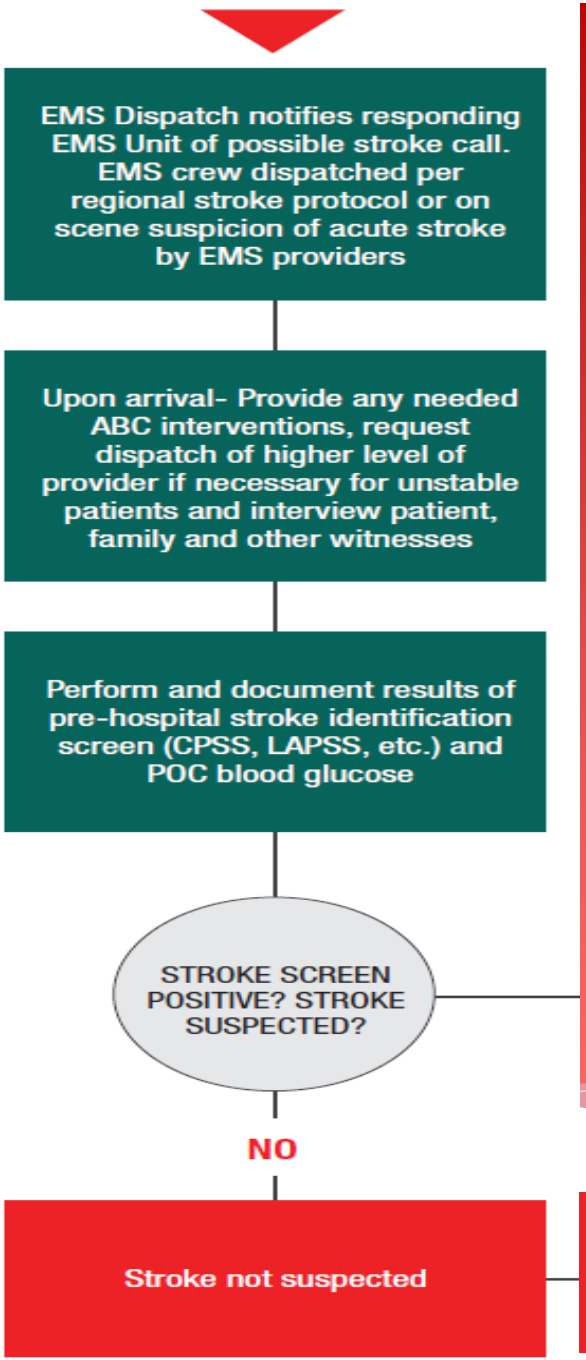


ON SCENE

- Interview patient, family members and other witnesses to determine Last Known Well (LKW) time and time of Symptom Discovery.
- Attempt to identify possible stroke mimics (eg, seizure, migraine, intoxication) and determine if patient has pre-existing substantial disability (need for nursing homecare or inability to walk without help from others).
- Encourage family to go directly to Emergency Department if not transported with patient and obtain mobile number of next of kin and witnesses.
- If Mobile Stroke Unit available—follow Mobile Stroke Unit Protocol.
- Each EMS agency should utilize a published and validated stroke screen to assess patients with non-traumatic onset of focal neurologic deficits and validated tool to assess possible Large Vessel Occlusion (LVO).
- Patients who are eligible for IV Alteplase if transported to nearest Acute Stroke Ready Hospital (ASRH) or PSC should not be rerouted to a CSC or EVT-capable Center if doing so would result in a delay that would make them ineligible for IV Alteplase.
- Collect a list of current medications (especially anticoagulants) and obtain patient history including co-morbid conditions (eg, serious kidney or liver disease, recent surgery, procedures or stroke) that may impact treatment decisions.



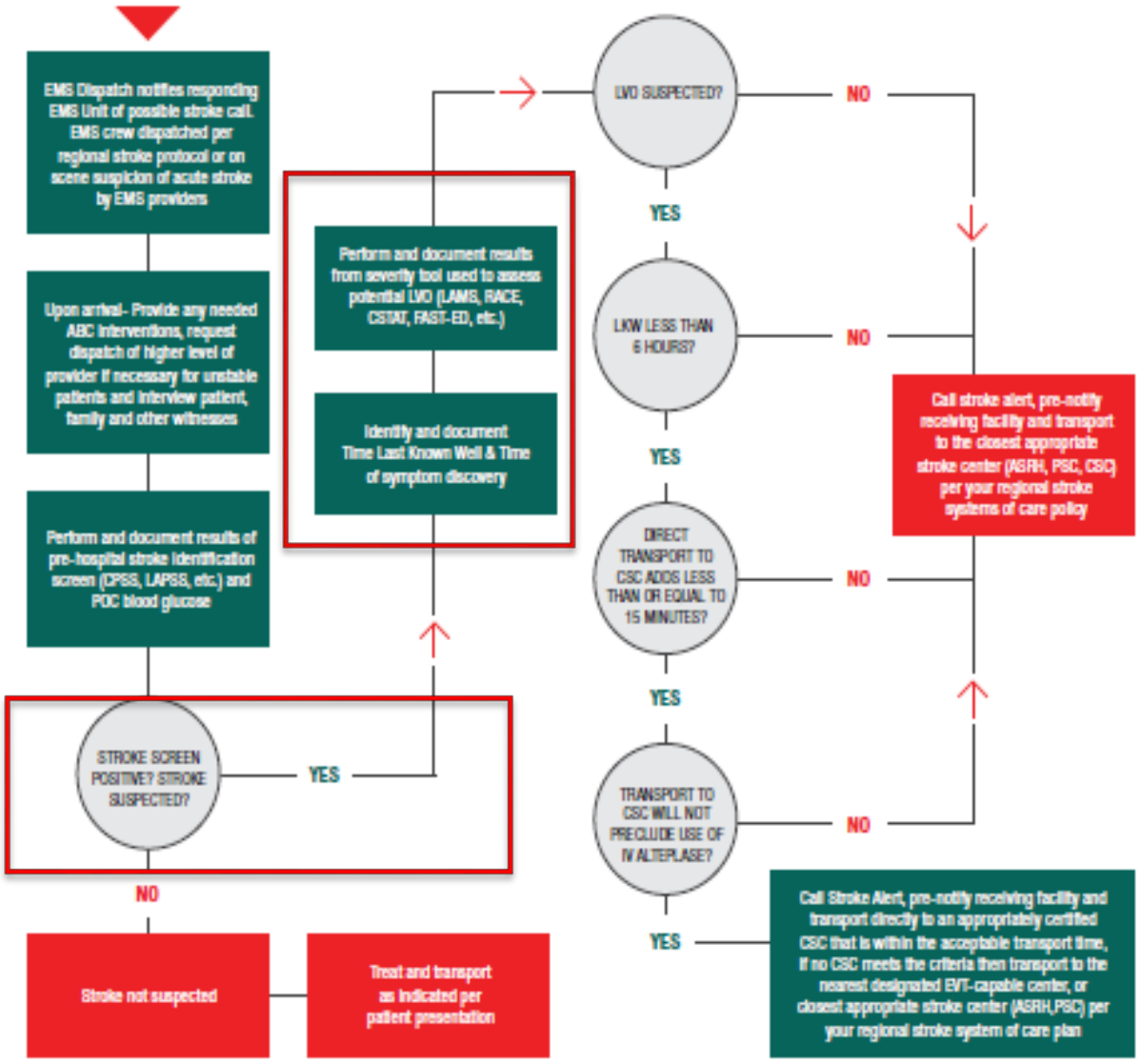
Mission:
Lifeline Stroke has developed this algorithm to help ensure the RIGHT patient is brought to the RIGHT stroke center RIGHT on time.



Initial Stroke Care:

No Significant Changes

SEVERITY-BASED STROKE TRIAGE ALGORITHM FOR EMS



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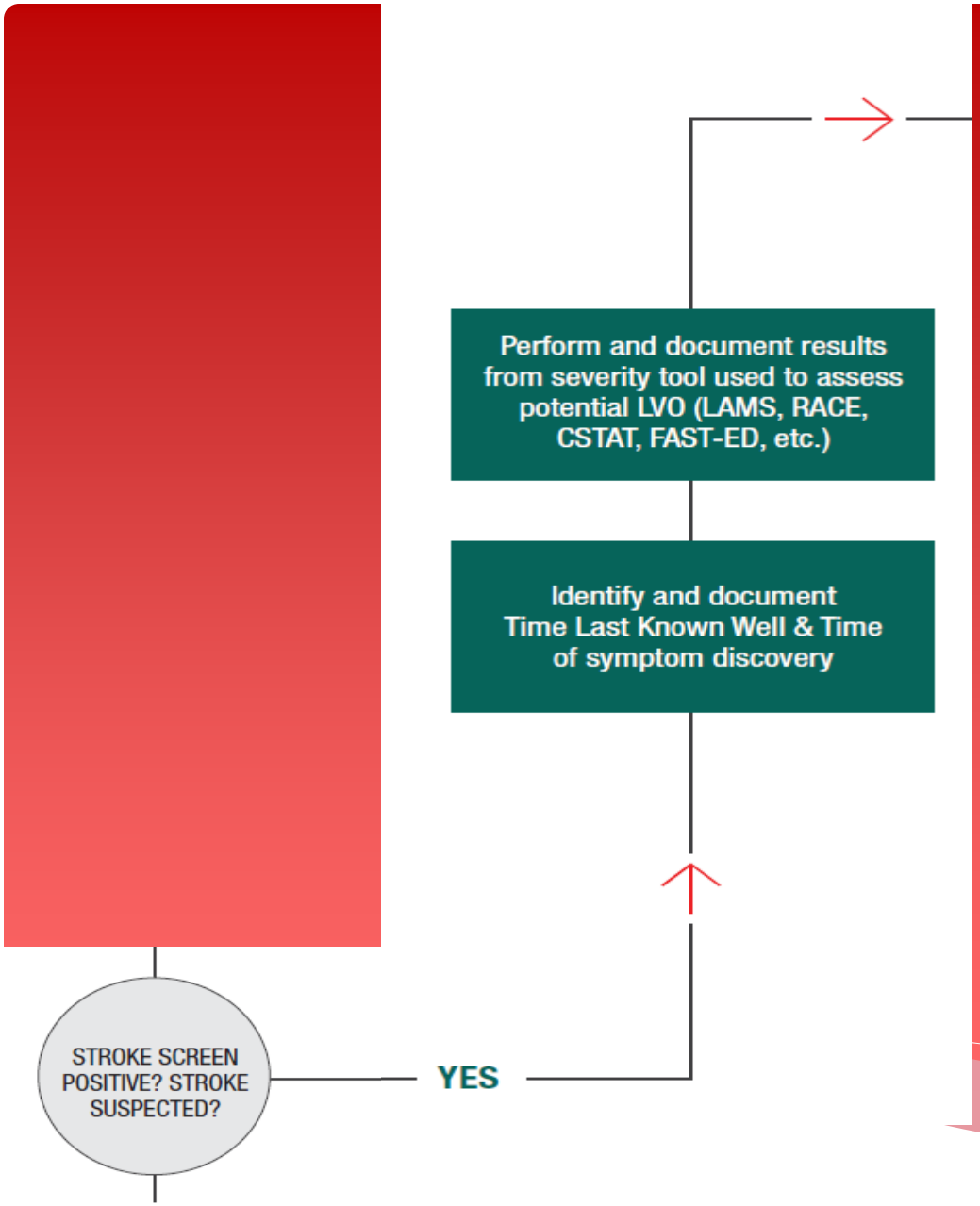
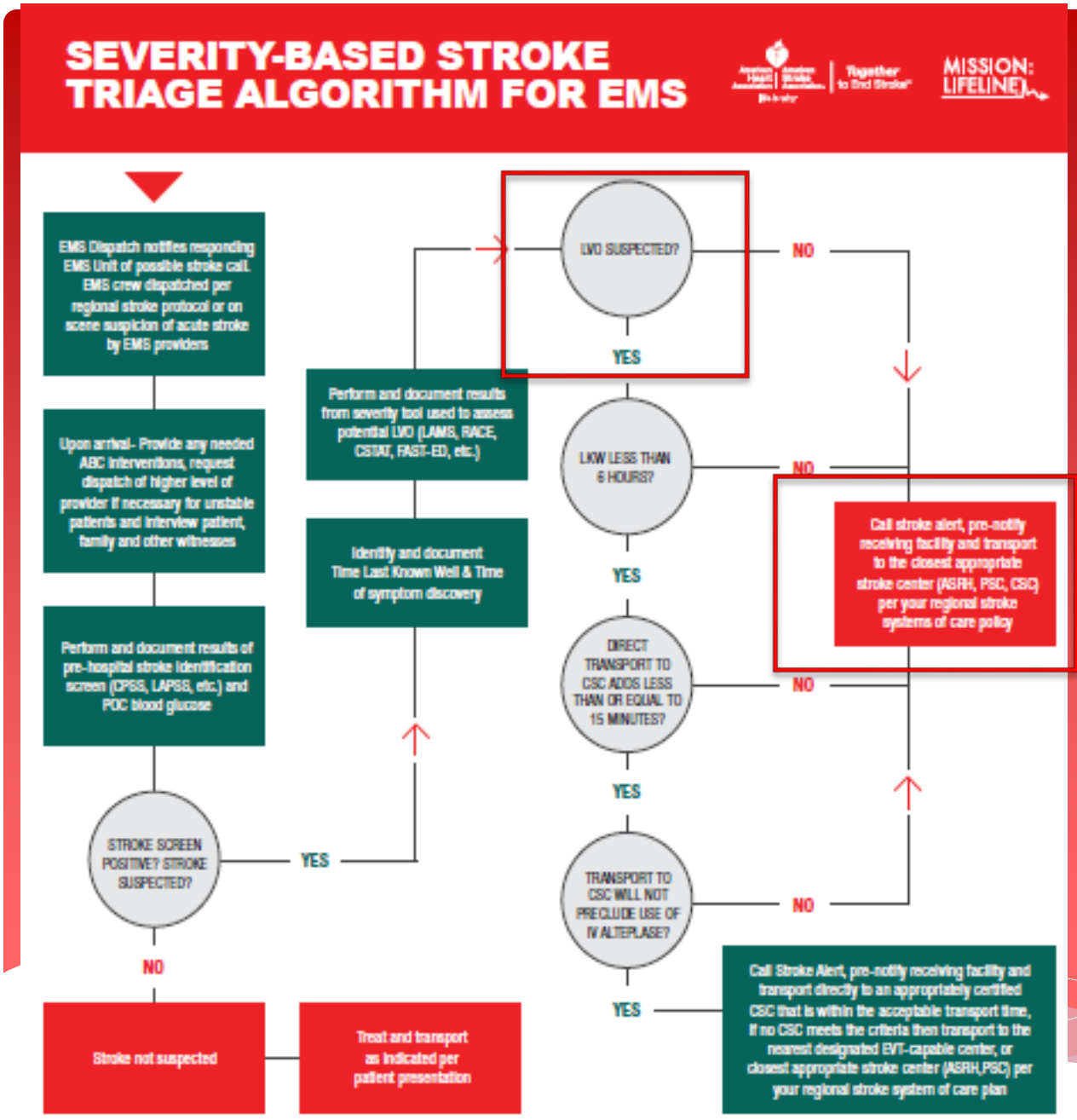
Utilizing Time + Best Available Severity Tools to Help Determine Patient Subset with LVO





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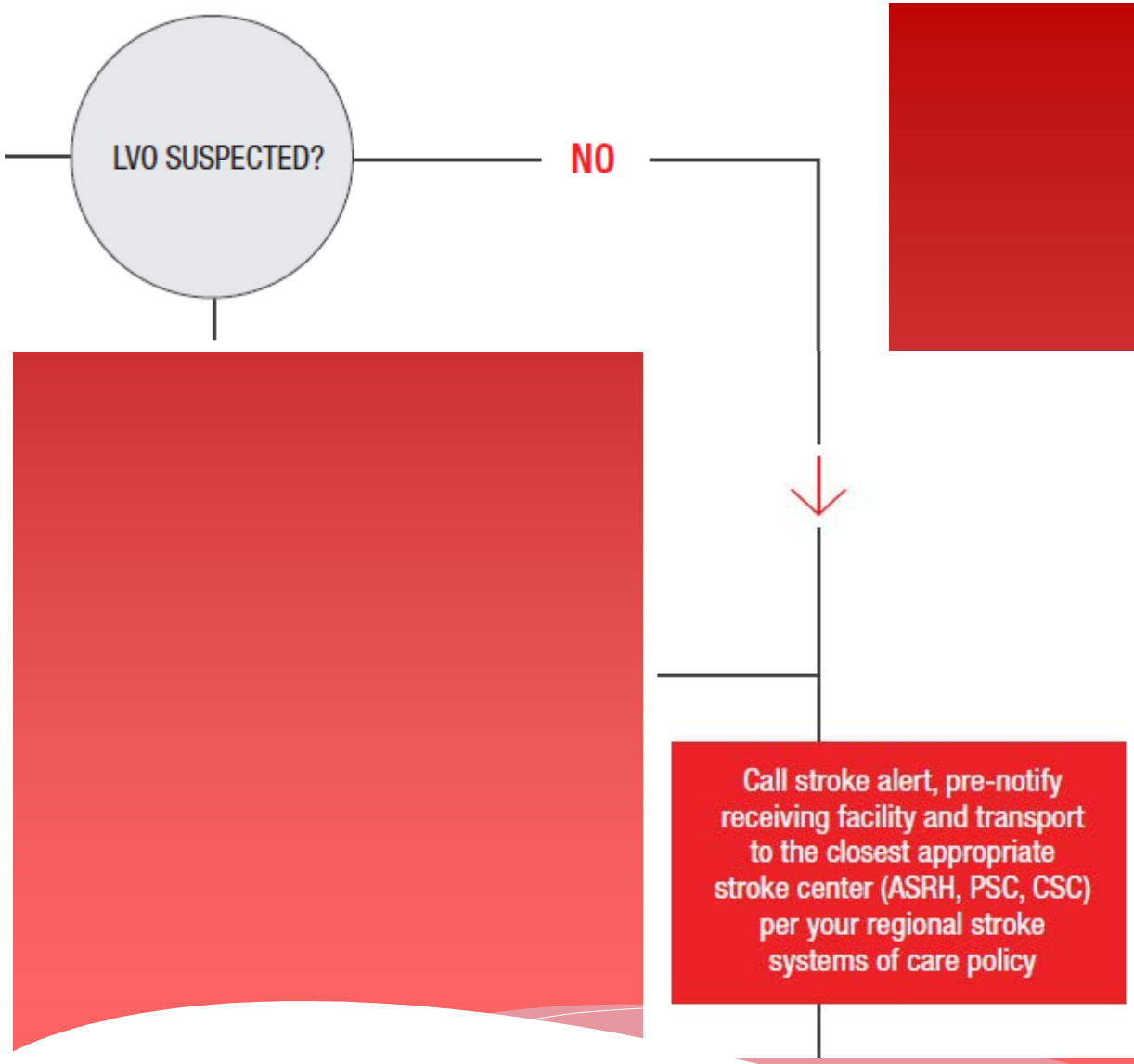
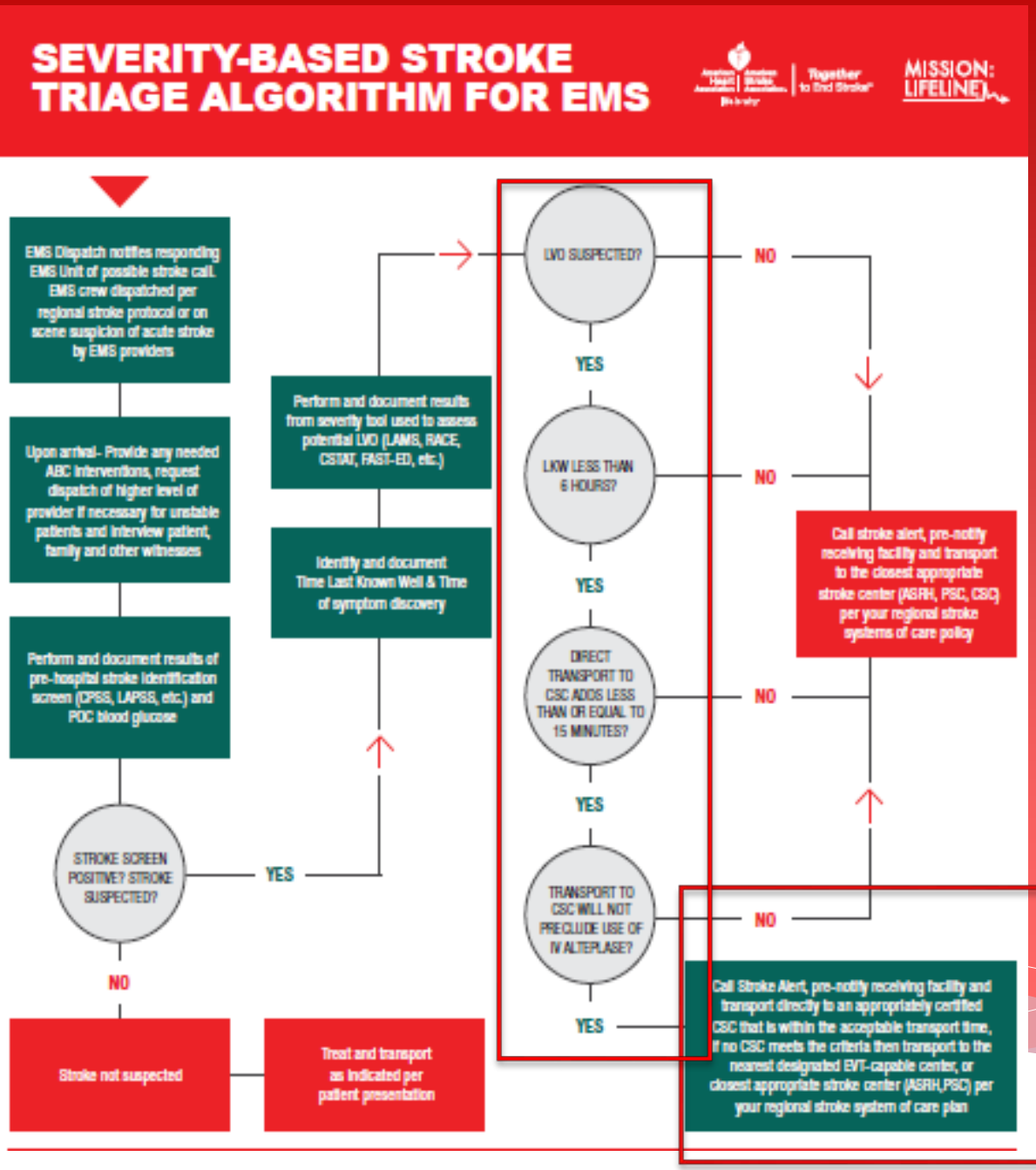


If LVO NOT suspected, then transport per regional plan

Anticipated that this would be >80% of all transports



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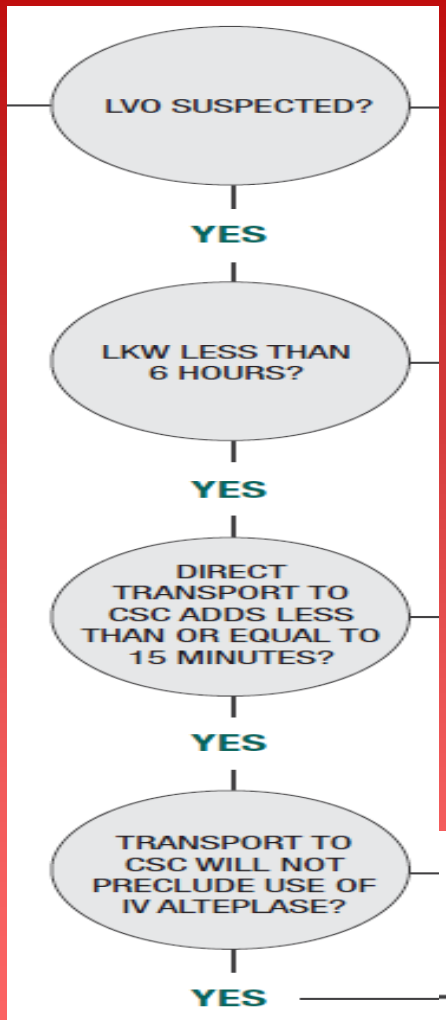

Go Directly to CSC IF:

Severity Screen (++)

+

LKW < 6 Hours

+

Transport to CSC Adds ≤ 15 min

+

Transport to CSC Does Not Delay Outside IV Thrombolysis

Any 'NO' then Go to Nearest/Closest Appropriate Facility Per Regional Plan

Call Stroke Alert, pre-notify receiving facility and transport directly to an appropriately certified CSC that is within the acceptable transport time, if no CSC meets the criteria then transport to the nearest designated EVT-capable center, or closest appropriate stroke center (ASRH,PSC) per your regional stroke system of care plan

On Scene Recommendations

ON SCENE

- Interview patient, family members and other witnesses to determine Last Known Well (LKW) time and time of Symptom Discovery.
- Attempt to identify possible stroke mimics (eg, seizure, migraine, intoxication) and determine if patient has pre-existing substantial disability (need for nursing homecare or inability to walk without help from others).
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- Collect a list of current medications (especially anticoagulants) and obtain patient history including co-morbid conditions (eg. serious kidney or liver disease, recent surgery, procedures or stroke) that may impact treatment decisions.

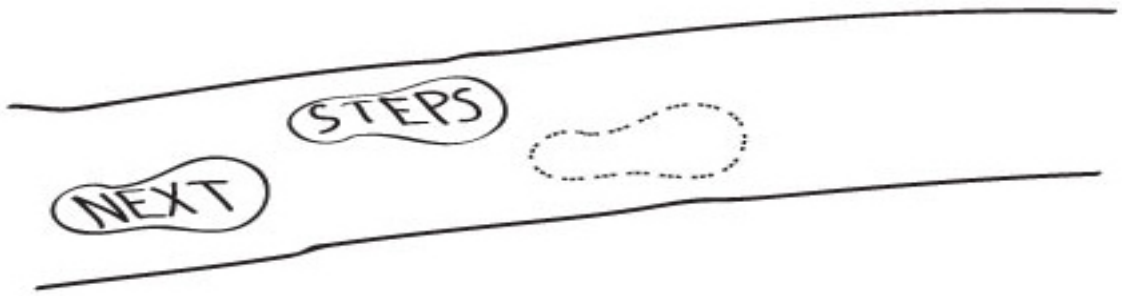
Generalized Assumptions

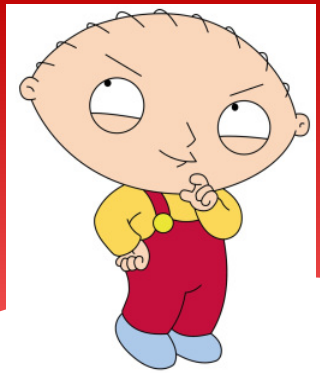
* **Balance access EVT in LVO with potential harms of delayed IV initiation (TIME IS BRAIN)**
* More PSCs (N=1182) than CSCs (N=118) and ASRH (N=24)
* Avoid overcrowding CSC
* **No current Severity Tool is superior**
* **Does not directly address hemorrhagic stroke**
* **Acceptable delay for re-routing still unclear??**
* Some data to suggest each 15 minute delay harmful
* Minimal disruption in clinical work-flow
* In rural settings, 20-30 minutes may be reasonable
* **Update algorithm when better evidence exists**

What Does This Mean For You?

Next Steps
Stroke Systems of Care Overhaul

* EMS Severity Routing Algorithm = High Level Framework
* Assess Your Local Resources
* **Develop a regional plan and Dialogue**
* **Continually Assess and Adapt to the Evolving Data**
* Base Changes on Best Practice with the Patient in Mind





Potential Research Questions

* Which Prehospital LVO tool(s) is the BEST?
* What is the Impact of using these scores?
* Trials ➡ compare drip-and-ship vs. direct to CSC
* Which LVO patients respond to EVT?
* Are all hospitals equal? What is Good Care?

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* Kothari R et al. Ann Emerg Med. 1999:33:3-8
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