ACUTE STROKE MANAGEMENT: BEYOND CLOT BUSTERS

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STROKE STATISTICS

• Approximately 795,000 Americans suffer a stroke each year with nearly 77% being first time strokes.

• 87% of all strokes are ischemic, 10% are intracerebral hemorrhage, and 3% are subarachnoid hemorrhage.

• Stroke has dropped to the 5th leading cause of death in the US but remains the leading cause of serious, long-term disability in adults.

• On average in the US, every 40 seconds someone has a stroke and every 4 minutes someone dies.
ISCHEMIC STROKE: ATEROPTHROMBOTIC

- Atherosclerotic changes in the vessel wall, typically causing stenosis (narrowing)
- Irregular wall shape catches platelets as they circulate in the blood
- Additional platelets are attracted to the site leading to thrombus formation and occlusion
ISCHEMIC STROKE: CARDIOEMBOLIC

• A clot develops in the heart then enters circulation and blocks an artery that supplies blood to the brain
• Cardiac conditions commonly associated with the development of clot include:
  • Atrial fibrillation
  • Dilated cardiomyopathy
  • Mechanical heart valve
  • Severe heart valve disease
TRANSIENT ISCHEMIC ATTACK (TIA)

• Transient stroke symptoms
  • Symptoms usually last 5 to 15 minutes
  • Symptoms lasting more than an hour are often associated with a small stroke
  • TIA is an indication that stroke risk factors are present and may lead to stroke in the near future if not identified and managed.
PRIORITIES IN STROKE MANAGEMENT

• **Stroke Prevention**
  It is estimated that if everyone was able to manage/prevent stroke risk factors, the incidence of stroke could be reduced by 80-85%

• This would require:
  • Everyone has regular health maintenance visits with a primary care provider
  • All primary care provider routinely screen for stroke risk factors
  • All stroke risk factors are identified and a treatment plan is initiated
  • Everyone would follow the recommended treatment plan (healthy diet, regular exercise, maintain a healthy weight, take prescribed medications, stop smoking, etc.)
  • If treatment plan is not controlling risk factors, modify plan until risk reduction is achieved.
A lot of work
PRIORITIES IN STROKE MANAGEMENT

• **Disability Reduction**
  For ischemic stroke, re-opening the occluded artery (recanalization) before the area of brain it supplies can die is the key to reducing or preventing disability.
  • Time is key! The earlier blood flow is reestablished, the greater the likelihood of reducing or preventing disability

Time is Brain
*Tempus Cerebrum Est*
STROKE RECOGNITION: FAST

ACT FAST at the FIRST SIGN of STROKE

FACIAL WEAKNESS
ARM WEAKNESS
SPEECH DIFFICULTY
TIME LOSS IS BRAIN LOSS

ALWAYS CALL 911

Minneapolis Stroke Association
STROKE RECOGNITION – BE FAST

B is for Balance: Does the person have a sudden loss of balance?
E is for Eye: Has the person lost vision in one or both eyes?
F is for Face: Does the person’s face look uneven?
A is for Arm: Is one arm hanging down?
S is for Speech: Is the person’s speech slurred? Does the person have trouble speaking or seem confused?
T is for Time: Call 911 now!
**WHY DOES TIME MATTER?**

Estimated loss of nerve tissue in a typical large artery stroke

<table>
<thead>
<tr>
<th></th>
<th>Neurons Lost</th>
<th>Synapses Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Stroke</td>
<td>1.2 billion</td>
<td>8.3 trillion</td>
</tr>
<tr>
<td>Per Hour</td>
<td>120 million</td>
<td>830 billion</td>
</tr>
<tr>
<td><strong>Per Minute</strong></td>
<td><strong>1.9 million</strong></td>
<td><strong>14 billion</strong></td>
</tr>
<tr>
<td>Per Second</td>
<td>32,000</td>
<td>230 million</td>
</tr>
</tbody>
</table>

PRIORITIES IN STROKE MANAGEMENT

• Disability Reduction

• Current Recanalization Therapies:
  • **Thrombolytic (clot-busting) Therapy** – Alteplase, the only drug proven to be effective for stroke, works to dissolve the clot
  • **Mechanical Thrombectomy** – A device is advanced through the artery to the occlusion and the clot is removed.

• Related terms:
  • Recanalization = Revascularization
  • Mechanical Thrombectomy = Mechanical Endovascular Recanalization (MER)
MEASURING STROKE OUTCOMES

• In stroke research, the most commonly used outcome measure is the modified Rankin Scale (mRS) score.

• Studies measure the extent of recanalization using the Thrombolysis in Cerebral Infarction (TICI) score.

• The NIH Stroke Scale may also be used to determine the nature and severity of stroke symptoms.

• The complications of symptomatic intracerebral hemorrhage (sICH) and 30-day mortality are also reported for treatment trials.
# MODIFIED RANKIN SCALE

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No symptoms</td>
</tr>
<tr>
<td>1</td>
<td>No significant disability. Able to carry out all usual activities, despite some symptoms</td>
</tr>
<tr>
<td>2</td>
<td>Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities</td>
</tr>
<tr>
<td>3</td>
<td>Moderate disability. Requires some help, but able to walk unassisted</td>
</tr>
<tr>
<td>4</td>
<td>Moderately severe disability. Unable to attend to own bodily needs without assistance, and unable to walk unassisted</td>
</tr>
<tr>
<td>5</td>
<td>Severe disability. Requires constant nursing care and attention, bedridden, incontinent</td>
</tr>
<tr>
<td>6</td>
<td>Expired</td>
</tr>
</tbody>
</table>
## THROMBOLYSIS IN CEREBRAL INFARCTION (TICI)

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Perfusion (no flow beyond the point of occlusion)</td>
</tr>
<tr>
<td>1</td>
<td>Perfusion past the initial obstruction but limited distal branch filling with little or slow distal perfusion</td>
</tr>
<tr>
<td>2a</td>
<td>Only partial filling (&lt;2/3) of the entire vascular territory is visualized.</td>
</tr>
<tr>
<td>2b</td>
<td>Complete filling of all of the expected vascular territory is visualized, but the filling is slower than normal.</td>
</tr>
<tr>
<td>3</td>
<td>Complete Perfusion with normal filling of the vascular bed distal to the obstruction and clearance of contrast material from the involved bed.</td>
</tr>
</tbody>
</table>

A score of 2b or 3 is considered successful recanalization.
<table>
<thead>
<tr>
<th>Assessment Parameter</th>
<th>Scoring Guidelines</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level of Consciousness</td>
<td>0 = Alert 1 = Anxious with minimal stimuli 2 = Anxious with repeated stimuli (withdraw/purposeful) 3 = Un arousable or respond with posturing</td>
<td></td>
</tr>
<tr>
<td>LOC (Age and Month)</td>
<td>0 = Both correct 1 = One correct (artificial airway) 2 = Neither correct</td>
<td></td>
</tr>
<tr>
<td>LOC Commands (Open &amp; Close Eyes) (Grip and Relax)</td>
<td>0 = Performs both correctly (one attempt only) 1 = Performs one correctly (one attempt only) 2 = Performs neither correctly (one attempt only)</td>
<td></td>
</tr>
<tr>
<td>Face</td>
<td>0 = Normal (Horizontal movement) 1 = Palsy in one or both eyes 2 = Paresis deviation (both eyes)</td>
<td></td>
</tr>
<tr>
<td>Visual Fields (Upper &amp; Lower Quadrants)</td>
<td>0 = Normal 1 = Partial homonymous 2 = Unilateral homonymous 3 = Bilateral homonymous (central vision only/blind)</td>
<td></td>
</tr>
<tr>
<td>Facial Palsy (Show teeth &amp; close eyes)</td>
<td>0 = Normal, symmetrical movement 1 = Minor palsy (flattened nasolabial fold/symmetrical smile) 2 = Partial palsy (lower face/unilateral or bilateral) 3 = Complete palsy (full face/unilateral or bilateral)</td>
<td></td>
</tr>
<tr>
<td>Motor (Arm)</td>
<td>0 = No drift &gt; 30 degrees 1 = Drift &gt; 10 seconds 2 = Some effort against gravity 3 = No effort against gravity 4 = No movement</td>
<td></td>
</tr>
<tr>
<td>Motor (Leg)</td>
<td>0 = No drift &gt; 30 degrees 1 = Drift &gt; 10 seconds 2 = Some effort against gravity 3 = No effort against gravity 4 = No movement</td>
<td></td>
</tr>
<tr>
<td>Touch (Finger-nose Finger) (Heel to shin sit)</td>
<td>0 = Absent 1 = Present in one limb 2 = Present in two limbs</td>
<td></td>
</tr>
<tr>
<td>Sensory (Arms, legs, trunk &amp; face)</td>
<td>0 = Normal 1 = Mild/moderate loss (feels gentle touch as dull) 2 = Severe to total loss on face, arms &amp; legs</td>
<td></td>
</tr>
<tr>
<td>Language</td>
<td>0 = Normal 1 = Mild/moderate (converses thoughts/responds) 2 = Severe (difficulty conveying thoughts/responding) 3 = Mutism/total aphasia (no usable speech)</td>
<td></td>
</tr>
<tr>
<td>Apraxia</td>
<td>0 = Normal 1 = Mild/moderate (slurred speech) 2 = Severe (speech unintelligible)</td>
<td></td>
</tr>
<tr>
<td>Neglect/intention (visual, tactile, auditory, spatial, person)</td>
<td>0 = No abnormality 1 = Inattention to any one stimulus (unilateral or bilateral) 2 = Profound hemi-inattention (&gt; 1 stimulus)</td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL SCORE**
TIMING OF TREATMENT

• 0-4.5 hours of last known well:
  • IV thrombolytic (alteplase) therapy

• 0-6 hours of last known well:
  • Endovascular revascularization therapy
    • Intra-arterial thrombolytic therapy
    • Mechanical thrombectomy

• Mechanical thrombectomy may be considered beyond 6 hours in certain patients
  • Basilar artery occlusions may be treated for up to 24 hours
TREATMENT WINDOW – IV ALTEPLASE

• IV alteplase has been shown to be safe AND effective if administered within 4.5 hours of stroke onset.
  • Beyond 4.5 hours, the likelihood of benefit no longer outweighs the risk of possible complications.

• Other thrombolytic agents have been studied and research continues, but to date, no other agent has demonstrated superior efficacy or safety compared to alteplase.

• “Neuro-protective” agents continued to be studies with the thought that they may make thrombolytic therapy more effective for a longer period thus extending the treatment window.
IV ALTEPLASE

IV Alteplase Administered Within 3 Hours of Time Last Known Well (NINDS Study)

- FAVORABLE OUTCOME: 50% Treated, 30% Placebo
- SYMPTOMATIC ICH: 6.40% Treated, 0% Placebo
- MORTALITY AT 3 MO.: 17% Treated, 20% Placebo
- MORTALITY AT 1 YEAR: 24% Treated, 28% Placebo
IV ALTEPLASE

IV tPA Administered 3-4.5 Hours After Last Known Well (ECASS-3 Study)

- FAVORABLE OUTCOME: 52.4% (Treated) vs 3.5% (Placebo)
- SYMPTOMATIC HEMORRHAGE: 7.9% (Treated) vs 8.4% (Placebo)
- MORTALITY AT 3 MONTHS: 7.7% (Treated) vs 8.4% (Placebo)
Number of Patients that Need to be Treated (NNT) for One to Achieve a Favorable Outcome (NINDS and ECASS-3 Studies)

- **0-3 Hour Window**
  - Favorable Outcome: 14
  - Improved Outcome: 8

- **3-4.5 Hour Window**
  - Favorable Outcome: 8.3
  - Improved Outcome: 3.1
TIMING OF ALTEPLASE ADMINISTRATION

<table>
<thead>
<tr>
<th>Stroke Onset to Time IV alteplase initiated</th>
<th>Odds Ratio for favorable Outcome</th>
<th>Number Needed to Treat for Excellent Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 90 minutes</td>
<td>2.81†</td>
<td>4.5</td>
</tr>
<tr>
<td>91 – 180 minutes</td>
<td>1.55 †</td>
<td>9</td>
</tr>
<tr>
<td>181 – 270 minutes</td>
<td>1.3 *</td>
<td>14.9</td>
</tr>
</tbody>
</table>

Favorable Outcome is defined as a modified Rankin Score of 0-2
Excellent Outcome is defined as a modified Rankin Score of 0-1

†Alteplase Thrombolysis for Acute Non-interventional Treatment of Stroke (ATLANTIS) - IV rtPA 0.9 mg/Kg 0–5 hours from stroke onset. U.S. based, industry funded trial

*Pooled data from ECASS-1, ECASS-2, ECASS-3 and ATLANTIS
PROS & CONS OF IV ALTEPLASE

• Pros:
  • Can be provided in most Emergency Departments
  • Consultation with stroke experts can be done remotely if consultation needed prior to treatment
  • Most hospitals have the equipment and clinical staff needed to completed the necessary diagnostic work-up and administer IV alteplase
  • Improved outcome at 90-days post-stroke

• Cons:
  • Relatively short treatment window
  • Intermediate recanalization rate (30-40%)
TREATMENT WINDOW-MECHANICAL THROMBECTOMY

• Five studies published in 2015, demonstrated improved outcomes when mechanical thrombectomy is accomplished within 6 hours of stroke symptom onset.

• 2 of the 5 studies enrolled patients beyond 6 hours
  • Too few patients were treated beyond 6 hours to definitively demonstrate efficacy but there was a trend toward efficacy.
## META-ANALYSIS OF RECENT ENDOVASCULAR TRIALS

<table>
<thead>
<tr>
<th></th>
<th>TICI Score 2b/3</th>
<th>NIH Stroke Scale Score 0-2 at 24 hours</th>
<th>mRS 0-2 at 90 days</th>
<th>Symptomatic Intracerebral Hemorrhage</th>
<th>30-day mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Group</td>
<td>71%</td>
<td>21.0%</td>
<td>46.0%</td>
<td>4.4%</td>
<td>15.3%</td>
</tr>
<tr>
<td>Control Group</td>
<td>NA</td>
<td>8.3%</td>
<td>26.5%</td>
<td>4.3%</td>
<td>18.9%</td>
</tr>
</tbody>
</table>

Over 80% of patients in both the control and treatment groups received IV alteplase.
HOW EFFECTIVE IS RECANALIZATION THERAPY?

Number Needed to Treat (NNT) - The number of patient who need to be treated for one to have a favorable outcome (mRS 0-2)

Mechanical Thrombectomy for Ischemic Stroke
NNT = 4

IV Alteplase for Ischemic Stroke
NNT = 8-9
PROS & CONS OF MECHANICAL THROMBECTOMY

• Pros:
  • Higher recanalization rates
  • Improved outcomes at 90-days post-stroke
  • Same or lower complications rates compared to IV alteplase
  • Safe in patients with bleeding risks
  • Longer treatment window

• Cons:
  • Requires specialized equipment and personnel so is typically only available in large metropolitan hospitals
  • It can only be performed when the occlusion is in a large artery
  • Because it is an invasive procedure, the risk is felt to outweigh the possible benefit in patients with mild stroke symptoms
MECHANICAL THROMBECTOMY DEVICES
PENUMBRA™ THROMBO-ASPIRATION DEVICE

https://www.youtube.com/watch?v=ajcgsAr6K2A
SOLITAIRE™ STENT RETRIEVER DEVICE

https://www.youtube.com/watch?v=0DQPDS5TS5Y
TREVO™ STENT RETRIEVER DEVICE
CLOTS REMOVED WITH STENT RETRIEVER
EMERGENT STROKE IMAGING

Determining Eligibility for IV Alteplase and/or Mechanical Thrombectomy
The denser the structure, the lighter it is on CT (bone is densest so is bright white, CSF is least dense so is black). Blood is dense so is lighter, infarcted tissue has decrease/no blood flow so it is darker (hypodense).
Blood is denser than tissue so is lighter. A blood clot is very dense so is much lighter. A dense MCA or basilar sign (also called clot sign) is very predictive of an occlusion in that vessel.
The ASPECTS Score is used to identify the extent of hypodensity (indication of infarcted tissue). It only applies to strokes caused by middle cerebral artery occlusion. Starting with a score of 10, 1 point is subtracted for each area of hypodensity. Typically a score of 0-5 is considered too much infarcted tissue to benefit from endovascular recanalization.
CT ANGIOGRAM OF HEAD AND NECK

Left MCA Occlusion
Raw CTA Image

Right MCA Occlusion
Reconstructed Images
CT/CTA

Dense MCA on non-contrast CT

CT Angiogram
A perfusion mismatch (decreased CBF with normal or increased CBV) indicates that there is ischemic tissue that has not yet infarcted.
CEREBRAL ANGIOGRAPHY

Normal

MCA Occlusion
CASE STUDIES
The Cincinnati Prehospital Stroke Scale is a tool used by most EMS agencies to assess for stroke symptoms.

**Cincinnati Prehospital Stroke Scale**

**Facial Droop**
- **Normal:** Both sides of face move equally
- **Abnormal:** One side of face does not move at all

**Arm Drift**
- **Normal:** Both arms move equally or not at all
- **Abnormal:** One arm drifts compared to the other

**Speech**
- **Normal:** Patient uses correct words with no slurring
- **Abnormal:** Slurred or inappropriate words or mute
CASE STUDY #1

• Mr. Brown is a 54 year old man who went out for a walk at 17:40 and was found down by a passerby approximately 15 minutes later. 911 was called.

• At the scene, EMS noted a speech abnormality on the Cincinnati Prehospital Stroke Scale and documented that the patient was unable to follow commands or get up on his own.

• EMS pre-notified the ED of a stroke alert and arrived to the ED 35 minutes after the patient was last known well.
CASE STUDY #1

- Mr. Brown had a history of hypertension and an aortic valve replacement (mechanical valve)
- Current medications included lisinopril, metoprolol, simvastatin and warfarin
- BP = 168/84, blood glucose = 92 and INR = 2.1
- NIH Stroke Scale = 5 (unable to answer questions, mild facial droop and severe aphasia)
- CT/CTA revealed no hemorrhage and an occlusion of the superior M2 segment of the left middle cerebral artery
- Mr. Brown was taken to Interventional Radiology for mechanical thrombectomy using the thrombo-aspiration and a stent retriever
CASE STUDY #1

Pre-treatment TICI = 1

Post-treatment TICI = 2b
CASE STUDY #1

• Mr. Brown was sedated for the procedure but upon wakening, all of his symptoms had resolved.

• An MRI the following day revealed a small infarct

• Mr. Brown later described his experience: “My right arm suddenly went numb and then my right leg went numb too. A neighbor saw me and asked what was wrong and I couldn’t answer him. I knew what I wanted to say, but couldn’t say it”

• Mr. Brown was discharged from the hospital 2 days later with an NIH Stroke Scale = 0 and a mRS = 0
CASE # 2

- Mrs. Jones is a 72 year old woman who was shopping at Menards and began to slump to one side. She was helped to the floor and was noted to have left sided paralysis, right gaze deviation, slurring of words, and seemed confused. 911 was called.

- EMS noted abnormal findings for all 3 components of the Cincinnati Prehospital Stroke Scale (facial droop, arm weakness and abnormal speech).

- EMS pre-notified the hospital of a stroke alert and arrived to the ED 25 minutes after the patient was last known well.
CASE # 2

• Mrs. Jones had a history of hypertension, hyperlipidemia, coronary artery disease and myocardial infarction with coronary angioplasty

• Current medications included aspirin, Losartan, HCTZ and Simvastatin

• Upon arrival to the ED, Mrs. Jones’ NIHSS score = 20

• Non-contrast head CT = no hemorrhage, positive dense right MCA sign so CTA deferred

• IV alteplase was initiated with a door to needle time of 23 minutes
CASE # 2

Pre-treatment TICI = 0
CASE # 2

• Pre-procedure angiogram showed a right ICA occlusion with a TICI score = 0
• Mechanical Thrombectomy of the ICA was achieved using thrombo-aspiration and a stent retriever
• Intra-arterial alteplase was infused to an occluded branch that was too small for mechanical thrombectomy
CASE # 2

Post-Procedural TICI = 2b
CASE # 2

• During her hospital stay Mrs. Jones went in and out of atrial fibrillation. This was felt to be the most likely cause of her stroke.

• She was discharged to Knapp Rehabilitation Hospital at HCMC on day 5 with an NIHSS = 4

• Upon discharge from rehab she was able to walk with a single point cane and had some fine motor dysfunction in her hand

• At 90 days her mRS = 3 (primary due to cognitive issues)
CASE # 3

• Mr. Smith is a 53 year man who was watching TV with his wife and went to the kitchen without difficulty. She heard a concerning sound so went to check on him and found him with right face, arm and leg weakness, speech difficulty and “confusion”. 911 was called.

• EMS found Mr. Smith to have abnormal findings on all 3 components of the Cincinnati Prehospital Stroke Scale

• EMS pre-notified HCMC ED of a stroke alert and arrived to the hospital 48 minutes after the patient was last known to be well.
CASE # 3

• According to Mrs. Smith, her husband had not seen a healthcare provider for several years and was not on any medications. He had been told that he had high blood pressure at some time in the past but had not followed up.

• Mr. Smith smoked two packs per day for 35 years.

• In the ED, Mr. Smith’s BP = 178/89, Blood glucose = 84, EKG showed normal sinus rhythm

• His NIH Stroke Scale score = 17
CASE # 3

- CT/CTA showed no hemorrhage and a left M₁ occlusion
- IV alteplase was initiated with a door to needle time of 33 minutes (81 minutes since last known well time.
- Because it was late in the evening, the Interventional Radiology Nurses and Technician had to be called in from home.
- At the initial neuro check 15 minutes after the alteplase infusion was started, Mr. Smith showed significant improvement.
- When the IR team arrived 30 minutes after alteplase was started, a pre-procedure assessment showed that the NIHSS = 2 so mechanical thrombectomy was deferred.
- A repeat CTA showed nearly complete recanalization of the MCA (SORRY IR TEAM!!)
• Mr. Smith was discharged to home 2 days later with an NIHSS = 0 and mRS = 0

• Food for Thought...
  
  • Sometimes tPA alone does the trick. This is more likely when treatment is within 90 minutes of symptom onset.
Mrs. White is an 86 year old woman who was last known to be well at 22:00 the night before arrival. Her daughter went to check on her at 1 pm when she didn’t answer her phone and found her on the bathroom floor with right sided weakness, unable to speak. 911 was called.

EMS found her to have abnormal findings for all 3 components of the Cincinnati prehospital stroke scale.

EMS pre-notified HCMC ED of a suspected stroke with last known well > 8 hours ago.

Upon arrival, a stroke code was called because the HCMC protocol is to call a stroke code if the last known well is within 24 hours
CASE # 4

- Mrs. White has a history of hypertension, hypothyroidism and atrial fibrillation
- Her only medication was an antihypertensive
- Her BP was 208/92, blood glucose = 104, EKG = a-fib
- Mrs. White’s NIHSS = 15. She was not able to communicate to clarify when her symptoms started.
- CT/CTA showed no hemorrhage and left M_1 occlusion. The CT showed only slight hypodensity in the left MCA distribution (ASPECTS score = 8) which suggested that the infarct was had occurred recently so it was decided to pursue mechanical recanalization.
CASE # 4

Pre-procedure TICI = 0

Post-procedure TICI = 3
Mrs. White was transferred to Knapp Rehabilitation Hospital on day 4 with an NIHSS = 1

Upon discharge from Knapp, her mRS = 3. She was ambulating independently, had no noted weakness, and had only occasional word finding difficulty but had significant cognitive impairment and was felt to be unsafe without 24 hour supervision.

At her 90-day follow-up her mRS = 2. Her cognition had improved significantly but she still needed some help with her finances. She had returned to her own home.
Rapid initiation of IV alteplase remains a priority so patients in rural areas should still be transported to the nearest stroke-ready hospital.

All patients should be considered for endovascular therapy so hospitals without this capability need to complete a CTA or assess for symptoms of large vessel occlusion and transfer for mechanical thrombectomy when appropriate (after initiating IV alteplase).

The American Stroke Association is recommending that EMS agencies adopt one of several expanded stroke assessment tools that help identify large vessel occlusion.

Many states are implementing EMS routing criteria that require patients with symptoms of large vessel occlusion to centers with endovascular capability if the transport time must be increased by more than 15-30 minutes.
WHAT DOES THE FUTURE HOLD?

• A research study (DAWN), which is initiating mechanical thrombectomy for up to 24 hours from time last known well, based on CT Perfusion criteria, has halted enrollment after an interim analysis showed significantly better outcomes for patients who were treated beyond 6 hours than for those who were not treated.
  • Once all study patients have completed the 90-day follow-up assessments, the analysis will be completed and reported.
  • Stroke expert suspect this will lead to a extension in the recommended treatment window within the next few months.
CONCLUSION

• Research has shown that earlier IV alteplase and earlier mechanical thrombectomy are associated with improved patient outcomes so despite expanding treatment windows, don’t forget:

Time is Brain!
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