

The advantages and limitations of
EMS field triage
for acute stroke in light of the
positive EVT trials.

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Disclosures

Genentech speaker's bureau



Outline

1) *Disadvantages*

2) *Advantages*

3) *Likely Future directions*



Getting acute LVO ischemic strokes promptly to CSC

Pursuit of this Obvious benefit...

odds patient gets intervention drop 2.5%
each minute of PCS-to-CSC transport time¹

Prabhakaran S, Ward E, John S, Lopes DK, Chen M, Temes RE, et al. **Transfer Delay Is a Major Factor Limiting the Use of Intra-Arterial Treatment in Acute Ischemic Stroke.** *Stroke.* 2011;42:1626-1630.



...Can lead to this intellectually lazy
detrimental approach

- Some “Big city” EMS policies are to take ALL strokes to only CSC’s

A) *“Plunder of our fine system of PSC’s...”*

B) *ASA GWTG/CSC = 50% of strokes brought by POV’s*

A+B= weakened acute stroke readiness for PSC’s and POV strokes



Lack of regional stroke system
planning

- Too many CSC’s in some affluent areas (South Florida Starbucks rule: 16 across 3 counties)
- Volume likely drives admin commitment and quality



State attestation and minimal oversight of CSC's and EMS med directors

- “interventional centers” that “*do everything except Aneurysms*”
- Single interventionalist “CSC’s” that takes week-ends off
- EMS---likely attempting to help trauma centers---can take LVO strokes to “CSC’s” when they have no interventionalists



Suggestions:

- Revise guidelines to encourage EMS severity adjusted triage in the field and more selective bypass rather than “w/in 15-20 min bypass”
- Better supervision of EMS medical directors?---more realistic than “regional planning” of CSC’s
- Required third party CSC certification???



Stroke Severity Adjusted EMS Triage Has Benefits For Bypassed Primary Stroke Centers

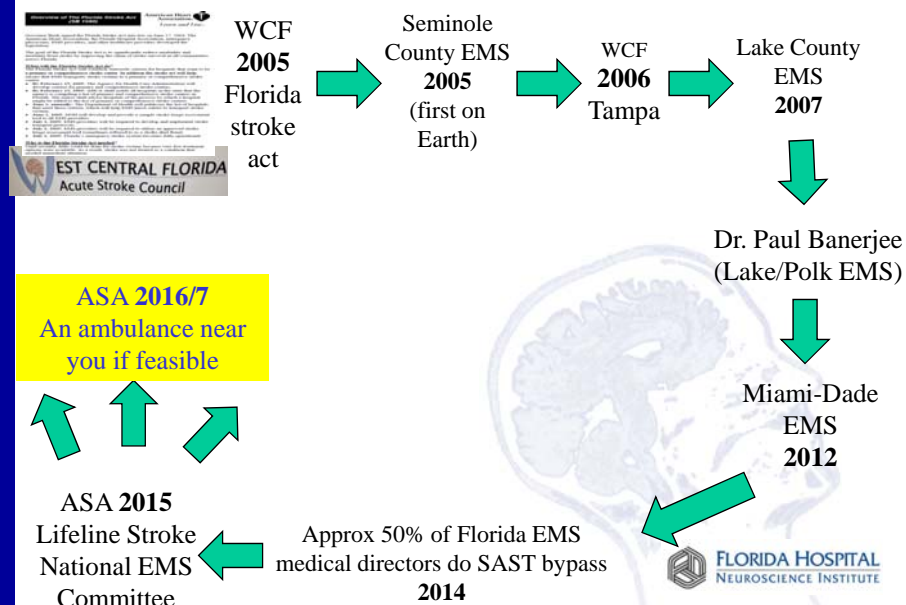
Stroke 2014; 45:A213

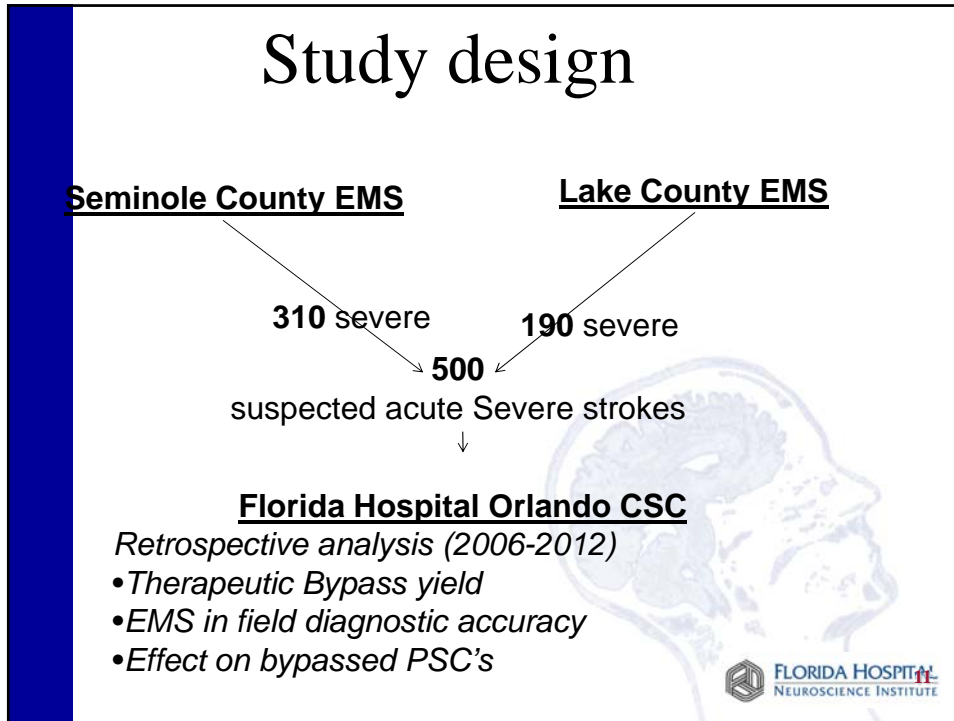
Allen E*, Husty T**, Banerjee P, Lovec R*, Richards D*, Claunch J***, Qureshi A****

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10 years of Florida EMS Severe Stroke Adjusted Triage (SAST) bypass coming to rest of USA, when feasible, soon





We recommend LAMS


UCLA's LA Motor Scale

A Brief Prehospital Stroke Severity Scale Identifies Ischemic Stroke Patients Harboring Persisting Large Arterial Occlusions
3008-30-0762 15671

Table. The Los Angeles Motor Scale (LAMS)

Facial droop	
Absent	0
Present	1
Arm drift	
Absent	0
Drifts down	1
Falls rapidly	2
Grip strength	
Normal	0
Weak grip	1
No grip	2

LAMS \geq 87% chance an ischemic stroke has a large vessel occlusion (intervention)



Results: Therapeutic yield

“Therapeutic Bypass Yield” Definition = *percentage of patients that got Cranial Neurosurgery or Endovascular intervention during this admission not available at Bypassed PSC’s*

Therapeutic Yield = **15%** got a CSC-specific Intervention
(77/500 CSC triaged patients)

Acute endovascular intervention

(ischemic stroke)=7.5%

Neurosurgery for Intracranial bleed = 5%

Neurosurgery for Intracranial tumor =2%

Other: Aneurysm coiling + EC/IC bypass= 0.5%

=15%



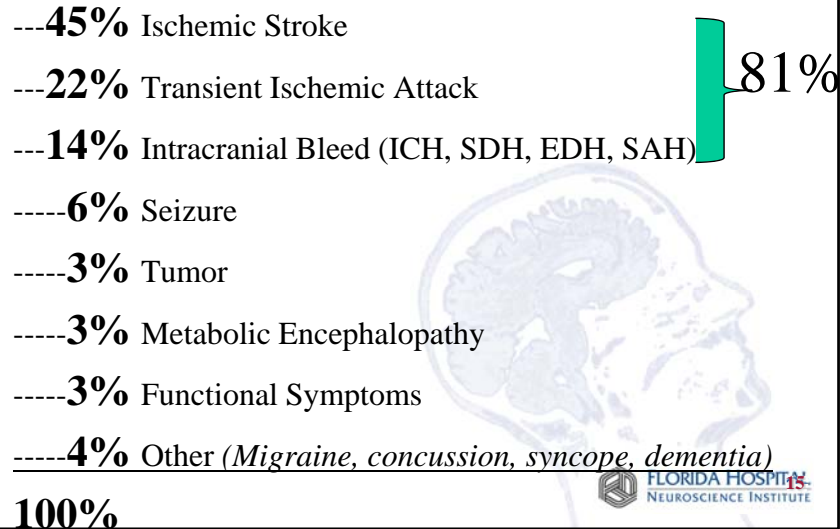
Comparison of Therapeutic Bypass yields: *Trauma vs Stroke*

- **STROKE: 15%** got CSC-specific stroke procedure
(77 of 526)
- **TRAUMA: 18%** got taken to Operating room in 1st 48
hrs at level one trauma center (35 of 193)
- **No stat sig diff** in therapeutic bypass yields for
trauma and stroke
Odds Ratio 0.77, 95% CI = 0.5-1.2



EMS was pretty accurate

- Of 471 patients with known diagnoses



Achtung!

“Hell hath no fury like a PSC scorned....”

Step 1: strongly facilitate rehab at the bypassed PSC choice

STEP 2: Benefits for bypassed PSC

	What Altamonte PSC got 643 direct-to- PSC patients	What Altamonte PSC was spared 209 SAST bypass CSC patients
Major Complications** respiratory failure, infection, DVT, PE, MI or recurrent stroke in house	13%	34%
ICH, fatal or d/c hospice*	0.6%	9.6%

1 in 8 CSC patients were transferred for a CSC-SI

Fatal/Hospice ICH: Odds ratio =15.38, 95% CI =5.2 to 45.5, P<0.0001
 Major Complications: Odds ratio =2.54, 95% CI =1.78 - 3.62), P<0.0001



Future directions for SAST and bypass

EMS often asks: “can we extend the window beyond 4.5 hrs?”



What % of Intervention strokes are missed with a 4.5 hr LKN in the field window?

No significant difference in Age, stroke severity or other factors known to predict outcome after Intervention

	<6hr (n=106)	≥6hr (n=42)
Median time of image	128 minutes	480 minutes
% that got procedure	41%	33% <small>(no stat sig dif)</small>

Eligible for procedure if favorable CTP---ASPECTS not used for decision making



What % of Intervention strokes are missed with a 4.5 hr LKN in the field window?

	Percentage of treated <6+≥6 hr LVO strokes that would have been excluded at FH Orlando CSC
4.5hr LKN in the field	24.5%
6 hr LKN in the field	11%
8 hr LKN in the field	9%
10 hr LKN in the field	2%
13 hr LKN in the field	0%



Outline

Future directions for SAST and bypass

For resource constrained counties:
Should we exclude patients with high
chance of poor outcome from CSC triage
and transport?



Typical case

A dedicated but mildly resource impaired
EMS medical director wishes to send acute
severe strokes 1.5 counties away to the CSC
past 3 different closer PSC's. A 89 year old
woman with a severe stroke (NIHSS 20) and
Glucose 200 is transported out of the county
for CSC intervention. The response reminds
the EMS med dir of the "*Achtung! Hell hath
no fury....*" slide.



Is pursuing this outcome, or worse, a good use of EMS SAST bypass resources?

Modified rankin scale

Score	Description
0	No symptoms at all
1	No significant disability despite symptoms; able to carry out all usual duties and activities
2	Slight disability; unable to carry out all previous activities, but able to look after own affairs without assistance
3	Moderate disability; requiring some help, but able to walk without assistance
4	Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
5	Severe disability; bedridden, incontinent and requiring constant nursing care and attention
6	Death

ITAL
TITUTE

no PSC bypass if modified HIAT =3, or 2 for intubating CSC >1 ?

Identifying Patients at High Risk for Poor Outcome After Intra-Arterial Therapy for Acute Ischemic Stroke

Hen Halleivi, MD; Andrew D. Borrato, MD; David S. Lieberkind, MD; Miriam M. Morales, BS; Sheryl B. Martin-Schi (*Stroke*, 2009;40:1780-1785.) ID; Jignesh Gadia, MD; Jeffrey L. Saver, MD; the James C. Grotts

HIAT score

- If Age ≥ 75 years 1 point
- If NIHSS ≥ 18 1 point
- If glucose ≥ 150 1 point

