Current Stroke Care, is this the new STEMI Battle?

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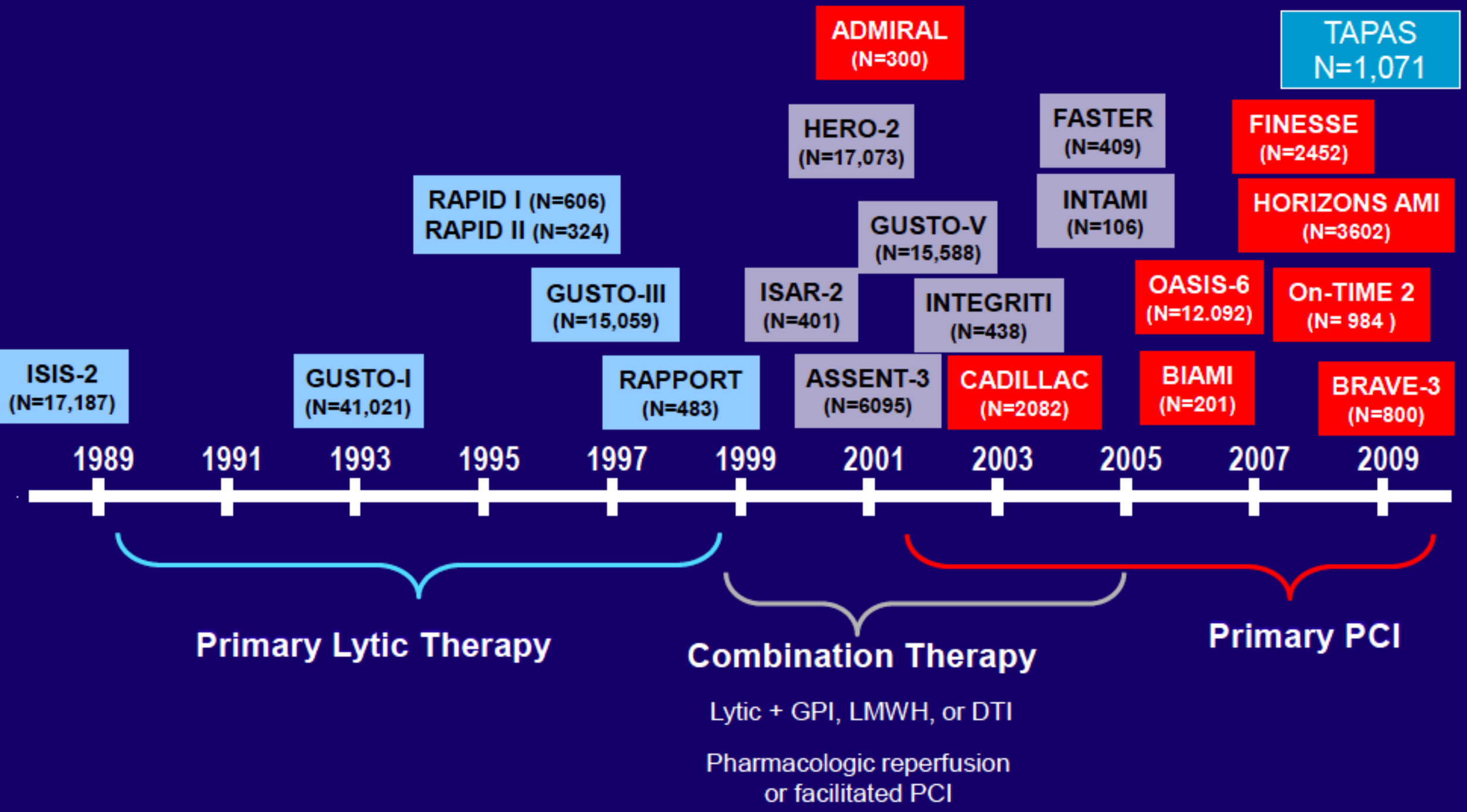
The old days

- Let’s go way back to the 1990’s
- How did we treat STEMI?
- Things changed in the early 2000’s, why?

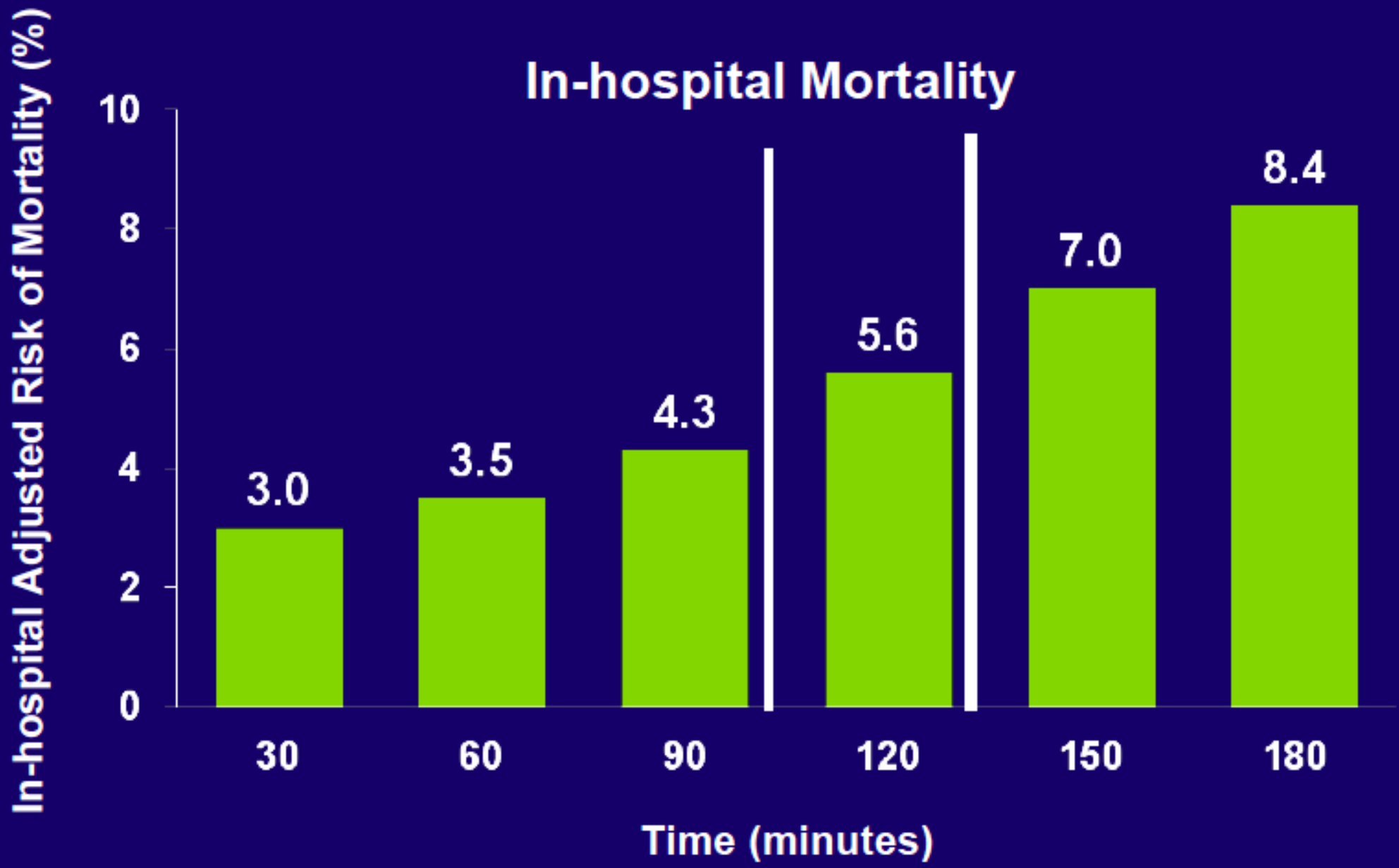
Evolution of STEMI Patient Management

- STEMI management has evolved over that past 2 decades based on new clinical data involving technologic and pharmacologic advances



Heart Attack, Reperfusion and Time: The First 60 Minutes

- American College of Cardiology National Cardiovascular Data Registry: an analysis of 43,801 STEMI patients undergoing primary PCI between 2005-2006



Rathore SS et al. *Br Med J*. 2009;338:b1807.

AHA Guidelines

- 2016 current therapy
- almost all areas of US have STEMI protocols
- primary transport to STEMI center
- Transfer for PCI in under 120min

D. Prehospital Destination Protocols

Class I

1. **Patients with STEMI who have cardiogenic shock and are less than 75 years of age should be brought immediately or secondarily transferred to facilities capable of cardiac catheterization and rapid revascularization (percutaneous coronary intervention [PCI] or coronary artery bypass graft surgery [CABG]) if it can be performed within 18 hours of onset of shock. (*Level of Evidence: A*)**
2. **Patients with STEMI who have contraindications to fibrinolytic therapy should be brought immediately or secondarily transferred promptly (ie, primary-receiving hospital door-to-departure time less than 30 minutes) to facilities capable of cardiac catheterization and rapid revascularization (PCI or CABG). (*Level of Evidence: B*)**
3. **Every community should have a written protocol that guides EMS system personnel in determining where to take patients with suspected or confirmed STEMI. (*Level of Evidence: C*)**

Class IIa

1. **It is reasonable that patients with STEMI who have cardiogenic shock and are 75 years of age or older be considered for immediate or prompt secondary transfer to facilities capable of cardiac catheterization and rapid revascularization (PCI or CABG) if it can be performed within 18 hours of onset of shock. (*Level of Evidence: B*)**
2. **It is reasonable that patients with STEMI who are at especially high risk of dying, including those with severe congestive heart failure (CHF), be considered for immediate or prompt secondary transfer (ie, primary-receiving hospital door-to-departure time less than 30 minutes) to facilities capable of cardiac cath-**

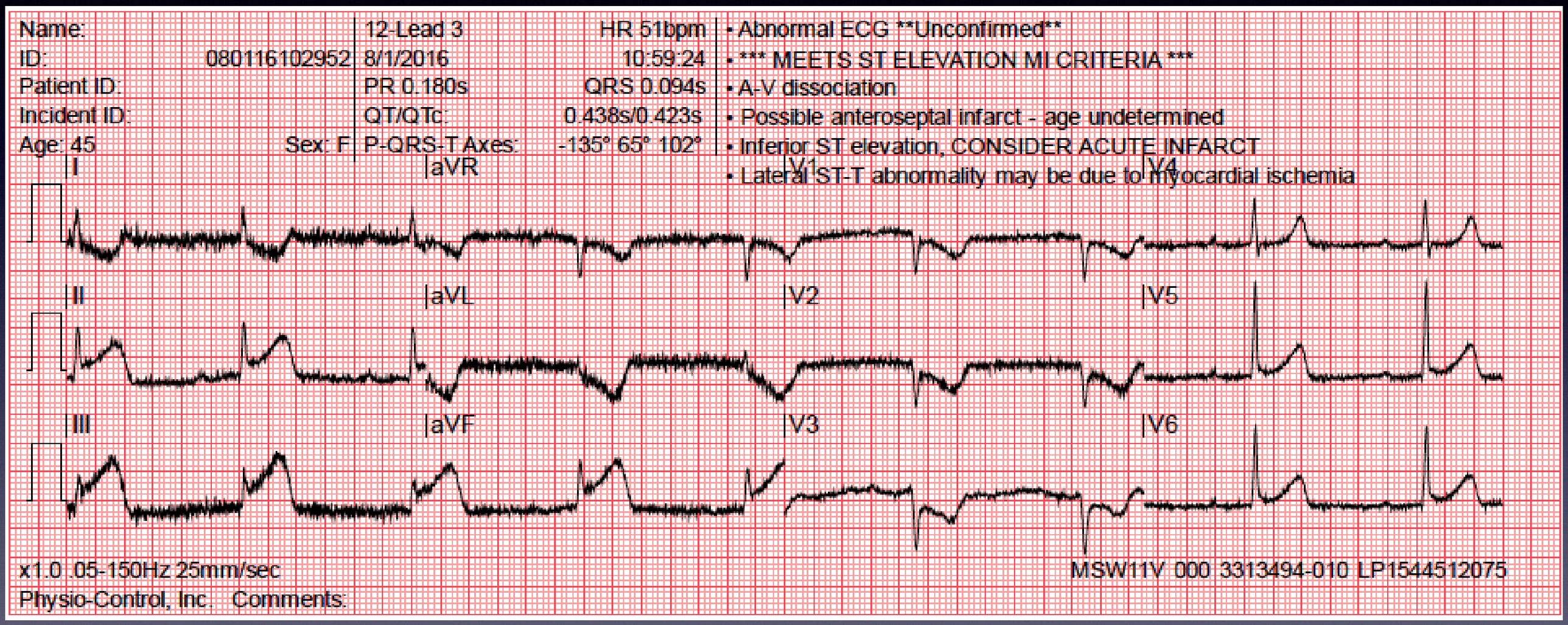
What about Stroke

- Time is muscle!
- Does Time is Brain apply?
- Aren’t these both cardiovascular diseases
- Do we need a system to determine destination?

Issues

- What’s the EKG for stroke?
- Are all strokes the same?
- How do we accurately identify in the field
- Timeframe?
- Destination decisions?

Yes/No?


Name:
ID: 080116102952
Patient ID:
Incident ID:
Age: 45 Sex: F
12-Lead 3
8/1/2016
PR 0.180s
QT/QTc:
P-QRS-T Axes:
HR 51bpm
10:59:24
QRS 0.094s
0.438s/0.423s
-135° 65° 102°
• Abnormal ECG **Unconfirmed**
• *** MEETS ST ELEVATION MI CRITERIA ***
• A-V dissociation
• Possible anteroseptal infarct - age undetermined
• Inferior ST elevation, CONSIDER ACUTE INFARCT
• Lateral ST-T abnormality may be due to myocardial ischemia
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
x1.0 .05-150Hz 25mm/sec
MSW11V 000 3313494-010 LP1544512075
Physio-Control, Inc. Comments:

Types of stroke

- Hemorrhagic
- Ischemic
    - Lacunar
    - LVO
- TIA
- Stroke Mimics

What’s an LVO

- A blockage of a great vessel in the brain such as the Middle Cerebral Artery (M1) or one of it’s proximal cortical branches.

Why do we care about LVO

- Multiple recent studies show good results with interventional therapy
- LVO resistent to TPA
- Significant improvement of function

The Advanced Reperfusion Era: Implications for Emergency Systems of Ischemic Stroke Care

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Large vessel ischemic stroke is a leading cause of morbidity and mortality throughout the world. Recent advances in endovascular stroke treatment are changing the treatment paradigm for these patients. This concepts article summarizes the time-dependent nature of stroke care and evaluates the recent advancements in endovascular treatment. These advancements have significant implications for out-of-hospital, hospital, and regional systems of stroke care. Emergency medicine clinicians have a central role in implementing these systems that will ensure timely treatment of patients and selection of those who may benefit from endovascular care. [Ann Emerg Med. 2016;■:1-10.]

0196-0644/$-see front matter

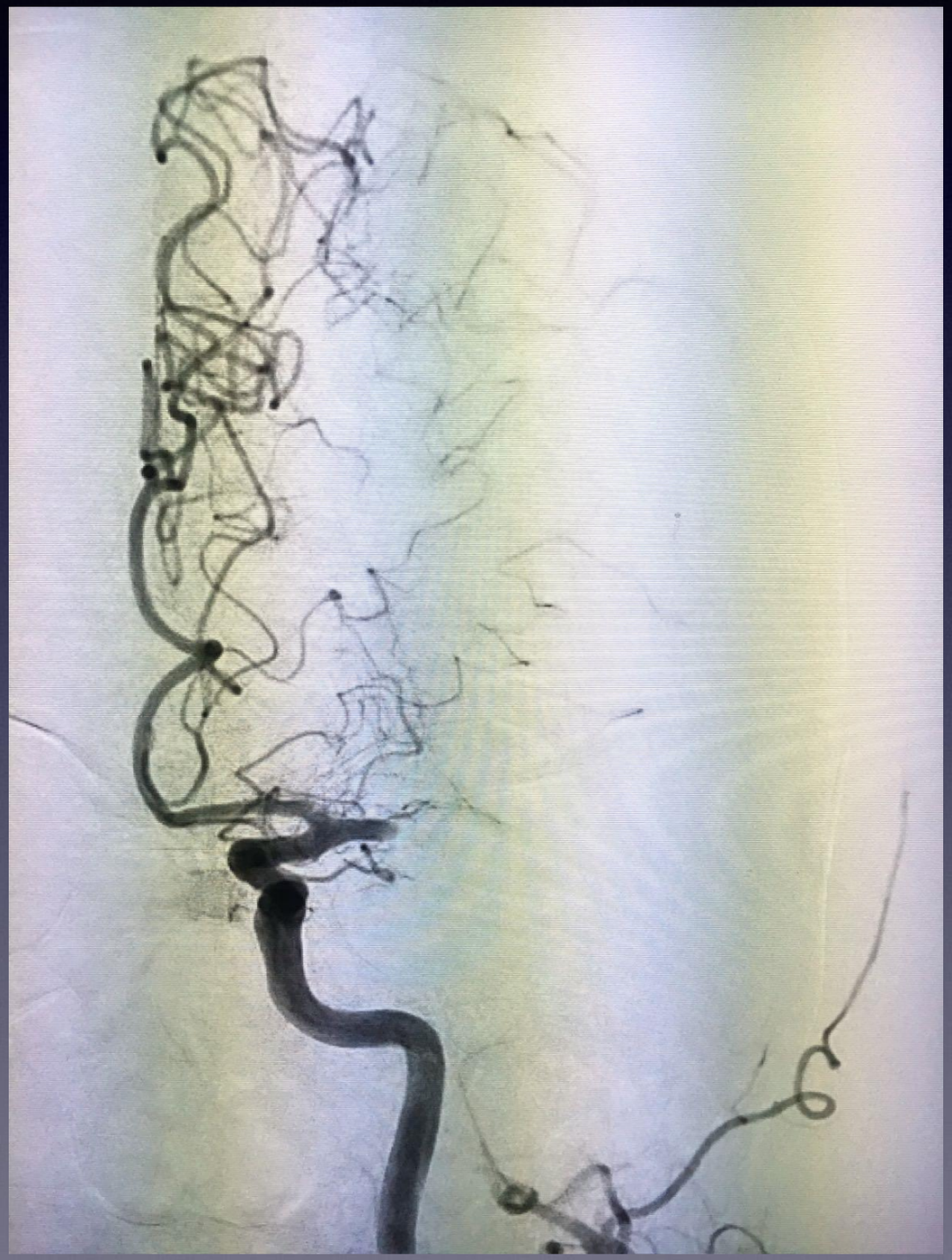
http://dx.doi.org/10.1016/j.annemergmed.2016.06.042

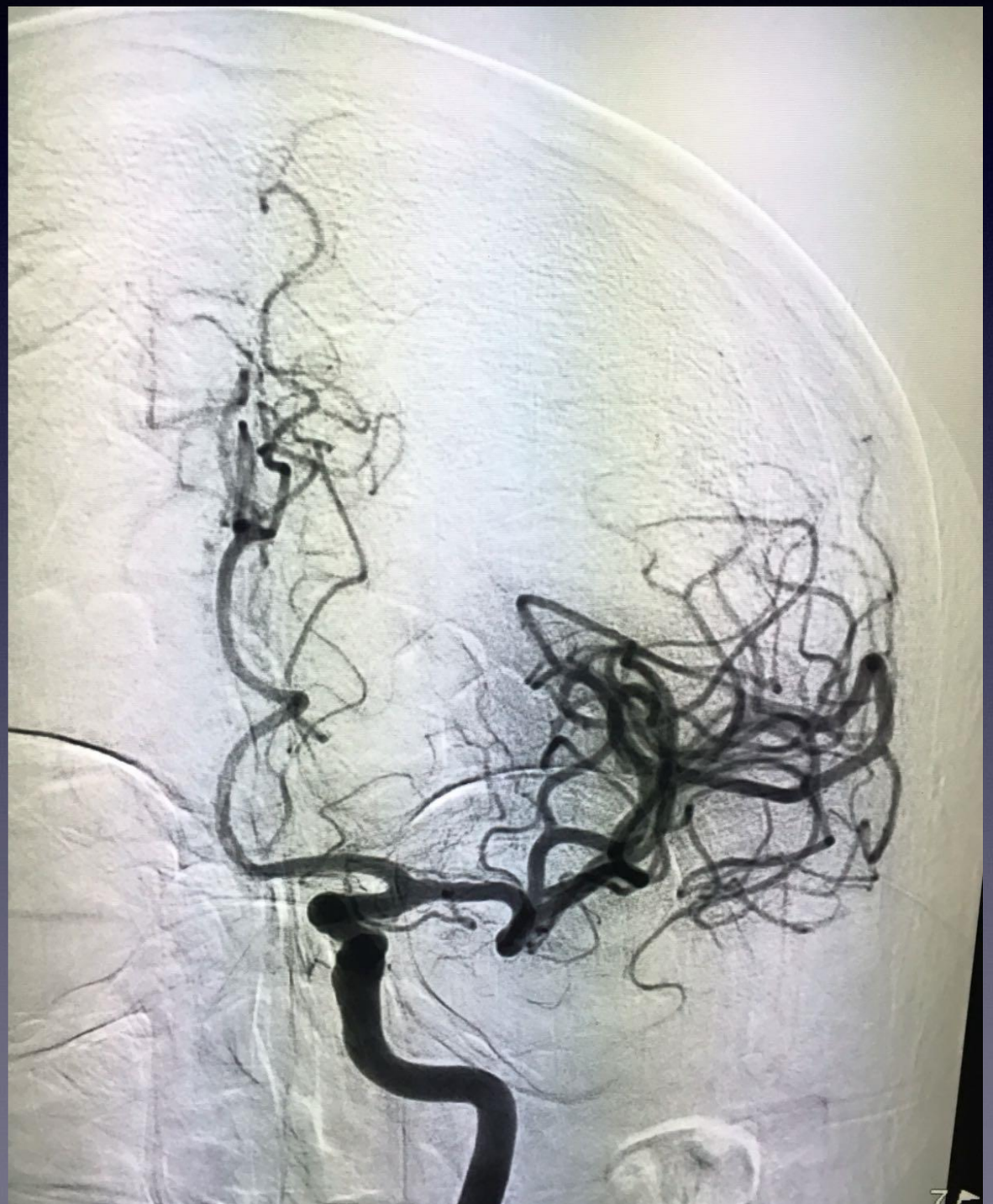
Table 1. Stent retriever multicenter endovascular trials.

Trial	Number of Patients	Onset to Endovascular Therapy, Hours	Prevalence of IV tPA Treatment, %	Median NIHSS Score	Stent Retriever as Primary Device, %	NNT for Functional Independence at 90 Days (95% CI)*
MR CLEAN[27]	500	6	89	18	82	7 (5–17)
SWIFT PRIME[28]	196	6	100	17	100	4 (3–9)
EXTEND-IA[30]	70	6	100	15	100	3 (2–11)
ESCAPE[29]	316	12†	76	17	79	4 (3–8)
REVASCAT[35]	206	8	73	17	100	6 (4–38)

IV, Intravenous; *NNT*, number needed to treat; *MR CLEAN*, Multicenter Randomized Clinical Trial of Endovascular Treatment for Acute Ischemic Stroke in the Netherlands; *SWIFT PRIME*, Solitaire With the Intention for Thrombectomy as Primary Endovascular Treatment; *REVASCAT*, Randomized Trial of Revascularization With Solitaire FR Device Versus Best Medical Therapy in the Treatment of Acute Stroke Due to Anterior Circulation Large Vessel Occlusion Presenting Within Eight Hours of Symptom Onset.
*NNT for functional independence at 90 days was based on a modified Rankin Scale score of 0 to 2 (the modified Rankin Scale includes mortality).
†For the ESCAPE trial, 84% of patients were treated within 6 hours. Time for onset to endovascular therapy was based on time from symptom onset to groin puncture for endovascular procedure.

LVO





Trevo - one example

Stroke Protocol

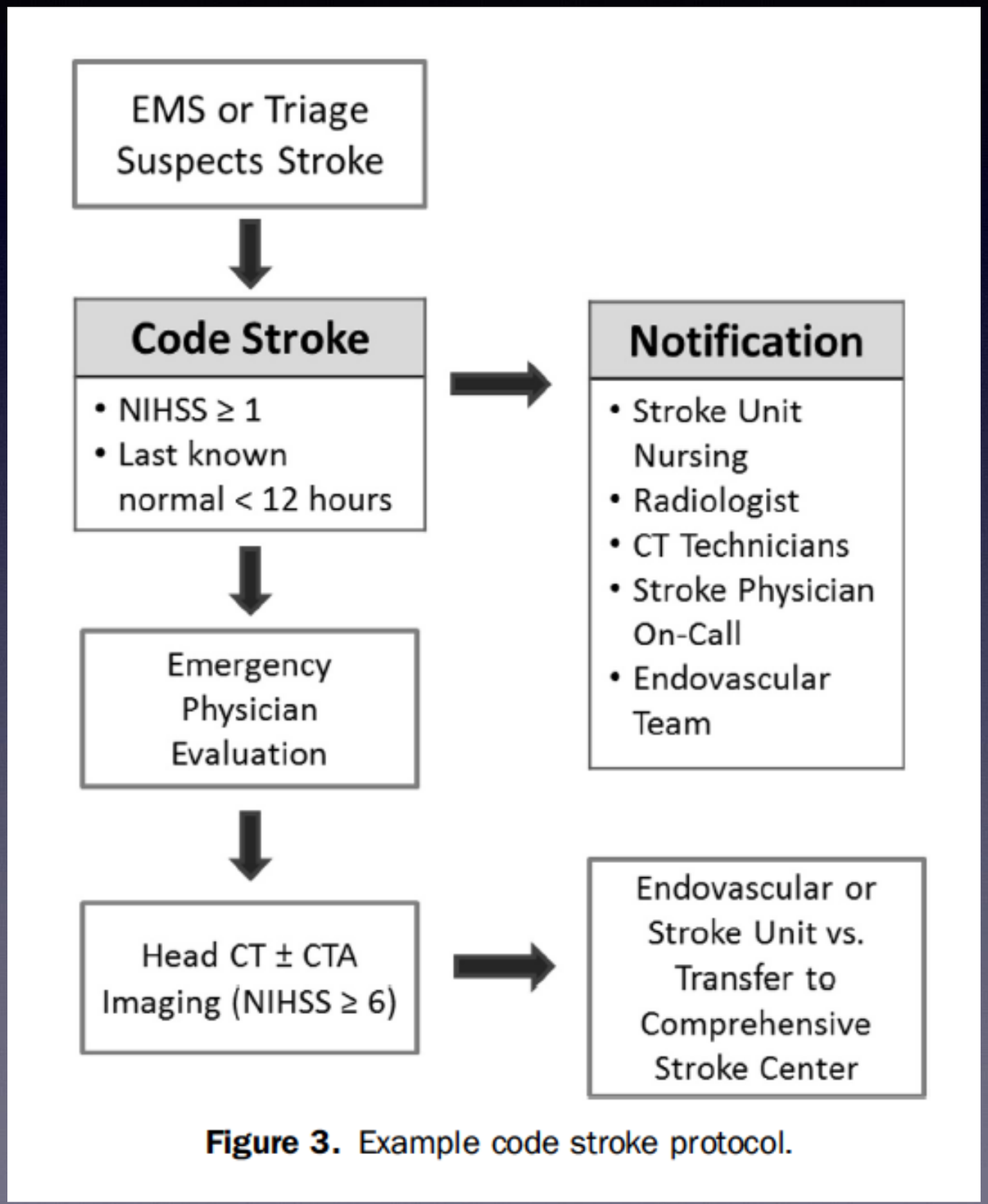


Figure 3. Example code stroke protocol.

How do we Identify Stroke?

- LAPSS
- CPSS

Assessment	CPSS	LAPSS	MASS	Med PACS	OPSS	ROSIER	FAST
Eligibility criteria (historical factors)							
Age >45 years	-	✓	✓	-	-	-	-
Seizure	-	✓ (No history of seizure)	✓ (No history of seizure)	✓ (No history of seizure)	✓ (No seizure at onset)	✓ (No seizure at onset)	-
Patient not wheelchair-bound or bedridden prior to the event	-	✓	✓	-	-	-	-
Blood glucose	-	✓ (2.8 to 22.2 mmol/L)	✓ (2.8 to 22.2 mmol/L)	✓ (2.8 to 22.2 mmol/L)	✓ (>4 mmol/L)	✓ (>3.5 mmol/L)	-
Time since symptom onset	-	✓ (≤25 hours)	-	✓ (≤25 hours)	✓ (<2 hours)	-	-
Glasgow Coma scale >10	-	-	-	-	✓	-	-
Symptoms have not resolved when EMS arrives	-	-	-	-	✓	-	-
Canadian Triage and Acuity Scale Level ≥2 and /or corrected airway, breathing, or circulation problem	-	-	-	-	✓	-	-
Patient not terminally ill or palliative care patient	-	-	-	-	✓	-	-
Patient conscious/syncope ruled out	-	-	-	-	-	✓	-
Physical examination							
Facial droop	✓	✓	✓	✓	✓	✓	✓
Arm weakness/drift	✓	✓	✓	✓	✓	✓	✓
Leg weakness/drift	-	-	-	✓	✓	✓	-
Handgrip		✓	✓	-	-	-	-
Speech difficulty	✓	-	✓	✓	✓	✓	✓
Gaze preference	-	-	-	✓	-	-	-
Visual fields	-	-	-	-	-	✓	-

How good is it?

	NIHSS	CPSS	LAPSS	LAMS	RACE
No. of items scored	13	3	6	3	6
Score cutoff point	≥6	≥2	*	≥3	≥4
Sensitivity/specificity for stroke identification	59%/50%	67%/46%	33%/84%	51%/59%	48%/65%
Sensitivity/specificity for LVO	74%/62%	78%/54%	43%/88%	62%/70%	56%/87%

What is the stroke window?

- 3 hours
- 4.5 hours
- 6?
- 12?

Acute Stroke

If the historical/physical findings indicate an acute stroke, transport the patient to the nearest NYS DOH designated Stroke Center (See Appendix R, Stroke Patient Criteria), unless **one** of the following conditions is met:

- The patient is in cardiac arrest;
- The patient has other medical conditions that warrant transport to the nearest appropriate hospital emergency department as per protocol;
- The total time from when the patient's symptoms and/or signs first began to when the patient is first assessed by EMS is greater than **three and one half (3 ½) hours**;
- An on-line medical control physician so directs.

What is a Primary Stroke Center?

Abbreviated Executive Summary

INSTRUCTIONS:

In no more than one page, provide a succinct overview of your Stroke Center. This may be done in bullet format. The purpose of the Abbreviated Executive Summary (AES) is to give the reviewers an understanding of your facility's capability of meeting the criteria enclosed in the application. If all criteria cannot be met at the time of application, please provide the date when the criteria will be met, or an explanation of how the equivalency meets the intent of the criteria. The AES should summarize the key elements of your Stroke Center's service.

The key elements of a stroke center are:

1. **STROKE TEAM**
   - (a) Qualified physicians, physician assistants, nurse practitioners and registered nurses in the Emergency Department, ICU and Stroke Unit

2. **EDUCATION**
   - (a) Prehospital staff – EMS
   - (b) Stroke Medical Director
   - (c) Stroke team (ED, ICU and Stroke Unit)
   - (d) All other professionals caring for stroke patients
   - (e) Patient and family
   - (f) Community

3. **24/7 CAPABILITIES**
   - (a) Stroke Unit – identification of at least 2 beds with monitoring equipment
   - (b) Neuro Imaging Services
   - (c) Lab Services
   - (d) Neurosurgery (on site or through transfer agreement)

4. **QUALITY ASSURANCE/DATA/REGISTRY**
   - (a) QA of Stroke incorporated into overall hospital QA
   - (b) Stroke Center must submit quality data regarding time targets and performance measures
   - (c) Stroke Center agrees to participate in a registry

Comprehensive

Requirements

Certification is available only to comprehensive stroke centers in Joint Commission-accredited acute care hospitals. Organizations seeking CSC certification must meet all of the general eligibility requirements for Disease-Specific Care and Primary Stroke Center certification. In addition, CSCs are required to:

- Have dedicated neuro-intensive care unit beds for complex stroke patients that provide neuro-critical care 24 hours a day, seven days a week.
- Use advanced imaging capabilities.
- Annually provide care to 20 or more patients with a diagnosis of subarachnoid hemorrhage; perform 15 or more endovascular coiling or surgical clipping procedures for aneurysm; and administer IV tPA to an average of 25 or more eligible patients.
- Coordinate post hospital care for patients.
- Use a peer review process to evaluate and monitor the care provided to patients with ischemic stroke and subarachnoid hemorrhage.
- Participate in stroke research.

Performance measurement

Certified comprehensive stroke centers are required to meet the performance measurement requirements for primary stroke centers – collect data for the eight stroke core measures and submit monthly data points every quarter through the Certification Measure Information Process (CMIP). The stroke core (STK) measures can be found in the Specification Manual for National Hospital Inpatient Quality Measures.

Kawartha Lakes
Peterborough
Belleville
Prince Edward
Kingston
Watertown
VERMONT
Saratoga Springs
Green Mountain and Finger Lakes...
Syracuse
NEW YORK
Buffalo
Ithaca
MASSACHU
Allegheny National Forest
PENNSYLVANIA
CONNECTICUT
New Haven
Long Island

North York
Etobicoke
Hamilton
Buffalo
VERMONT
NEW YORK
PENNSYLVANIA
CONNECTICUT

Suspected Stroke
(Stroke)

Note:
This protocol is for patients who have an acute episode of neurological deficit without any evidence of trauma.

Note:
Request Advanced Life Support if available.
Do not delay transport to the nearest appropriate hospital.

I. Perform initial assessment.

II. Assure that the patient's airway is open and that breathing and circulation are adequate.

Caution:
Consider other causes of altered mental status, i.e. hypoxia, hypoperfusion, hypoglycemia, trauma or overdose.

III. Administer high concentration oxygen, suction as necessary, and be prepared to assist ventilations.

IV. Position patient with head and chest elevated or position of comfort, unless doing so compromises the airway.

CFR

V. Perform Cincinnati Pre-Hospital Stroke Scale:

A. Assess for facial droop: have the patient show teeth or smile,

B. Assess for arm drift: have the patient close eyes and hold both arms straight out for 10 seconds,

C. Assess for abnormal speech: have the patient say, "you can't teach an old dog new tricks".

What’s next?

- Expect new protocols
- Regionalized systems of care (STEMI)
- Stroke ambulances?
- Increased transfers?

NYC

- Stroke TAG formed
- Increased window to 5 hours from 3.5
- Use RACE
- Data gathering on services
- Medical Control Directed

Table 1. RACE Scale

Item	RACE Score	NIHSS Score Equivalence
Facial palsy		
Absent	0	0
Mild	1	1
Moderate to severe	2	2–3
Arm motor function		
Normal to mild	0	0–1
Moderate	1	2
Severe	2	3–4
Leg motor function		
Normal to mild	0	0–1
Moderate	1	2
Severe	2	3–4
Head and gaze deviation		
Absent	0	0
Present	1	1–2
Aphasia* (if right hemiparesis)		
Performs both tasks correctly	0	0
Performs 1 task correctly	1	1
Performs neither tasks	2	2
Agnosia† (if left hemiparesis)		
Patient recognizes his/her arm and the impairment	0	0
Does not recognized his/her arm or the impairment	1	1
Does not recognize his/her arm nor the impairment	2	2
Score total	0–9	

NIHSS, National Institutes of Health Stroke Scale; and RACE, Rapid Arterial oCclusion Evaluation.

*Aphasia: Ask the patient to (1) "close your eyes"; (2) "make a fist" and evaluate if the patient obeys.

†Agnosia: Ask the patient: (1) while showing him/her the paretic arm: "Whose arm is this" and evaluate if the patient recognizes his own arm. (2) "Can you lift both arms and clap" and evaluate if the patient recognizes his functional impairment.


MS1
Mobile Stroke Unit
AMBULANCE