Emergency Department Management of Acute Stroke
Saving Minutes, What is Needed

Charles R Wira, III, MD
Yale Emergency Medicine and Neurology
May, 2026

Disclosures

- NINDS/NHLBI, 1U24NS129500-01 (PI D'Onofrio; Successor); SIREN Hub; Yale-METRO Metropolitan Emergency Trial netwoRk to advance patient Outcomes
  - 1UG3NS131532-01A1 (KESETT)
  - 1UG3HL175260-01A1 (WINDSURFER)
- 5RO1EB-31114-04 (PI Sheth, SubI); Portable, Low Field Brain Magnetic Resonance Imaging (MRI) for Acute Stroke
- American Heart Association
  - Member, Stroke Council Leadership Committee
  - Past Chair, Emergency Neurovascular Care Committee (ENCC)
  - Co-Chair, Professional Education/Stroke Scientific and Clinical Education Lifelong Learning Committee
- CT DPH
  - Past Chair, Legislative Stroke Task Force
  - Co-Chair, State of Connecticut Stroke Advisory Council

Emergency Department Management of Acute Stroke *Saving Minutes, What is Needed*

Content Outline

- Key Messages
- Progress and success
- Opportunities for improvement

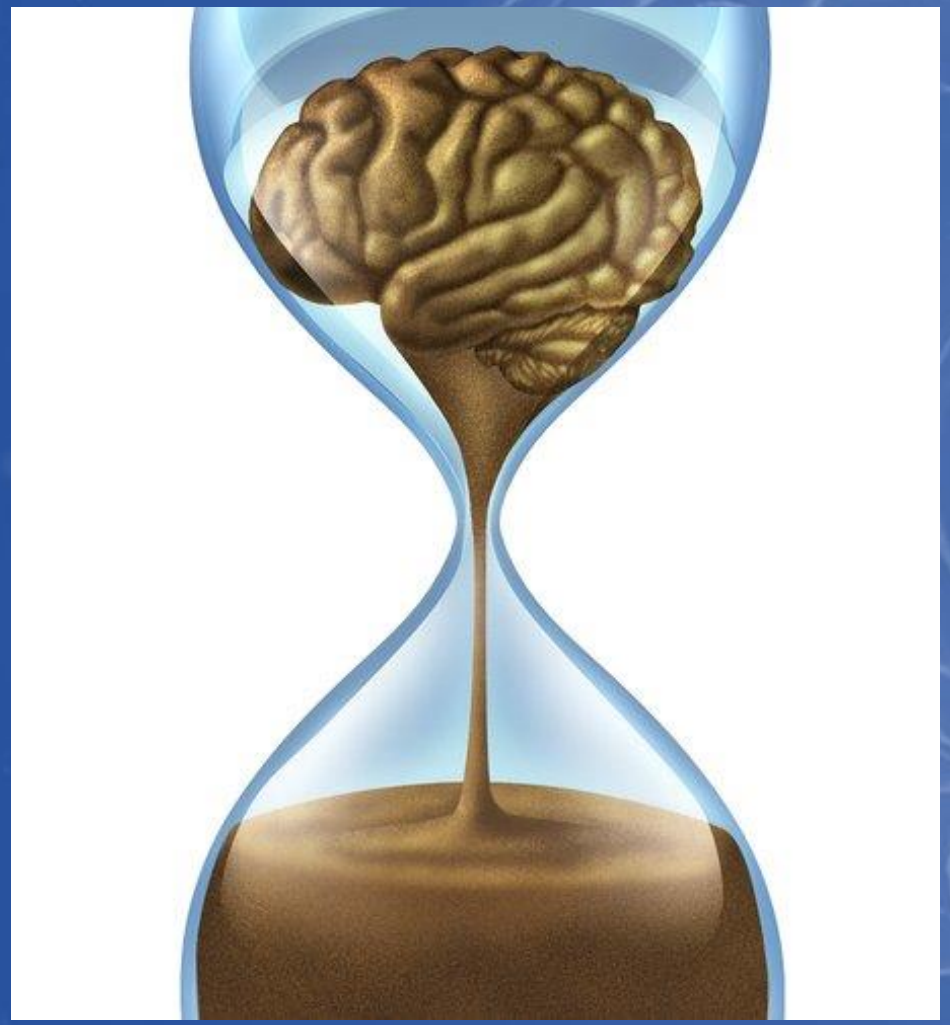
Emergency Department Management of Acute Stroke *Saving Minutes, What is Needed*


THE GOOD
THE BAD
THE UGLY

Minutes matter

Understanding Why Minutes Matter

Why Minutes Matter: Message to the ED



Academic Emergency Medicine
A GLOBAL JOURNAL OF EMERGENCY CARE

Commentary | Full Access

The Emergency Medicine Debate on tPA for Stroke: What Is Best for Our Patients? Efficacy in the First Three Hours

Joseph B. Miller MD, MS, Laura Heitsch MD, Matthew S. Siket MD, MS, Jon W. Schrock MD, Charles R. Wira III MD, Christopher Lewandowski MD, Tracy E. Madsen MD, ScM, Lisa H. Merck MD, MPH, David W. Wright MD, From the SAEM Neurologic Emergencies Interest Group Writing Group.
... See fewer authors

First published: 25 June 2015 | https://doi.org/10.1111/acem.12712 | VIEW METRICS

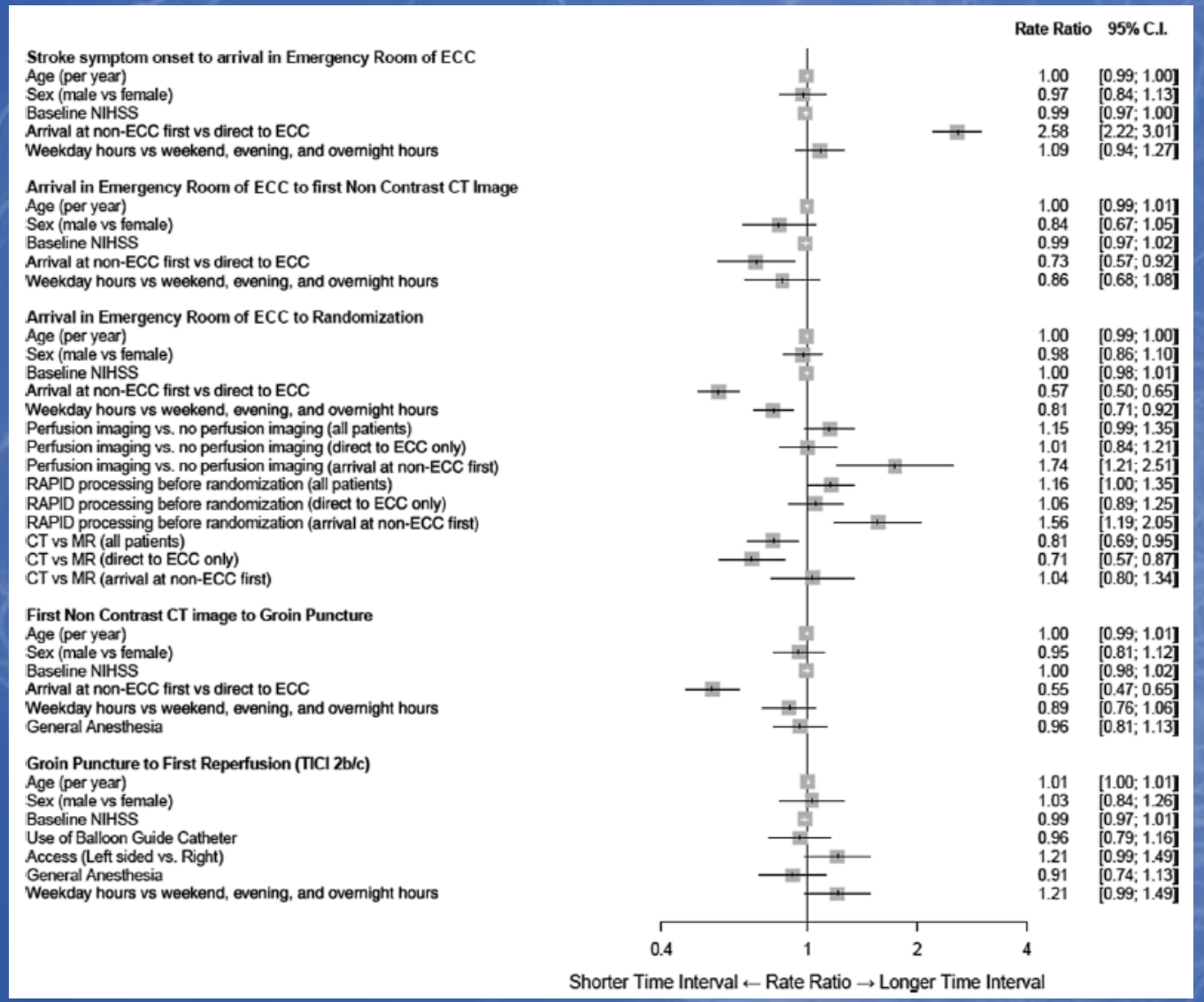
Treatment Time (Minutes)	Adjusted OR for Benefit (95% CI)	Number Needed to Treat17	Number Needed to Harm17	Help-to-Harm Ratio17
0 to 90	2.81 (1.75–4.50)	3.6	65	18.1
91 to 180	1.55 (1.12–2.15)	4.3	38	8.8
181 to 270	1.40 (1.05–1.85)	5.9	30	5.0
271 to 360	1.15 (0.90–1.47)	19.3	14	0.7

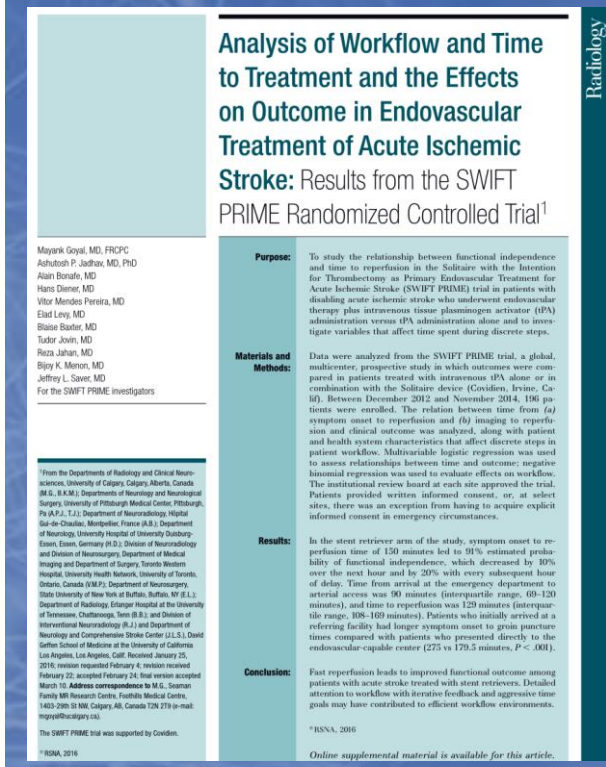
*Number needed to treat (for benefit) and to harm estimates were calculated for the number of patients that were shifted to the left and to the right, respectively, over the entire range of the modified Rankin score in a pooled analysis.[31]

Why Minutes Matter: Message to the ED

Advances in Knowledge

- Revascularization within 2.5 hours of symptom onset was associated with functional independence (minimal or no disability) in 91% of patients.
- Likelihood of functional independence was 10% higher in patients treated within 2.5 hours compared with patients treated between 2.5 and 3.5 hours after stroke onset.
- Every 60-minute delay after 3.5 hours resulted in a 20% lower likelihood of functional independence.
- Upon arrival to the emergency department, sources of delay from imaging acquisition, delivery of patient to the angiography suite, and reperfusion can all be decreased with streamlined workflow.





Radiology

Analysis of Workflow and Time to Treatment and the Effects on Outcome in Endovascular Treatment of Acute Ischemic Stroke: Results from the SWIFT PRIME Randomized Controlled Trial[1]

Mayank Goyal, MD, FRCPC
Ashutosh P. Jadhav, MD, PhD
Alain Bonafe, MD
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Reza Jahan, MD
Bijoy K. Menon, MD
Jeffrey L. Saver, MD
For the SWIFT PRIME investigators

Purpose: To study the relationship between functional independence and time to reperfusion in the Solitaire with the Intention for Thrombectomy as Primary Endovascular Treatment for Acute Ischemic Stroke (SWIFT PRIME) trial in patients with disabling acute ischemic stroke who underwent endovascular therapy plus intravenous tissue plasminogen activator (tPA) administration versus tPA administration alone and to investigate variables that affect time spent during discrete steps.

Materials and Methods: Data were analyzed from the SWIFT PRIME trial, a global, multicenter, prospective study in which outcomes were compared in patients treated with intravenous tPA alone or in combination with the Solitaire device (Covidien, Irvine, Calif). Between December 2012 and November 2014, 196 patients were enrolled. The relation between time from *(a)* symptom onset to reperfusion and *(b)* imaging to reperfusion and clinical outcome was analyzed, along with patient and health system characteristics that affect discrete steps in patient workflow. Multivariable logistic regression was used to assess relationships between time and outcome; negative binomial regression was used to evaluate effects on workflow. The institutional review board at each site approved the trial. Patients provided written informed consent, or, at select sites, there was an exception from having to acquire explicit informed consent in emergency circumstances.

Results: In the stent retriever arm of the study, symptom onset to reperfusion time of 150 minutes led to 91% estimated probability of functional independence, which decreased by 10% over the next hour and by 20% with every subsequent hour of delay. Time from arrival at the emergency department to arterial access was 90 minutes (interquartile range, 60–120 minutes), and time to reperfusion was 129 minutes (interquartile range, 108–169 minutes). Patients who initially arrived at a referring facility had longer symptom onset to groin puncture times compared with patients who presented directly to the endovascular-capable center (275 vs 129.5 minutes, $P < .001$).

Conclusion: Fast reperfusion leads to improved functional outcome among patients with acute stroke treated with stent retrievers. Detailed attention to workflow with iterative feedback and aggressive time goals may have contributed to efficient workflow environments.

[1] RSNA, 2016

Online supplemental material is available for this article.

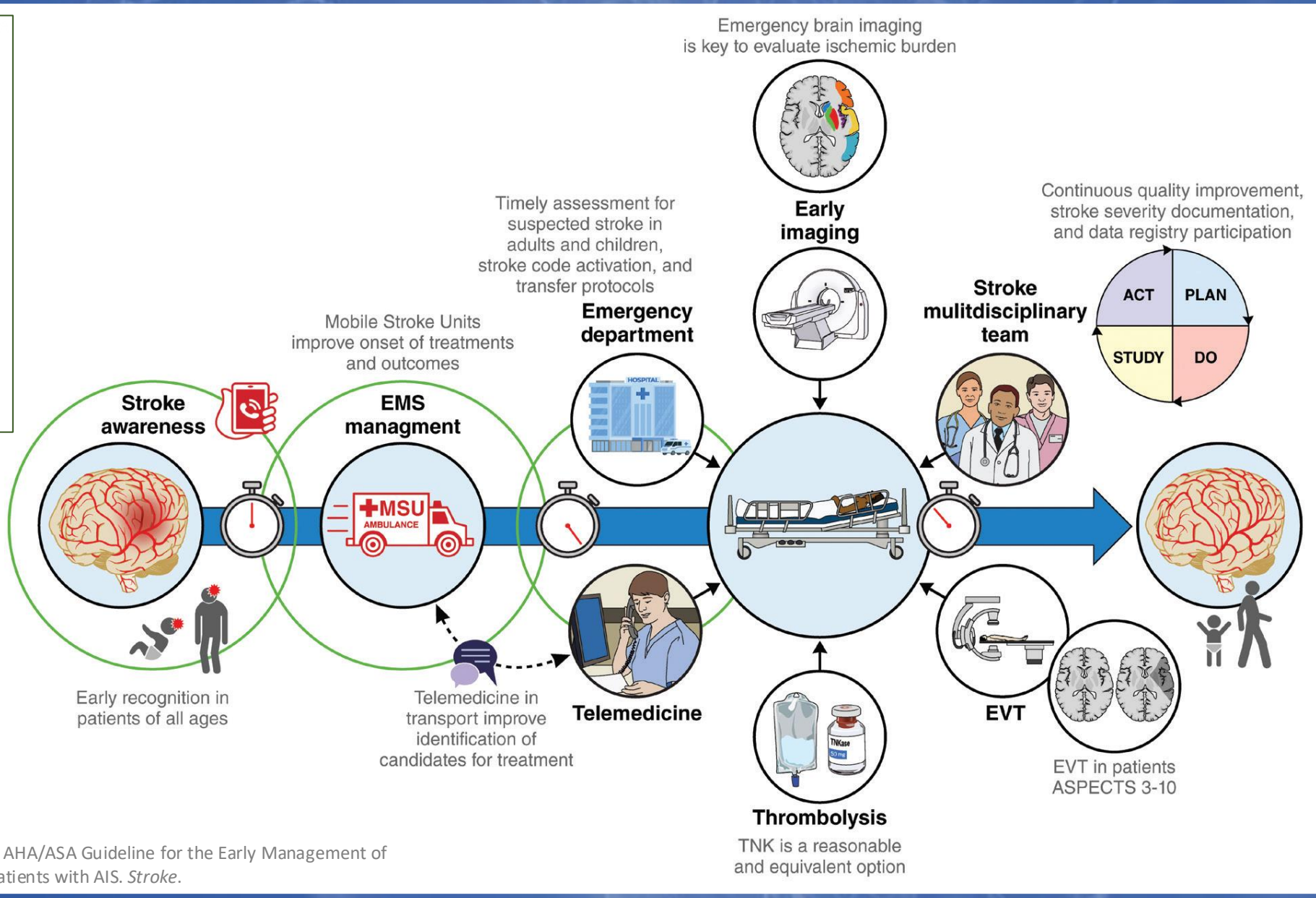
Stroke Systems of Care Models Spanning the Time Spectrum

Stroke
New online, 26 January 2026
https://doi.org/10.1161/STR.0000000000000513

AHA/ASA GUIDELINE

2026 Guideline for the Early Management of Patients With Acute Ischemic Stroke: A Guideline From the American Heart Association/American Stroke Association

Shyam Prabhakaran, MD, MS, FAHA, Chair, Nestor R. Gonzalez, MD, MSCR, FAHA, Co-Vice Chair, Kori S. Zachrison, MD, MSc, FAHA, Co-Vice Chair, Opeolu Adeoye, MD, MS, FAHA, Anne W. Alexandrov, PhD, AGACNP-BC, ANVP-BC, ASC-BC, Sameer A. Ansari, MD, PhD, FAHA, Sherita Chapman, MD, FAHA, Alexandra L. Czap, MD, Oana M. Dumitrascu, MD, MSc, FAHA, Koto Ishida, MD, FAHA, Ashutosh P. Jadhav, MD, PhD, FAHA, Brenda Johnson, DNP, MSN, FNP-BC, ANVP, FAHA, Karen C. Johnston, MD, MSc, FAHA, Pooja Khatri, MD, MSc, FAHA, W. Taylor Kimberly, MD, PhD, FAHA, Vivien H. Lee, MD, FAHA, Thabele M. Leslie-Mazwi, MD, Brian Mac Grory, MB BCh BAO, MHSc, MRCP, FAHA, Tracy E. Madsen, MD, MCTR, PhD, FAHA, Bijoy Menon, MD, Eva A. Mistry, MBBS, MSCI, FAHA, Soojin Park, MD, FAHA, Stephanie Parker, MHA, BSN, RN, Natalia Pérez de la Ossa, MD, PhD, Mathew Reeves, BVSc, PhD, FAHA, Tania Saiz, Phillip A. Scott, MD, MBA, FAHA, Dana Schwartzberg, Sunil A. Sheth, MD, Peter B. Sporns, MD, MHBA, Sabrina Times, DHSc, MPH, Stavropoula Tjoumakaris, MD, MBA, Stacey Q. Wolfe, MD, and Shadi Yaghi, MD, FAHA Peer Review Committee

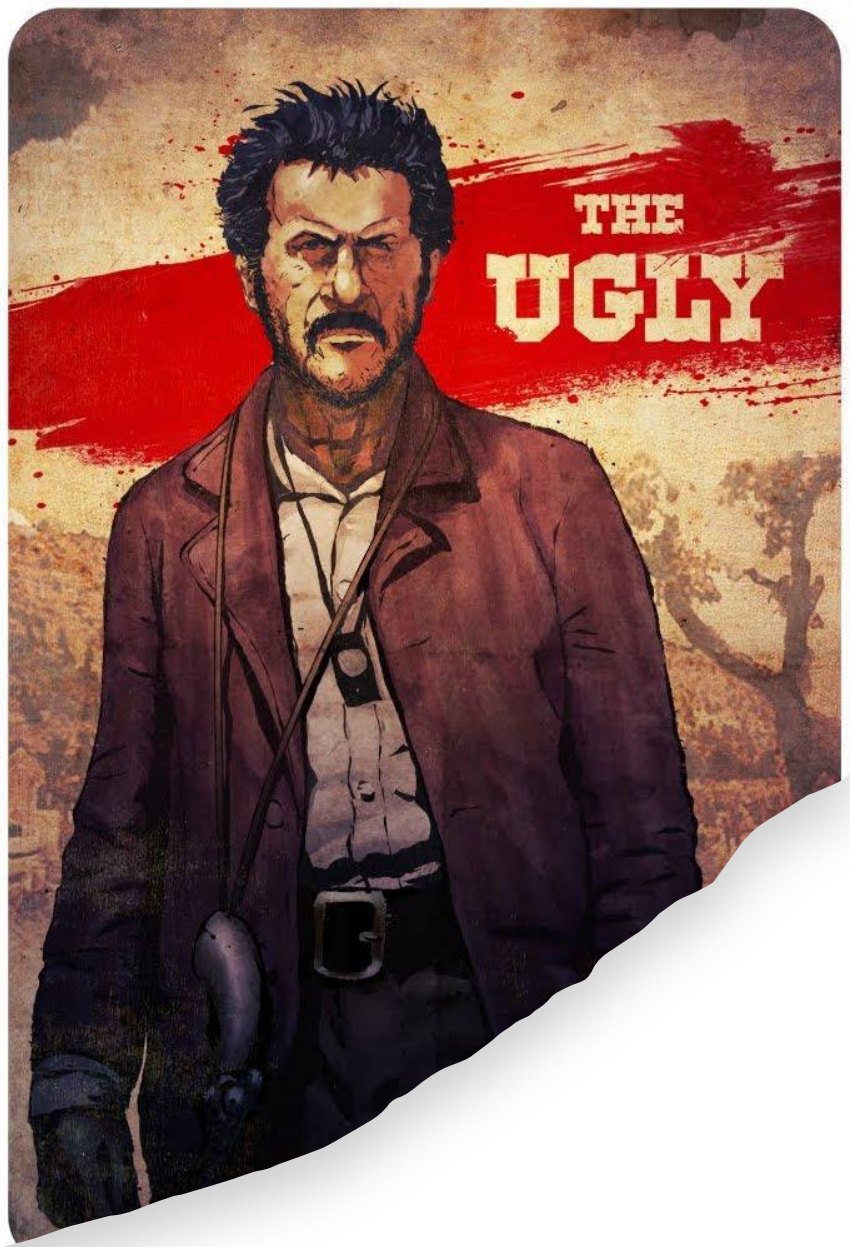


Prabhakaran, S., et al. 2026 AHA/ASA Guideline for the Early Management of Patients with AIS. *Stroke*.

Prehospital and Arrival–Start Before the Door

- EMS
  - 911 activation and dispatch
  - Minimizing on-Scene time
  - EMS Routing/Re-Routing
  - EMS prenotification
    - Stroke alert activation prior to arrival
  - Key tools
    - EMS stroke scale
    - LVO screening (i.e.: RACE, LAMS)
    - EMS Telemedicine
- OSH Transfers
  - DIDO Procedures
- Ambulatory/Walk-in ED triage Identification Strategies


THE
GOOD


THE
UGLY

Thrombolysis Trials


The New England Journal of Medicine

NINDS tPA

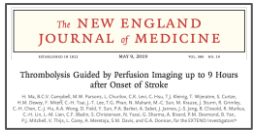
Intravenous Ancrod for Treatment of Acute Ischemic Stroke
The STAT Study: A Randomized Controlled Trial

Association of outcome with early stroke treatment: pooled analysis of ATLANTIS, ECASS, and NINDS rt-PA stroke trials
The ATLANTIS, ECASS, and NINDS rt-PA Study Group Investigators*


The New England Journal of Medicine

ECASS 3

Tenecteplase versus alteplase for management of acute ischaemic stroke (NOR-TEST): a phase 3, randomised, open-label, blinded endpoint trial

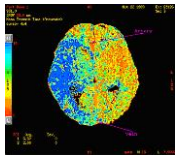

The NEW ENGLAND JOURNAL of MEDICINE

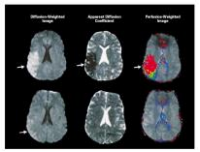
Thrombolysis Guided by Perfusion Imaging up to 9 Hours after Onset of Stroke

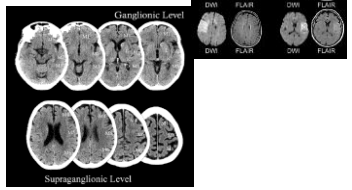
MRWITNESS

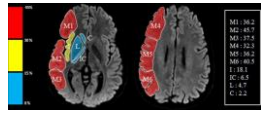
1995 → 2000 → 2005 → 2010 → 2015 → 2018 → 2026 and beyond...

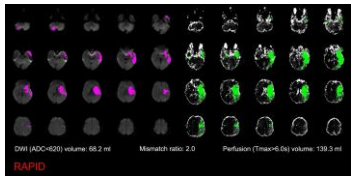
Imaging Advances











Endovascular Thrombectomy Trials

Intra-arterial Prourokinase for Acute Ischemic Stroke
The PROACT II Study: A Randomized Controlled Trial

MERCI I
A Phase 1 Study of Mechanical Embolus Removal in Cerebral Ischemia

Endovascular sono-lysis using EKOS system in acute stroke patients with a main cerebral artery occlusion — A pilot study

Mechanical Thrombectomy for Acute Ischemic Stroke
Final Results of the Multi MERCI Trial

Trevo versus Merci retrievers for thrombectomy revascularisation of large vessel occlusions in acute ischaemic stroke (TREVO 2): a randomised trial

synthesis

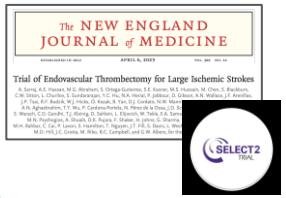
MR RESCUE

Penumbra

EXTEND-IA

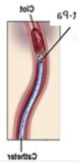
[SWIFT PRIME]

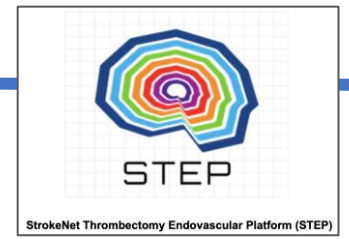
REVASCAT


The NEW ENGLAND JOURNAL of MEDICINE

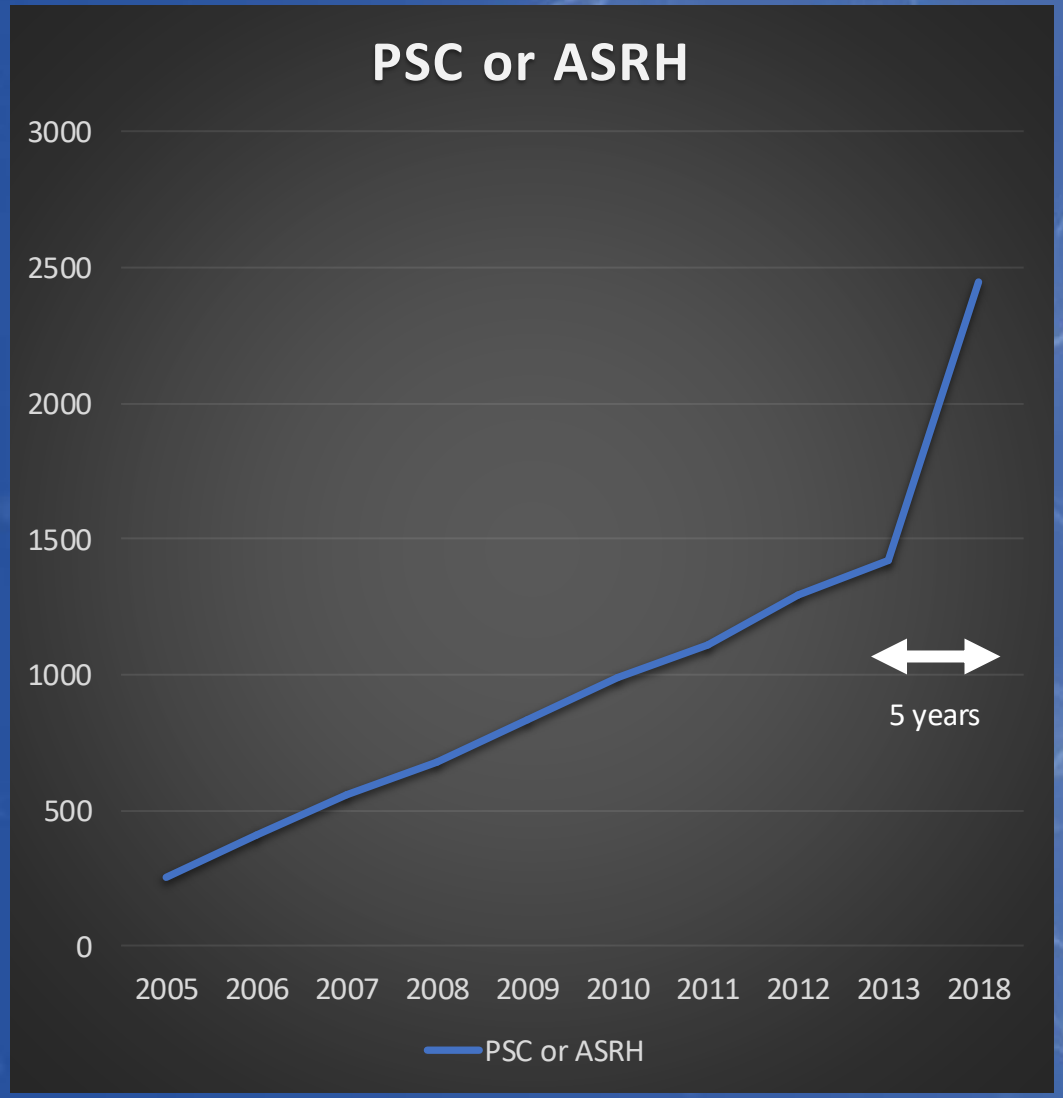
Trial of Endovascular Thrombectomy for Large Ischemic Strokes

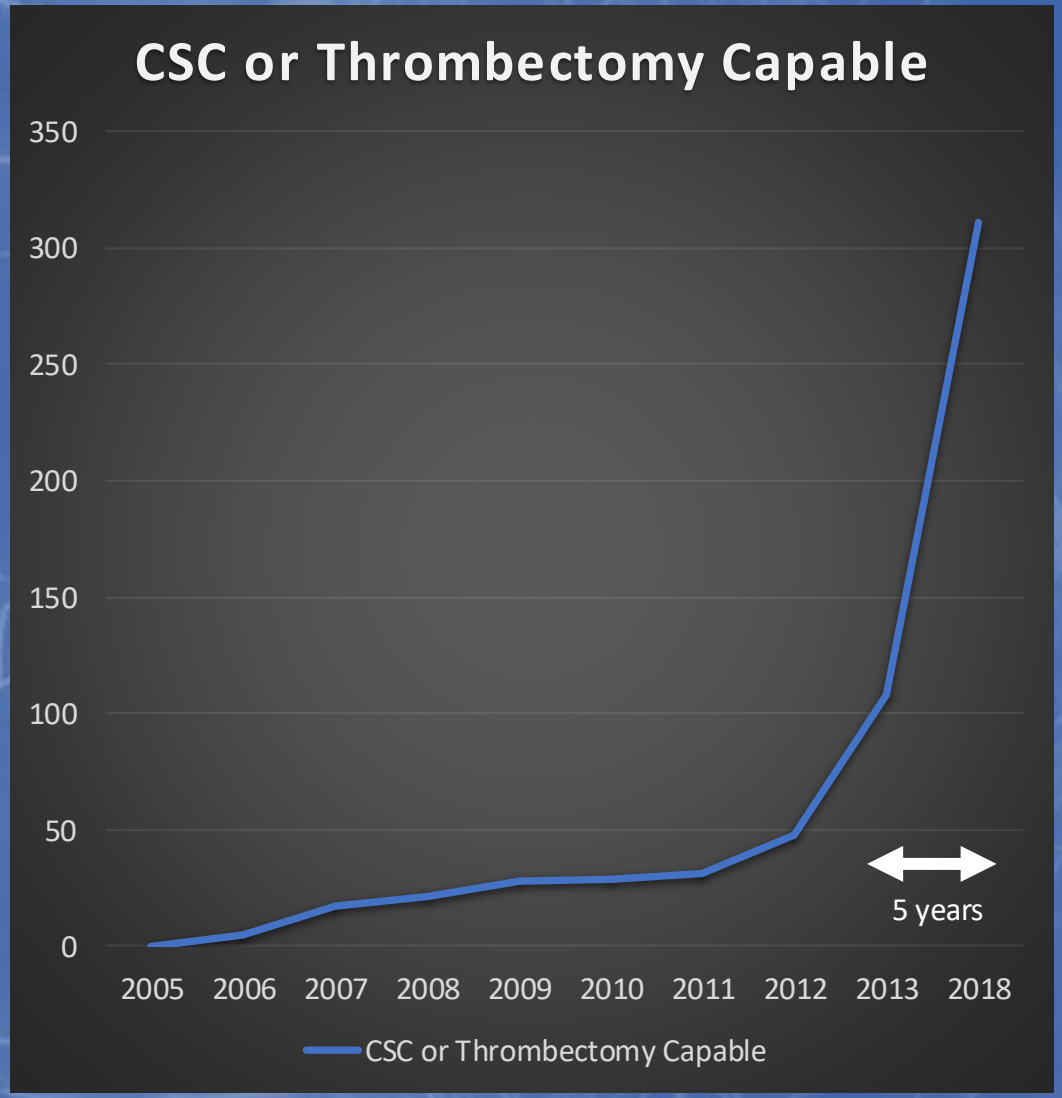
Device Evolution





Growth of Stroke Centers





Wira, 2019; Boggs, 2023

Growth of Stroke Centers

American Heart Association. Get With The Guidelines. Stroke

Get With The Guidelines: Silver Plus Achievement

These hospitals are recognized for one calendar year of 85% or higher adherence on all achievement measures applicable and 75% or higher adherence with additional select quality measures in stroke.

American Heart Association. Get With The Guidelines. Stroke

Get With The Guidelines: Gold Plus Achievement

These hospitals are recognized for two or more consecutive calendar years of 85% or higher adherence on all achievement measures applicable and 75% or higher adherence with additional select quality measures in stroke.

American Heart Association. Target: Stroke℠

Target: Stroke™ Honor Roll Elite

These hospitals are recognized for treating 85% or more of their eligible stroke patients in 60 minutes or less* in addition to their current Gold or Silver Get With The Guidelines®-Stroke status. *Door to Treatment Time

- https://usnewsbrandfuse.com/AmericanHeartAssociation (accessed 2.3.23)
- Wira CR 3rd, Melluzzo S, Beasley TM, Magdon-Ismail Z, Day D, Madsen TE, McCullough LD, Stein J, Schwamm LH, Gropen T; NorthEast Cerebrovascular Consortium. Stroke Center Certification and Performance: A Longitudinal Analysis of the Northeast Cerebrovascular Consortium Region. Yale J Biol Med. 2019 Dec 20;92(4):587-596. PMID: 31866774; PMCID: PMC6913814.

Importance of Stroke Centers

JAMA Network | Open

Original Investigation | Health Policy

Treatments and Patient Outcomes Following Stroke Center Expansion

Yu-Chu Shen, PhD; Anthony S. Kim, MD, MAS; Renee Y. Hsia, MD, MSc

Abstract

IMPORTANCE It is unclear how certified stroke center expansion contributes to improved access to stroke treatment and patient outcomes, and whether these outcomes differ by baseline stroke center access.

OBJECTIVE To examine changes in rates of admission to stroke centers, receipt of thrombolysis and mechanical thrombectomy, and mortality when a community gains a newly certified stroke center within a 30-minute drive.

DESIGN, SETTING, AND PARTICIPANTS This cohort study compared changes in patient outcomes when a community (defined by area zip code) experienced a stroke center expansion relative to the same community type that did not experience a change in access. Medicare fee-for-service beneficiaries with a primary diagnosis of acute ischemic stroke who were admitted to hospitals between January 1, 2009, and December 31, 2019, were included. The data analysis was performed between October 1, 2023, and September 9, 2024.

EXPOSURE New certification of a stroke center within a 30-minute driving time of a community.

MAIN OUTCOMES AND MEASURES The main outcomes were rates of admission to a certified stroke center, receipt of thrombolytics (delivered using drip-and-ship and drip-and-stay methods), mechanical thrombectomy, and 30-day and 1-year mortality estimated using a linear probability model with community fixed effects.

RESULTS Among the 2 853 508 patients studied (mean [SD] age, 79.5 [8.5] years; 56% female), 66% lived in communities that had a stroke center nearby at baseline in 2009, and 34% lived in communities with no baseline access. For patients without baseline access, after stroke center expansion, the likelihood of admission to a stroke center increased by 38.98 percentage poin CI, 37.74-40.21 percentage points), and receipt of thrombolytics increased by 0.48 percentag (95% CI, 0.24-0.73 percentage points). Thirty-day and 1-year mortality decreased by 0.28 percentage points (95% CI, −0.56 to −0.01) and 0.50 percentage points (95% CI, −0.84 to − percentage points), respectively, after expansion. For patients in communities with baseline center access, expansion was associated with an increase of 9.37 percentage points (95% CI 10.10 percentage points) in admission to a stroke center but no significant changes in other outcomes.

CONCLUSIONS AND RELEVANCE In this cohort study, patients living in communities witho baseline stroke center access experienced significant increases in stroke center admission an thrombolysis and a significant decrease in mortality after a stroke center expansion. Improve were smaller in communities with preexisting stroke center access. These findings suggest t newly certified stroke centers may provide greater benefits to underserved areas and are an important consideration when deciding when and where to expand health care services.

Key Points

Question Do rates of a certified stroke centers, receipt of thrombolytic therapy or mechanical thrombectomy, and mortality change for patients with stroke when a hospital near their community becomes stroke certified?

Findings In this cohort study of more than 2.8 million patients, those living in communities without preexisting stroke center access experienced increases in stroke center admission and thrombolysis and a decrease in mortality after a stroke center expansion within a 30-minute drive. Improvements were smaller for communities with preexisting stroke center access at baseline.

Meaning These findings suggest that newly certified stroke centers may provide greater benefits to patients residing in areas previously without a nearby stroke center and that targeted efforts to support stroke center

Joint Commission Primary Stroke Centers Utilize More rt-PA in the Nationwide Inpatient Sample

Michael T. Mullen, MD; Scott E. Kasner, MD; Michael J. Kallan, MS; Dawn O. Kleindorfer, MD; Karen C. Albright, DO, MPH; Brendan G. Carr, MD, MS

Published in final edited form as:
Am J Med Qual. 2019 ; 34(6): 585–589. doi:10.1177/1062860619835317.

Stroke Center Certification Is Associated With Improved Guideline Concordance

Adam S. Jasne, MD[1], Heidi Sucharew, PhD[2], Kathleen Alwell, BSN[3], Charles J. Moomaw, PhD[3], Matthew L. Flaherty, MD[3], Opeolu Adeoye, MD, MS[3], Daniel Woo, MD, MS[3], Jason Mackey, MD, MS[4], Simona Ferioli, MD[3], Sharyl Martini, MD, PhD[5], Felipe de los Rios la Rosa, MD[3,6], Brett M. Kissela, MD, MS[3], Dawn Kleindorfer, MD[3]

CONCLUSIONS AND RELEVANCE In this cohort study, patients living in communities without baseline stroke center access experienced significant increases in stroke center admission and thrombolysis and a significant decrease in mortality after a stroke center expansion. Improvements were smaller in communities with preexisting stroke center access. These findings suggest that newly certified stroke centers may provide greater benefits to underserved areas and are an important consideration when deciding when and where to expand health care services.

Elements of Systems That Save Minutes

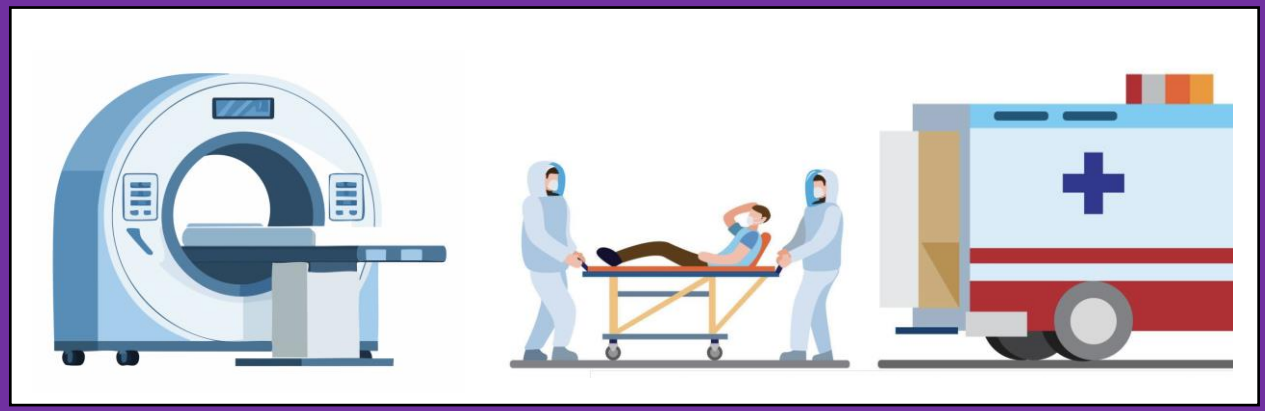
- **Stroke Protocols**
  - Pre-written order sets
  - Weight-based dosing ready
  - tPA/TNK stored in ED or CT
- **Team Coordination**
  - Defined roles:
    - ED physician: airway, initial stabilization, evaluation for other cryptic conditions (secondary trauma, parent vessel pathology)
    - Neurology: decision-making
    - Radiology: immediate reads
    - Nursing/pharmacy: drug prep without delay
- **Parallel Processing**
  - Registration, labs, imaging, neuro exam all happening simultaneously
- **Technology**
  - Telemedicine
  - Teleradiology
  - AI-assisted imaging for LVO detection
  - Rapid image sharing with comprehensive stroke centers

Door-to-Imaging—Overcoming The First Bottleneck

- Stroke Alert activation
- ABCs
- Registration
- Goal:
  - ASAP
- Neuro-Imaging
  - Non-contrast CT
    - Decision Node: ischemic or hemorrhagic
  - CTA ± CTP
  - MRI
- Process optimization:
  - Stroke team meets patient (ED triage, CT)
  - Labs drawn in route (not delaying imaging)
- Key point:
  - Imaging should **never wait for labs** (except rare cases)

The Good: System Innovations Cutting Time

- EMS to CT Protocols



Is Door-to-Needle Time Reduced for Emergency Medical Services Transported Stroke Patients Routed Directly to the Computed Tomography Scanner on Emergency Department Arrival?

Bryan Sloane, MD,*,1 Nichole Bosson, MD MPH,*,†,‡,1 Nerses Sanossian, MD,§ Jeffrey L. Saver, MD,‡,‖ Lorrie Perez, RN,† and Marianne Gausche-Hill, MD*,†,‡

Background: A nationally recommended practice to accelerate thrombolytic therapy for acute ischemic stroke is to route emergency medical services (EMS)-transported stroke patients directly to the computed tomography (CT) scanner on arrival. We evaluated door-to-needle time with direct-to-CT routing versus emergency department (ED)-bed first routing. *Methods:* This was a retrospective analysis from a large regionalized stroke system. Paramedics utilize the modified Los Angeles Prehospital Stroke Screen and transport acute stroke patients to Approved Stroke Centers. Individual stroke centers postarrival protocols vary, with some routing patients directly to CT. Stroke centers report treatment and outcomes to a registry, from which data were abstracted from May 2015 through April 2016. Adult patients transported by EMS and treated with thrombolytic therapy were included. The primary outcome was door-to-needle time. Secondary outcome was door-to-imaging time. *Results:* EMS transported 6315 patients for suspected stroke and 789 (13%) were treated with thrombolysis at 41 stroke centers, 171 (22%) at hospitals with direct-to-CT routing and 618 (78%) at hospitals with ED-bed routing. Patient characteristics were similar between groups. Door-to-needle time was not different in the 2 groups, median 57 minutes (interquartile range [IQR] 44-76) for CT routing versus 54 minutes (IQR 40-74) for ED routing, median difference 3 (95% CI −1, 7), $P = .2$. Door-to-imaging time was shorter with CT routing compared to ED routing, median 13 minutes (IQR 8-21) and 16 minutes (IQR 10-24), respectively. *Conclusions:* In this regional stroke system, hospitals with protocols for routing EMS-transported stroke patients directly to CT did not have reduced door-to-needle compared to hospitals without such protocols.

Key Words: Stroke—thrombolytic therapy—neuroimaging—emergency medical services

Prehospital and Emergency Department-Focused Mission Protocol Improves Thrombolysis Metrics for Suspected Acute Stroke Patients

Debbie Y. Madhok, MD,*,† Kevin J. Keenan, MD,‡ Sara B. Cole, RN, BSN,§ Christine Martin, MS, CNS, ACNP-BC,§ and J. Claude Hemphill 3rd, MD MAS†

Background: The Mission Protocol was implemented in 2017 to expedite stroke evaluation and reduce door-to-needle (DTN) times at Zuckerberg San Francisco General Hospital. The key system changes were team-based evaluation of suspected stroke patients at ambulance entrance by an Emergency Department (ED) physician, ED nurse, and neurologist and immediate emergency medical service (EMS) provider transport of patients to CT. *Methods:* Patients were eligible for a Mission Protocol prehospital stroke activation if an EMS provider found a positive Cincinnati Prehospital Stroke Scale and a last known normal time within 6 hours. We retrospectively compared treatment metrics between the first year of Mission Protocol patients and patients from the year prior also brought in via ambulance with suspected stroke and a last known normal time within 6 hours. Median Door to CT and DTN times were compared using 2 sample Wilcoxon rank-sum (Mann-Whitney) tests. *Results:* There were 236 patients in the Mission Protocol group and 112 in the comparison group. The Mission Protocol was associated with a 10 minutes faster median door to CT time ($P < .0001$), a 6 minutes faster median DTN time ($P = .0046$), a 22% increase in the proportion of patients treated within 45 minutes of arrival (84% versus 62%), and a 12% increase in the proportion of patients treated within 60 minutes (92% versus 80%). There were 8 stroke mimics treated in the Mission Protocol cohort compared to 2 in the comparison cohort. Symptomatic intracranial hemorrhage occurred in one Mission Protocol patient with an ischemic stroke. *Conclusions:* The EMS direct to CT based Mission Protocol was associated with faster median door to CT and DTN times. There was a 22% increase in the proportion of thrombolysis patients treated within 45 minutes or less. More stroke mimic patients received thrombolysis but symptomatic intracranial hemorrhage only occurred in 1 ischemic stroke patient.

Key Words: Stroke—ischemic stroke—prehospital—emergency medical service

Madhok et al: 10min DTCT reduction, 6min DTN, 22% increase in DTN <45min

Sloane et al: 3min DTCT reduction

Cone et al: 4 min CTCT reduction

ORIGINAL CONTRIBUTIONS

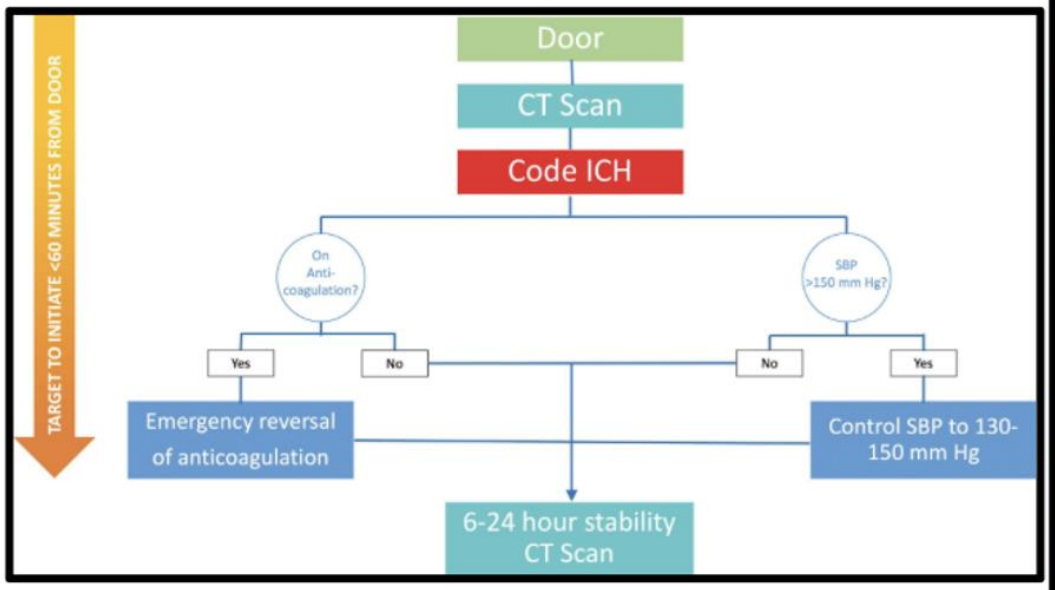
OBSERVATIONAL MULTICENTER STUDY OF A DIRECT-TO-CT PROTOCOL FOR EMS-TRANSPORTED PATIENTS WITH SUSPECTED STROKE

David C. Cone, MD, Craig Cooley, MD, MPH, EMT-P, Jeffrey Ferguson, MD, Andrew J. Harrell, MD, Jeffrey H. Luk, MD, MS, Christian Martin-Gill, MD, MPH, Sean W. Marquis, MD, MPH, Scott Pasichow, MD

Decision Node: Ischemic vs Hemorrhagic

- **Acute Ischemic Stroke**
  - Thrombolysis:
    - Alteplase or Tenecteplase
    - Door-to-needle goal: ≤ 60 min (aspire to ≤ 30)
  - Mechanical thrombectomy:
    - LVO within 6–24 hrs (selected patients)
  - Avoid delays:
    - BP management done **concurrently**, not sequentially
- **Hemorrhagic Stroke**
  - Rapid BP control:
    - Target systolic ~140 (context-dependent)
  - Reversal of anticoagulation:
    - PCC, idarucizumab, andexanet alfa as indicated
  - Early neurosurgical involvement:
    - Hematoma evacuation, EVD if needed

Head Bleed Alert



EUROPEAN STROKE JOURNAL

Acute care bundles should be used for patients with intracerebral haemorrhage: an expert consensus statement

ICH care bundles reduce morbidity and mortality.
We review current evidence and make practical recommendations for implementation.

Methods

Neurology, Neurosurgery, Critical Care, Emergency Medicine

Consensus Meeting May 2023

Consensus statement agreed

Results

We recommend:

Door	Stabilise patient, rapid imaging Coagulation tests
< 30 min	Reverse anticoagulant Start intensive BP lowering
< 60 min	SBP < 140, Consult Neurosurgery Achieve T < 37.5°C
7 days	Maintain SBP < 140; T < 37.5°C Maintain normoglycaemia

Conclusion

Multiple simultaneous interventions improve functional outcome

Rapid bundled care should be introduced

Quality improvement will help achieve **ambitious process targets**

Parry-Jones, A., et al. European Stroke Journal, 2023 adrian.parry-jones@manchester.ac.uk doi.org/10.1177_23969873231220235

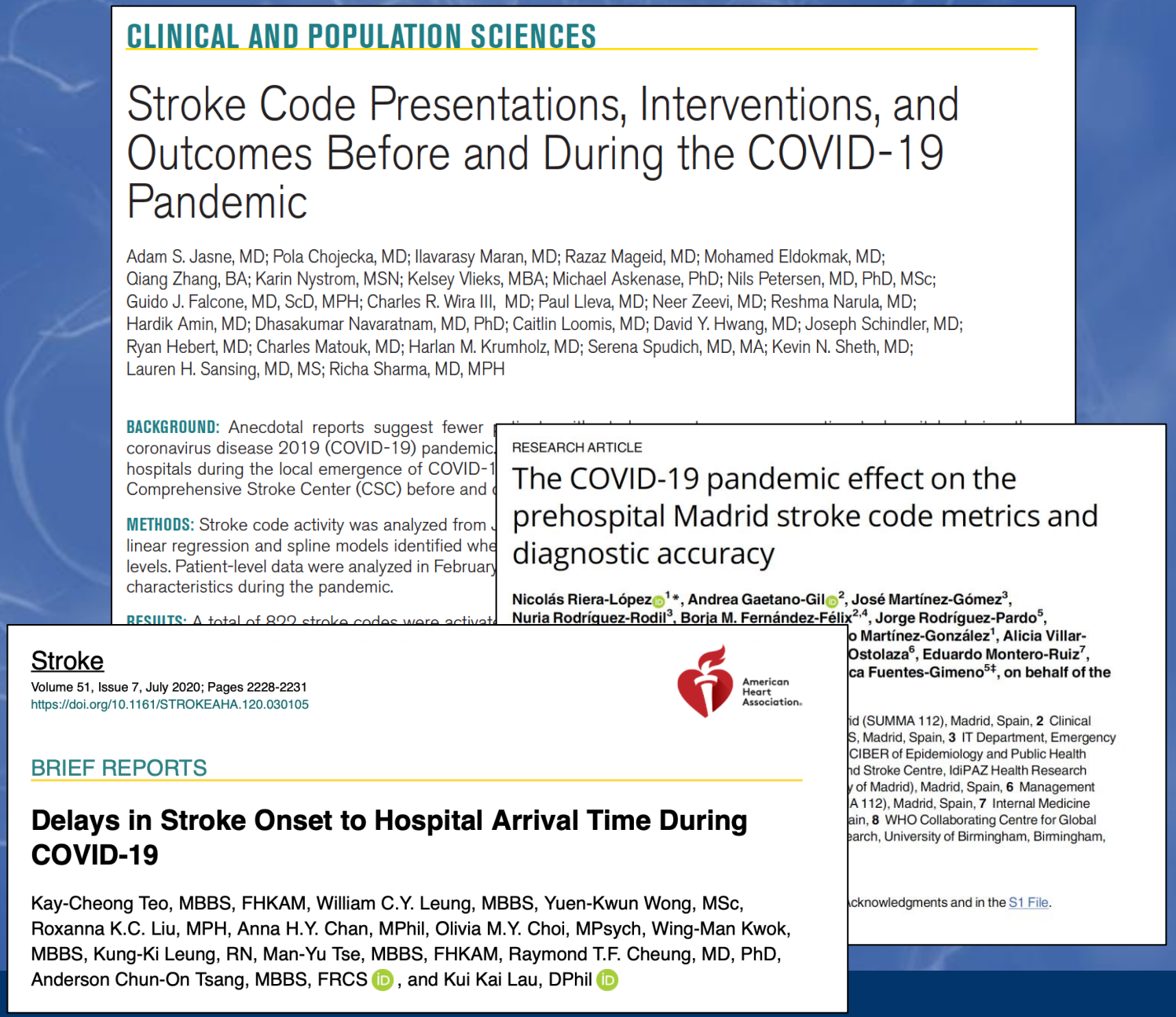
Li Q, Yakhkind A, Alexandrov AW, Alexandrov AV, Anderson CS, Dowlatshahi D, Frontera JA, Hemphill JC, Ganti L, Kellner C, May C, Morotti A, Parry-Jones A, Sheth KN, Steiner T, Ziai W, Goldstein JN, Mayer SA. Code ICH: A Call to Action. Stroke. 2024 Feb;55(2):494-505.

Parry-Jones AR, Järhult SJ, Kreitzer N, Morotti A, Toni D, Seiffge D, Mendelow AD, Patel H, Brouwers HB, Klijn CJ, Steiner T, Gibler WB, Goldstein JN. Acute care bundles should be used for patients with intracerebral haemorrhage: An expert consensus statement. Eur Stroke J. 2024 Jun;9(2):295-302.

Good News

Resilience in the Pandemic

- Teo et al, 2020
  - Prolongation in onset to hospital arrival time
  - In-hospital and treatment metrics did not change
- Jasne et al, 2020
  - No change in time to presentation, door-to-needle or door-to-perfusion times
- Riera-Lopez, 2022
  - Prehospital diagnostic accuracy and the proportion of patients treated at the hospital level with intravenous thrombolysis or mechanical thrombectomy were not altered



CLINICAL AND POPULATION SCIENCES

Stroke Code Presentations, Interventions, and Outcomes Before and During the COVID-19 Pandemic

Adam S. Jasne, MD; Pola Chojecka, MD; Ilavarasy Maran, MD; Razaz Mageid, MD; Mohamed Eldokmak, MD; Qiang Zhang, BA; Karin Nystrom, MSN; Kelsey Vlieks, MBA; Michael Askenase, PhD; Nils Petersen, MD, PhD, MSc; Guido J. Falcone, MD, ScD, MPH; Charles R. Wira III, MD; Paul Lleva, MD; Neer Zeevi, MD; Reshma Narula, MD; Hardik Amin, MD; Dhasakumar Navaratnam, MD, PhD; Caitlin Loomis, MD; David Y. Hwang, MD; Joseph Schindler, MD; Ryan Hebert, MD; Charles Matouk, MD; Harlan M. Krumholz, MD; Serena Spudich, MD, MA; Kevin N. Sheth, MD; Lauren H. Sansing, MD, MS; Richa Sharma, MD, MPH

BACKGROUND: Anecdotal reports suggest fewer
coronavirus disease 2019 (COVID-19) pandemic.
hospitals during the local emergence of COVID-1
Comprehensive Stroke Center (CSC) before and

METHODS: Stroke code activity was analyzed from
linear regression and spline models identified whe
levels. Patient-level data were analyzed in February
characteristics during the pandemic.

RESULTS: A total of 822 stroke codes were activat

RESEARCH ARTICLE

The COVID-19 pandemic effect on the prehospital Madrid stroke code metrics and diagnostic accuracy

Nicolás Riera-López[1]*, Andrea Gaetano-Gil[2], José Martínez-Gómez[3], Nuria Rodríguez-Rodil[3], Borja M. Fernández-Félix[2,4], Jorge Rodríguez-Pardo[5], o Martínez-González[1], Alicia Villar-Ostolaza[6], Eduardo Montero-Ruiz[7], ca Fuentes-Gimeno[5‡], on behalf of the

id (SUMMA 112), Madrid, Spain, 2 Clinical S, Madrid, Spain, 3 IT Department, Emergency CIBER of Epidemiology and Public Health nd Stroke Centre, IdiPAZ Health Research y of Madrid), Madrid, Spain, 6 Management A 112), Madrid, Spain, 7 Internal Medicine ain, 8 WHO Collaborating Centre for Global earch, University of Birmingham, Birmingham,

cknowledgments and in the S1 File.

Stroke

Volume 51, Issue 7, July 2020; Pages 2228-2231
https://doi.org/10.1161/STROKEAHA.120.030105

American Heart Association.

BRIEF REPORTS

Delays in Stroke Onset to Hospital Arrival Time During COVID-19

Kay-Cheong Teo, MBBS, FHKAM, William C.Y. Leung, MBBS, Yuen-Kwun Wong, MSc, Roxanna K.C. Liu, MPH, Anna H.Y. Chan, MPhil, Olivia M.Y. Choi, MPsych, Wing-Man Kwok, MBBS, Kung-Ki Leung, RN, Man-Yu Tse, MBBS, FHKAM, Raymond T.F. Cheung, MD, PhD, Anderson Chun-On Tsang, MBBS, FRCS, and Kui Kai Lau, DPhil


A Nation in Crisis
Waiting-Time
patient-acuity
boarder-volume
staffing
dwell-times
waiting-times
ICU-volume
door-to-doctor
daily-admissions
short-term-return
Delayed-Discharge
ED-volume
LOS
LWBS
Overcrowding
Occupancy-Rate
Throughput
Completion-Time
Hospital-Volume
20-03

Resilience For Hyperacute Metrics During ED Crowding….

Impact of Emergency Department Crowding on Delays in Acute Stroke Care

Todd A. Jaffe, MD*
Joshua N. Goldstein, MD, PhD†
Brian J. Yun, MD, MBA, MPH†
Mark Etherton, MD, PhD‡
Thabele Leslie-Mazwi, MD‡
Lee H. Schwamm, MD‡
Kori S. Zachrison, MD, MSc†

*Harvard Affiliated Emergency Medicine Residency at Massachusetts General Hospital and Brigham and Women's Hospital, Department of Emergency Medicine, Boston, Massachusetts
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Section Editor: Richard Lucarelli, MD
Submission history: Submitted December 19, 2020; Revision received May 5, 2020; Accepted May 5, 2020
Electronically published July 8, 2020
Full text available through open access at http://escholarship.org/uc/uciem_westjem
DOI: 10.5811/westjem.2020.5.45873

Introduction: Delays in identification and treatment of acute stroke contribute to significant morbidity and mortality. Multiple clinical factors have been associated with delays in acute stroke care. We aimed to determine the relationship between emergency department (ED) crowding and the delivery of timely emergency stroke care.

Methods: We used prospectively collected data from our institutional Get with the Guidelines-Stroke registry to identify consecutive acute ischemic stroke patients presenting to our urban academic ED from July 2016–August 2018. We used capacity logs to determine the degree of ED crowding at the time of patients' presentation and classified them as ordinal variables (normal, high, and severe capacity constraints). Outcomes of interest were door-to-imaging time (DIT) among patients potentially eligible for alteplase or endovascular therapy on presentation, door-to-needle time (DTN) for alteplase delivery, and door-to-groin puncture (DTP) times for endovascular therapy. Bivariate comparisons were made using t-tests, chi-square, and Wilcoxon rank-sum tests as appropriate. We used regression models to examine the relationship after accounting for patient demographics, transfer status, arrival mode, and initial stroke severity by the National Institutes of Health Stroke Scale.

Results: Of the 1379 patients with ischemic stroke presenting during the study period, 1081 (78%) presented at times of normal capacity, 203 (15%) during high ED crowding, and 94 (7%) during severe crowding. Median DIT was 26 minutes (interquartile range [IQR] 17-52); DTN time was 43 minutes (IQR 31-59); and median DTP was 58.5 minutes (IQR 56.5-100). Treatment times were not significantly different during periods of higher ED utilization in bivariate or in multivariable testing.

Conclusion: In our single institution analysis, we found no significant delays in stroke care delivery associated with increased ED crowding. This finding suggests that robust processes of care may enable continued high-quality acute care delivery, even during times with an increased capacity burden. [West J Emerg Med. 2020;21(4)891-898.]

Emergency Department Crowding and Time to Care in Patients With Acute Stroke

Pia Chatterjee, MD; Brett L. Cucchiara, MD; Nicole Lazarciuc, MD; Frances S. Shofer, PhD; Jesse M. Pines, MD, MBA, MSCE

Background and Purpose—Emergency department (ED) crowding occurs when demands for ED care exceed the supply of available resources. Prior studies have shown that ED crowding is associated with a delay in provision of critical ED services, but the impact of ED crowding on acute stroke care has not been extensively studied.

Methods—We conducted a retrospective study of patients who presented to the ED with acute stroke symptoms (ischemic stroke, transient ischemic attack, intracerebral hemorrhage) at 2 hospitals. All patients with active stroke symptoms who presented within 3 hours were included and a random sample of patients with symptoms >3 hours was used for comparison. The association between ED crowding measures (waiting room number, ED occupancy, number of admitted patients, and total patient hours) and time to head CT order, completion, and interpretation, and time to administration of thrombolysis was determined.

Results—Of 253 patients presenting with acute stroke symptoms ≤3 hours from symptom onset, 52 (21%) received thrombolysis. A random comparison group of 253 patients with symptoms >3 hours was identified. There was no significant association between ED crowding and delays in CT timing or thrombolysis in patients with symptoms ≤3 hours. Several measures of ED crowding were associated with prolonged times to CT order and completion in patients with symptoms >3 hours.

Conclusions—ED crowding was not associated with care delays in thrombolysis-eligible patients with stroke. However, those with symptoms >3 hours do experience CT delays at higher levels of ED crowding. (***Stroke*. 2011;42:1074-1080.)**

Key Words: crowing ■ emergency ■ overcrowding ■ quality ■ stroke ■ time to care


THE
BAD
THE
UGLY

The Bad….

- Gap Areas
- Geography is Destiny
- **Boggs et al, 2023 (For 2018)**
  - Among 5533 US EDs, 2446 (44%) are stroke centers

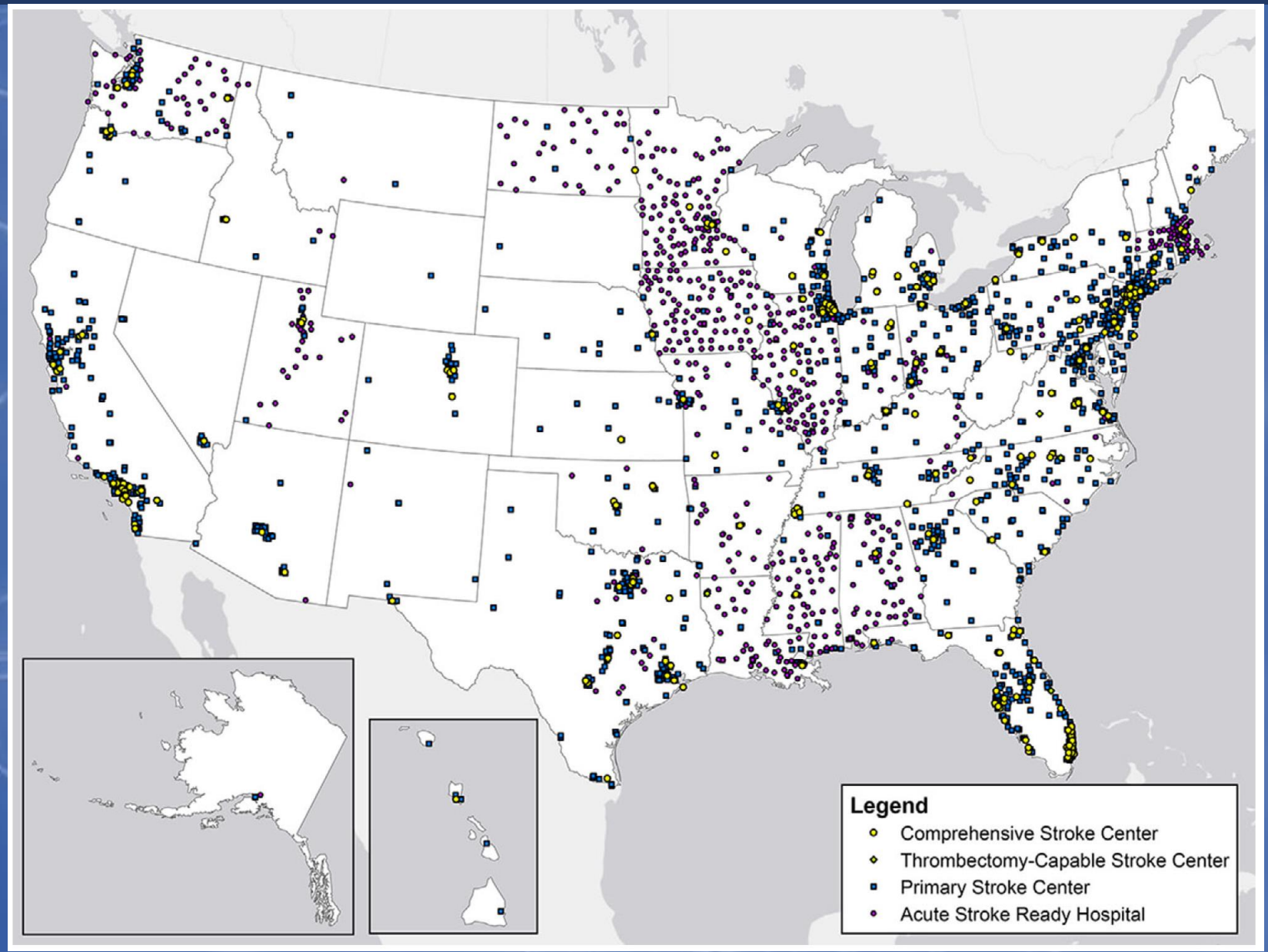
Received: 6 October 2021 | Revised: 5 January 2022 | Accepted: 12 January 2022
DOI: 10.1002/emp2.12673

JACEP OPEN WILEY

ORIGINAL RESEARCH
Neurology

An inventory of stroke centers in the United States

Krislyn M. Boggs MPH | Brian T. Vogel MD, DMA | Kori S. Zachrison MD, MSc | Janice A. Espinola MPH | Mohammad K. Faridi MPH | Rebecca E. Cash PhD, MPH | Ashley F. Sullivan MS, MPH | Carlos A. Camargo Jr. MD, DrPH



The Bad….

- Gap areas for access to EVT
- Aldstadt J, et al. J NeuroIntervent Surg 2022

Original research

Mapping access to endovascular stroke care in the USA and implications for transport models

Jared Aldstadt,[1] Muhammad Waqas ,[2,3] Misa Yasumiishi ,[1] Maxim Mokin ,[4,5] Vincent M Tutino ,[2,6] Hamid H Rai ,[7] Felix Chin ,[7] Bennett R Levy,[8] Ansaar T Rai ,[9] J Mocco,[10] Kenneth V Snyder,[3,11] Jason M Davies ,[3,12] Elad I Levy ,[2,3] Adnan H Siddiqui [2,3]

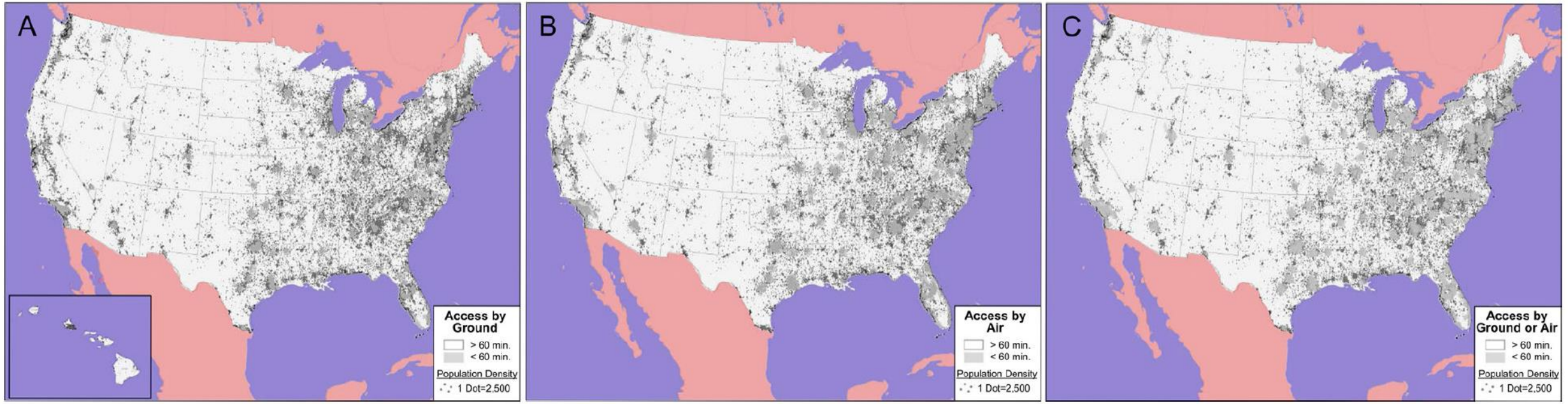


Figure 1 US maps showing 60 min access to endovascular-capable (stroke care) centers (ECCs) with respect to population density. Each dot represents a 2500 resident census block. The grey area indicates 60 min coverage via ground (A), air (B), and ground or air (C).

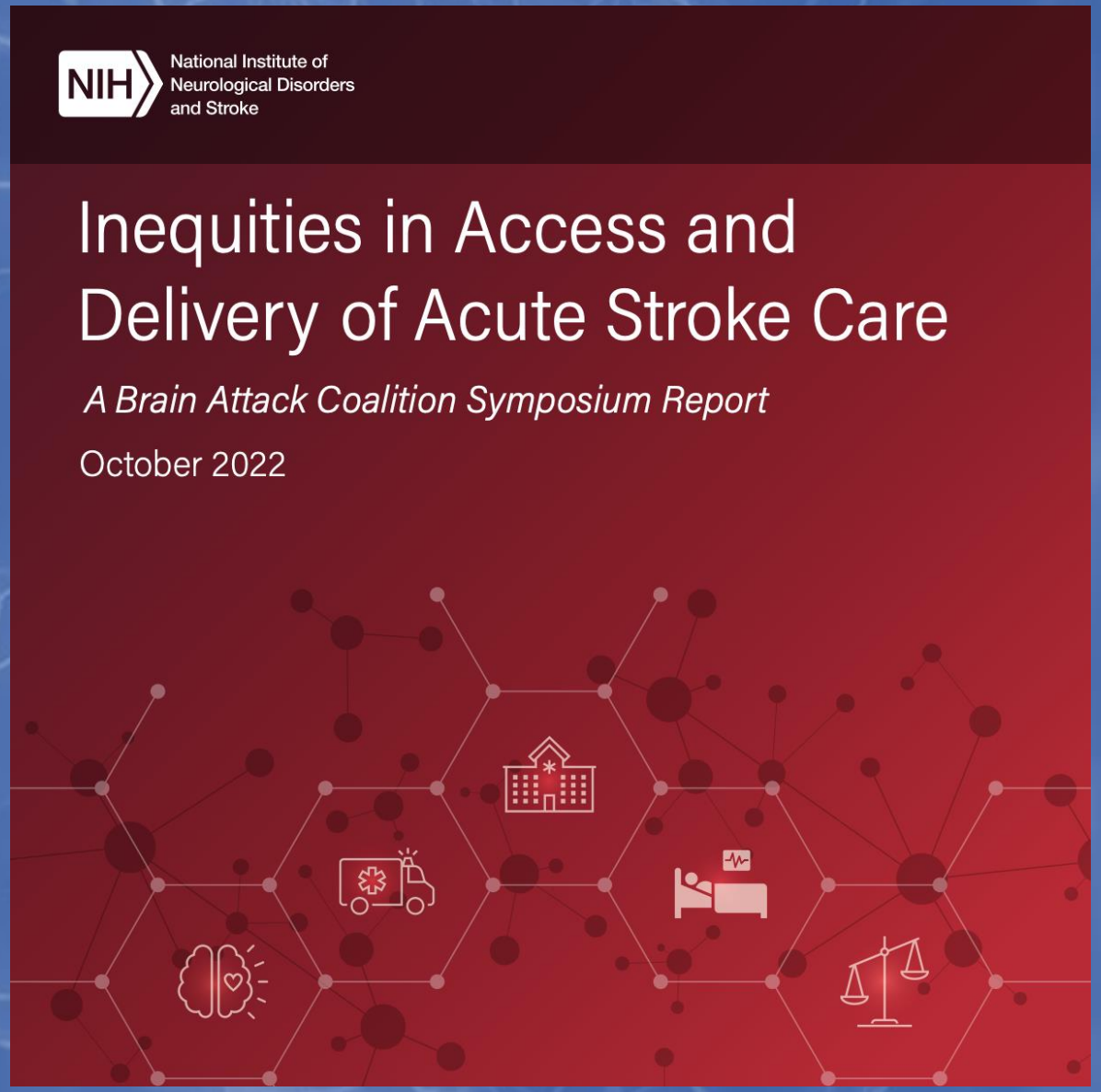
The Bad…Health Inequities….

Brain Attack Coalition

Brain Attack Coalition

The Brain Attack Coalition (BAC) is dedicated to improving prevention, advancing treatment, and enhancing recovery to eliminate the burden of stroke. The BAC is a group of non-profit professional, voluntary, and/or governmental agencies dedicated to setting direction, advancing knowledge, and communicating the best practices to prevent and treat stroke. The BAC meets twice annually and supports additional events, meetings, and workshops related to stroke.

- Phases of Care/Time Epochs
  - Pre-hospital
  - Hyperacute
  - Inpatient
- Priority Areas
  - Geography
  - Policy and Regulation
  - Economics and Healthcare Resources
  - Demographics



The Bad…Health Inequities….

NEWS RELEASE 23-FEB-2017

Many stroke patients do not receive life-saving therapy

American Stroke Association Meeting Report - Session A17 - Abstract 116

Peer-Reviewed Publication

AMERICAN HEART ASSOCIATION

INTERNATIONAL STROKE CONFERENCE ORAL ABSTRACTS

SESSION TITLE: EMERGENCY CARE/SYSTEMS ORAL ABSTRACTS II

Abstract 116: Minorities, Women, and Stroke Belters Left Behind in t-PA Use Despite Quality Improvement Efforts

Tracy E Madsen, Shannon Melluzzo, Charles R Wira, Zainab Magdon-Ismail, David Day, Toby Gropen and **On behalf of The NorthEast Cerebrovascular Consortium Investigators**

Originally published 21 Feb 2017 | https://doi.org/10.1161/str.48.suppl_1.116 | Stroke. 2017;48:A116

Health Inequities….

NEWS RELEASE 23-FE

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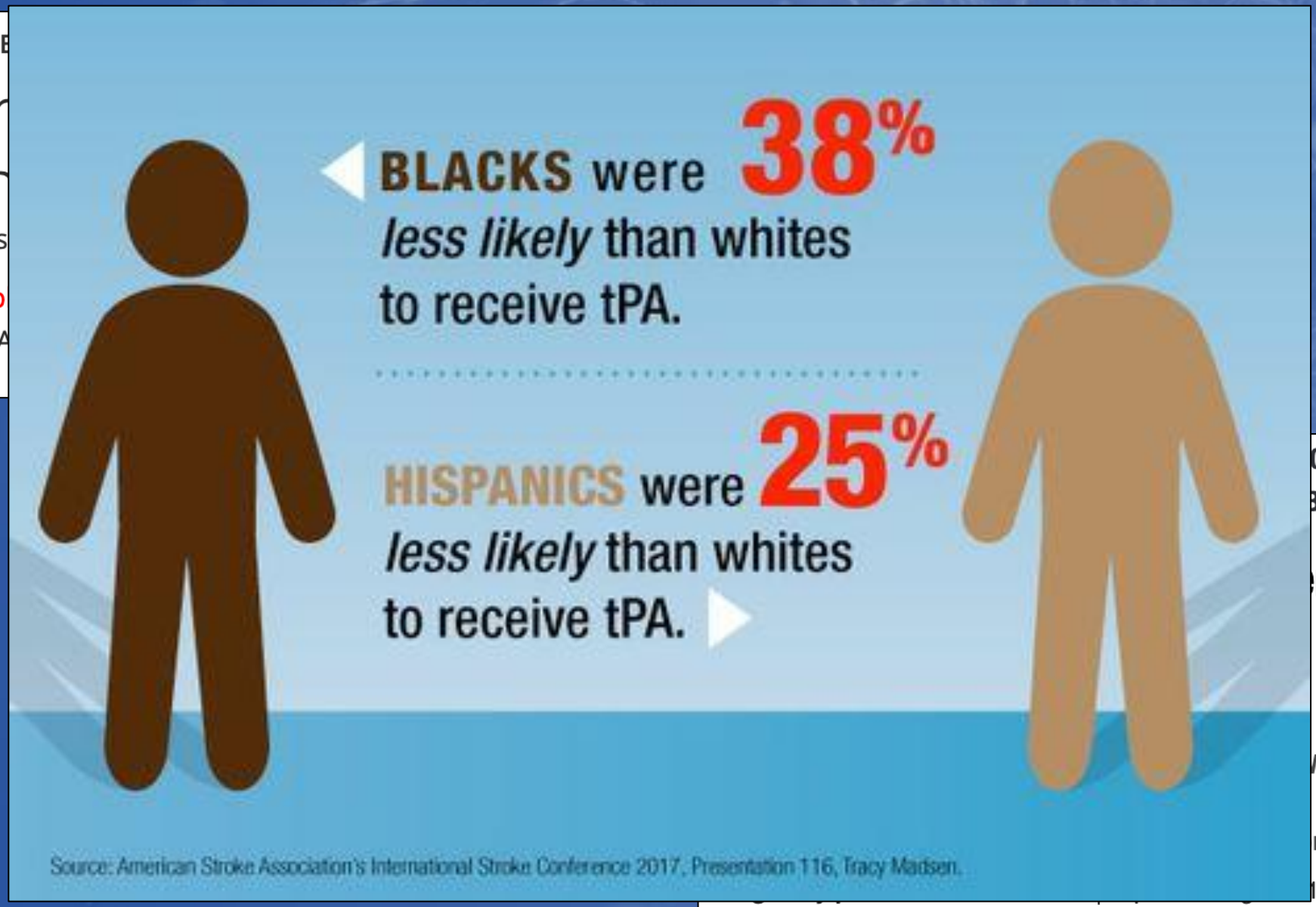
Peer-Reviewed Pub
AMERICAN HEART A



CTS
BSTRACTS II

n, and Stroke
Despite Quality

Wira,
and
nsortium Investigators

161/str.48.suppl_1.116 |
Stroke. 2017;48:A116

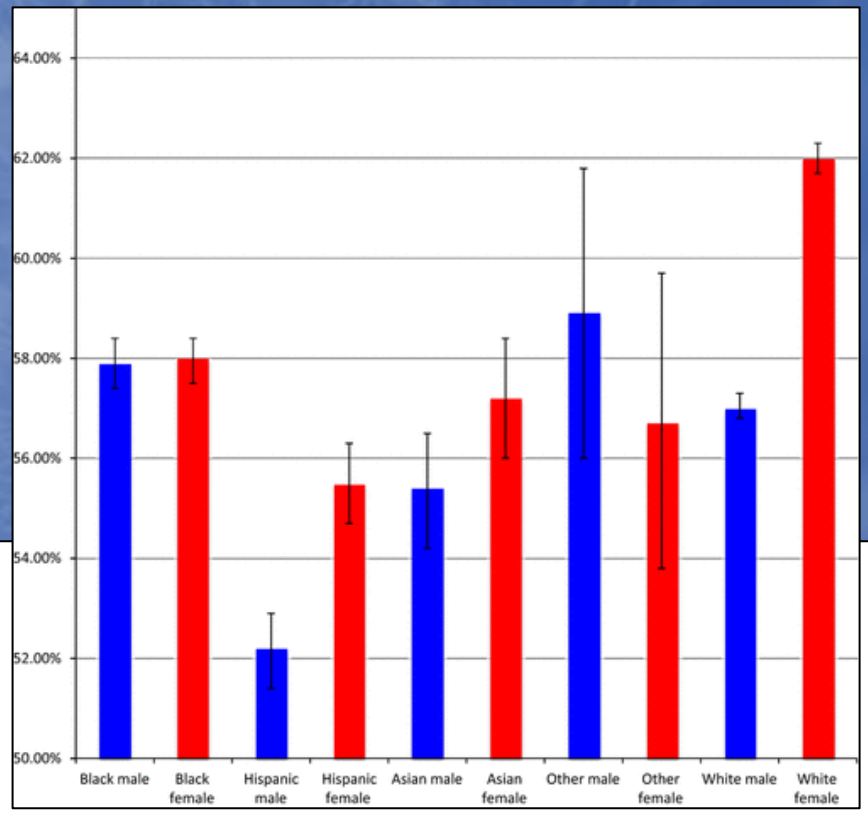
Health Inequities….

FOCUSED UPDATES: HEALTH EQUITY

Evidence-Based Disparities in Stroke Care Metrics and Outcomes in the United States: A Systematic Review

Shelly Ikeme, PharmD, MPH; Emilie Kottenmeier, MSc; Goldfield Uzochukwu, MD; Waleed Brinjikji, MD

ABSTRACT: Stroke disproportionately affects racial minorities, and the level to which stroke treatment practices differ across races is understudied. Here, we performed a systematic review of disparities in stroke treatment between racial minorities and White patients. A systematic literature search was performed on P
1, 2010, to April 5, 2021 that investigated disparities in access to str
patients. A total of 30 studies were included in the systematic review.
medical services at a greater rate (59.8%) than African American (55.6
A greater proportion of White patients (37.4%) were estimated to arrive
African American (26.0%) and Hispanic (28.9%) patients. A greater p



ORIGINAL RESEARCH

Patterns of Emergency Medical Services Use and Its Association With Timely Stroke Treatment

Findings From Get With the Guidelines-Stroke

Olaniyi James Ekundayo, MD, DrPH; Jeffrey L. Saver, MD; Gregg C. Fonarow, MD; Lee H. Schwamm, MD; Ying Xian, MD, PhD; Xin Zhao, MS; Adrian F. Hernandez, MD, MHS; Eric D. Peterson, MD, MPH; Eric M. Cheng, MD, MS

Background—Prior studies found that only about half of stroke patients arrived at hospitals via emergency medical services (EMSs), yet since then, there have been efforts to increase public awareness that time is brain. Using contemporary Get With the Guidelines-Stroke data, we assessed nationwide EMS use by stroke patients.

Methods and Results—We analyzed data from 204 591 patients with ischemic and hemorrhagic stroke admitted to 1563 Get With the Guidelines-Stroke participating hospitals with data on National Institute of Health Stroke Score and insurance status. Hospital arrival by EMSs was observed in 63.7% of patients. Older patients, those with Medicaid and Medicare insurance, and those with severe stroke were more likely to activate EMSs. In contrast, minority race and ethnicity and living in rural communities were associated with decreased odds of EMS use. EMS transport was independently associated with earlier arrival (onset-to-door time, ≤3 hours; adjusted odds ratio, 2.00; 95% confidence interval, 1.93–2.08), prompter evaluation (more patients with door-to-imaging time, ≤25 minutes; odds ratio, 1.89; 95% confidence interval, 1.78–2.00), more rapid treatment (more patients with door-to-needle time, ≤60 minutes; odds ratio, 1.44; 95% confidence interval, 1.28–1.63), and more eligible patients to be treated with tissue-type plasminogen activator if onset is ≤2 hours (67% versus 44%; odds ratio, 1.47; 95% confidence interval, 1.33–1.64).

Conclusions—Although EMS use is independently associated with more rapid evaluation and treatment of stroke, more than one third of stroke patients fail to use EMSs. Interventions aimed at increasing EMS activation should target populations at risk, particularly younger patients and those of minority race and ethnicity. (***Circ Cardiovasc Qual Outcomes***. 2013;6:262-269.)

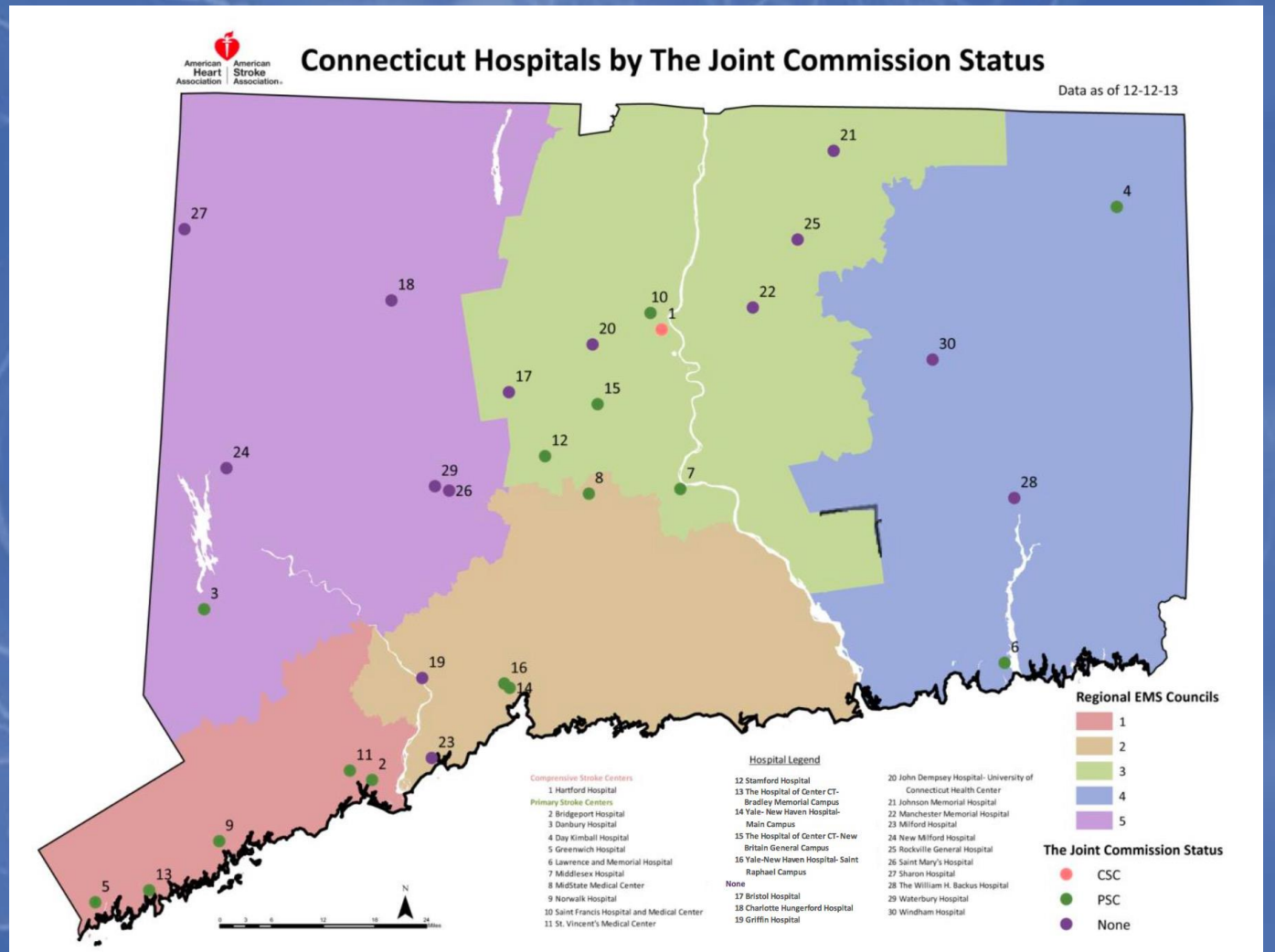
Racial/Ethnic and Sex Differences in Emergency Medical Services Transport Among Hospitalized US Stroke Patients: Analysis of the National Get With The Guidelines–Stroke Registry

Heidi Mochari-Greenberger, PhD, MPH; Ying Xian, MD, PhD; Anne S. Hellkamp, MS; Phillip J. Schulte, PhD; Deepak L. Bhatt, MD, MPH; Gregg C. Fonarow, MD; Jeffrey L. Saver, MD; Mathew J. Reeves, PhD; Lee H. Schwamm, MD; Eric E. Smith, MD, MPH

Finding Solutions: Local Grass Roots Efforts

important facts
that you should
know about stroke

Black women in Connecticut are the group most disproportionately impacted by stroke. Use the information in this brochure to reduce your chance of becoming part of the statistic.



In 2014 ~ 50% of CT hospitals were stroke certified

Finding Solutions: Local Grass Roots Efforts

SCIENTIFIC

Translating Best Practices to a Statewide System of Care for Stroke: The Passage of Legislation to Recognize Stroke Centers in Connecticut

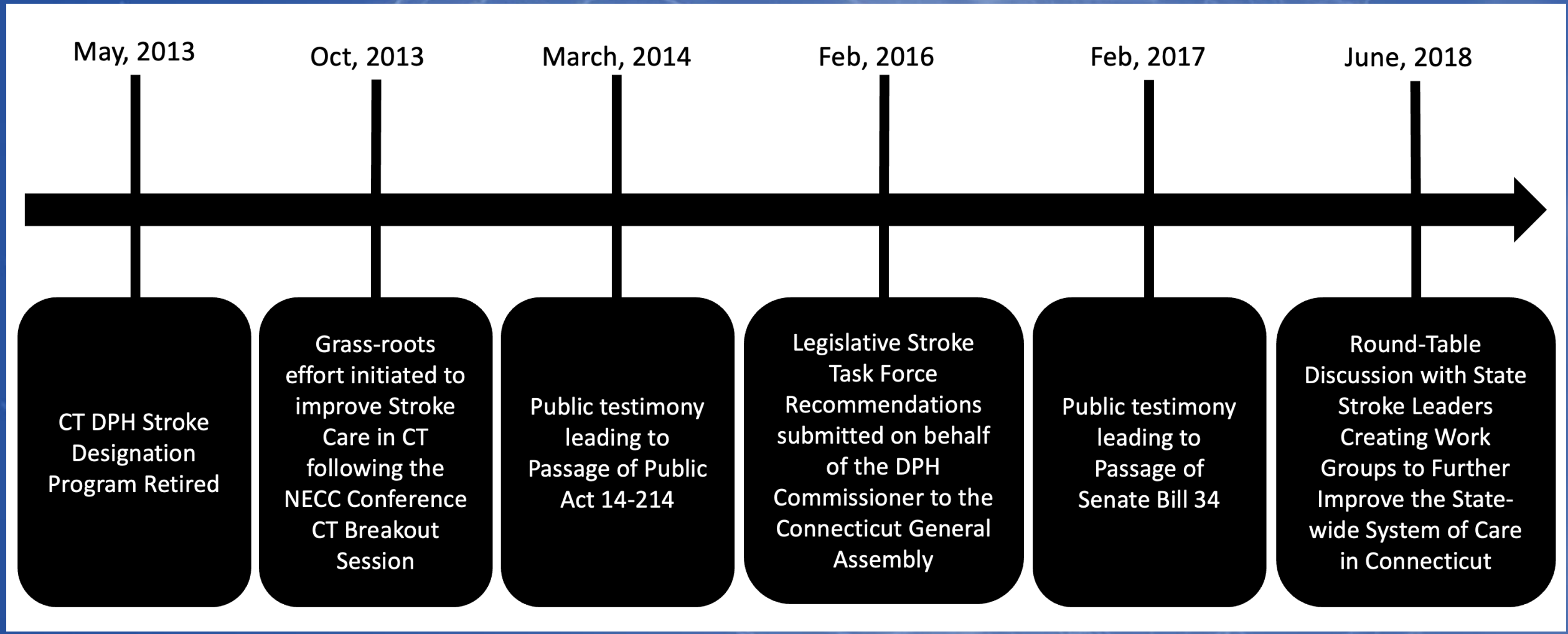
AUTHORS

Amre Nouh, MD
Dawn Beland, MSN, RN, SCRN
Rich Kamin, MD
Joseph Schindler, MD
Karin Nystrom, MSN, APRN
Kristen Hickey, RN
Louise McCullough, MD, PhD
Mark Alberts, MD
Charles R. Wira III, MD

ABSTRACT – Stroke is a leading cause of death and disability in Connecticut. Due to a lack of federal funding, the State Department of Public Health retired the Hospital Designation Program in 2013, leaving multiple hospitals without any form of a state-sponsored stroke center certification designation. Subsequently, a grass-roots effort was initiated to improve the state-wide system of care for acute stroke care. This effort culminated in the passage of two legislative bills, and formal recommendations made by a legislature-appointed Stroke Task Force. This manuscript outlines the past, present, and future vision for this continued collaborative effort to improve stroke care for all citizens in Connecticut.

Finding Solutions: Local Grass Roots Efforts

Finding Solutions: Local Grass Roots Efforts

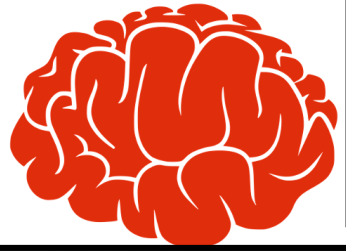


The path to a Stroke Registry

Goal was to:

- Establish a centralized, statewide repository of patient-specific care data in a stroke registry
- Assess and monitor statewide trends in care
- Identify potential disparities and inequities in the delivery of stroke care
- Data aggregation and analysis enables the creation of a statewide performance improvement plan
- lead to practice strategies to ensure that all CT citizens are afforded access to evidence-based standards of acute and recovery stroke care





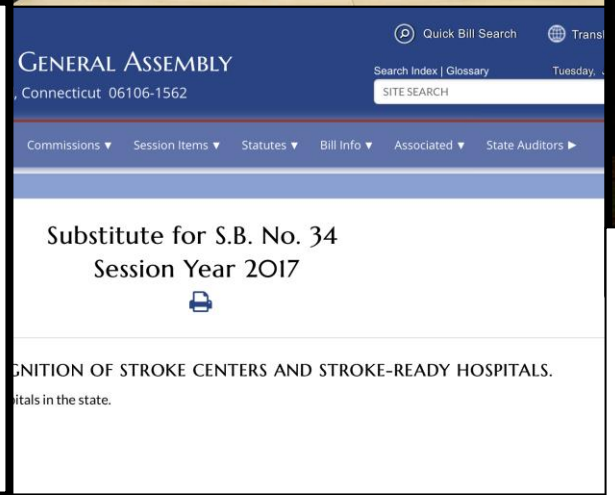
Overview of Survey Responses

Mission Statement

It is the mission of the Stroke Coordinators of Connecticut (SCC) to promote stroke systems of care and to decrease the burden of stroke in order to meet the 2020 AHA/ASA goal of improving cardiovascular and cerebrovascular health for the citizens of Connecticut.

Goals

- To promote the implementation of stroke systems of care within medical facilities that admit patients diagnosed with TIA and stroke syndromes utilizing evidence-based clinical practice guidelines and mandates for primary stroke center certification or partnerships with such facilities.
- To support community initiatives for increasing public awareness of stroke symptoms, the importance of calling 9-1-1 for help, and for identifying stroke risk factors and taking steps to reduce stroke risk for patients and families.
- To develop and maintain a workforce that examines potential research ventures and creative solution projects to reinforce the SCC mission.



The 12th Annual NECC Summit


State Breakout Sessions

Connecticut
GWTG-Stroke Data
January 2016 – December 2016



THE
GOOD

THE
BAD


THE
UGLY

The Ugly….Diagnostic Errors

Viewpoint ONLINE FIRST FREE
January 27, 2023

Misdiagnosis in the Emergency Department
Time for a System Solution

Jonathan A. Edlow, MD[1]; Peter J. Pronovost, MD, PhD[2]
» Author Affiliations | Article Information

JAMA. Published online January 27, 2023. doi:10.1001/jama.2023.0577

- Estimates from 130 million emergency department (ED) visits per year:
  - 7.4 million (5.7%) patients are misdiagnosed,
  - 2.6 million (2.0%) suffer an adverse event as a result,
  - 370,000 (0.3%) suffer serious harms from diagnostic error.

Who Published Their Misses?

- **Mean Age <50 y.o.**
- **Mortality Rate 40%**
    - Savitz et al, AEM, 2007

Pitfalls in the Diagnosis of Cerebellar Infarction

Sean I. Savitz, MD, Louis R. Caplan, MD, Jonathan A. Edlow, MD

Abstract

Background: Cerebellar infarctions are an important cause of neurologic disease. Failure to recognize and rapidly diagnose cerebellar infarction may lead to serious morbidity and mortality due to hydrocephalus and brain stem infarction.

Objectives: To identify sources of preventable medical errors, the authors obtained pilot data on cerebellar ischemic strokes that were initially misdiagnosed in the emergency department.

Methods: Fifteen cases of misdiagnosed cerebellar infarctions were collected, all seen, or reviewed by the authors during a five-year period. For each patient, they report the presenting symptoms, the findings on neurologic examination performed in the emergency department, specific areas of the examination not performed or documented, diagnostic testing, the follow-up course after misdiagnosis, and outcome. The different types of errors leading to misdiagnosis are categorized.

Results: Half of the patients were younger than 50 years and presented with headache and dizziness. All patients had either incomplete or poorly documented neurologic examinations. Almost all patients had a computed tomographic scan of the head interpreted as normal, and most of these patients underwent subsequent magnetic resonance imaging showing cerebellar infarction. The initial incorrect diagnoses included migraine, toxic encephalopathy, gastritis, meningitis, myocardial infarction, and polyneuropathy. The overall mortality in this patient cohort was 40%. Among the survivors, about 50% had disabling deficits. Pitfalls leading to misdiagnosis involved the clinical evaluation, diagnostic testing, and establishing a diagnosis and disposition.

Conclusions: This study demonstrates how the diagnosis of cerebellar infarction can be missed or delayed in patients presenting to the emergency department.

ACADEMIC EMERGENCY MEDICINE 2007; 14:63–68 © 2007 by the Society for Academic Emergency Medicine

Keywords: medical errors, cerebellar infarction, misdiagnosis, stroke

- 22% miss rate overall
- 1/3 in 3hr window
- 37% Posterior Syndromes initially misdiagnosed
- 65% at the community site without a fully documented neurological exam were missed

Missed Ischemic Stroke Diagnosis in the Emergency Department by Emergency Medicine and Neurology Services

Allison E. Arch, MD, MPH; David C. Weisman, MD; Steven Coca, DO, MS; Karin V. Nystrom, APRN, MSN; Charles R. Wira III, MD; Joseph L. Schindler, MD

Background and Purpose—The failure to recognize an ischemic stroke in the emergency department is a missed opportunity for acute interventions and for prompt treatment with secondary prevention therapy. Our study examined the diagnosis of acute ischemic stroke in the emergency department of an academic teaching hospital and a large community hospital.

Methods—A retrospective chart review was performed from February 2013 to February 2014.

Results—A total of 465 patients with ischemic stroke were included in the analysis; 280 patients from the academic hospital and 185 patients from the community hospital. One hundred three strokes were initially misdiagnosed that is 22% of the included strokes at the combined centers. Fifty-five of these were missed at the academic hospital (20%) and 48 were at the community hospital (26%, P=0.11). Thirty-three percent of missed cases presented within a 3-hour time window for recombinant tissue-type plasminogen activator eligibility. An additional 11% presented between 3 and 6 hours of symptom onset for endovascular consideration. Symptoms independently associated with greater odds of a missed stroke diagnosis were nausea/vomiting (odds ratio, 4.02; 95% confidence interval, 1.60–10.1), dizziness (odds ratio, 1.99; 95% confidence interval, 1.03–3.84), and a positive stroke history (odds ratio, 2.40; 95% confidence interval, 1.30–4.42). Thirty-seven percent of posterior strokes were initially misdiagnosed compared with 16% of anterior strokes (P<0.001).

Conclusions—Atypical symptoms associated with posterior circulation strokes lead to misdiagnoses. This was true at both an academic center and a large community hospital. Future studies need to focus on the evaluation of identification systems and tools in the emergency department to improve the accuracy of stroke diagnosis. **(*Stroke*. 2016;47:668-673. DOI: 10.1161/STROKEAHA.115.010613.)**

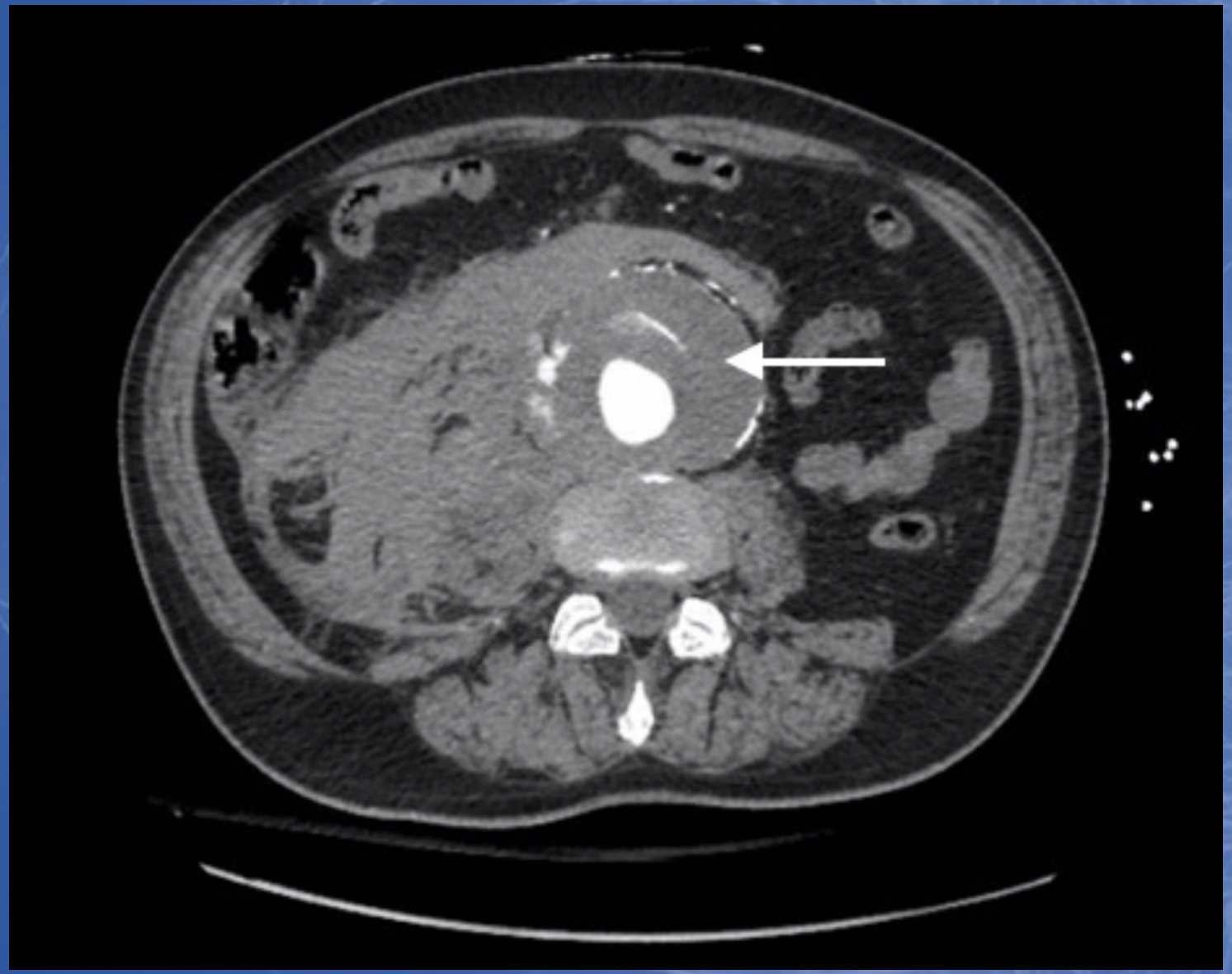
Key Words: community hospitals ■ diagnosis ■ diagnostic error ■ dizziness ■ stroke

Pitfalls: Diagnostic Errors

- **Failure of Early Identification**
  - Reframe:
    - The greatest delay is **failure to recognize stroke → no activation**
  - Key message:
    - *"The fastest stroke team is of no role if not called."*
- **Drivers of Error**
  - Anchoring, premature closure
  - Triage bias / low acuity assignment
  - Over-weighting stroke mimics vs under-recognition
- **System Fix**
  - Low threshold for **stroke alert activation**
  - Sudden onset deficit is a stroke until proven otherwise
  - Over-triage is acceptable; under-recognition is not

A Unique Challenge

A Unique Challenge



Opportunity to Optimize EM Residency Education

CONCEPT PAPER

Is There a Neurologist in the House? A Summary of the Current State of Neurovascular Rotations for Emergency Medicine Residents

Charles R. Wira III, MD, Tracy E. Madsen, MD, ScM, Bernard P. Chang, MD, PhD, Jason T. Nomura, MD, Evie Marcolini, MD, Nina T. Gentile, MD, Kraftin E. Schreyer, MD, CMQ, Lisa H. Merck, MD, MPH, Matthew Siket, MD, Karen Greenberg, DO, FACOEP, Christopher G. Zammit, MD, Edward C. Jauch, MD, MS, M. Fernanda Bellolio, MD, MSc, and from the Society for Academic Emergency Medicine Neurological Emergencies Interest Group

- Survey of EM Residency Programs
  - N=48
  - 52.1% indicated having a required rotation
    - 6.2% general neurology,
    - 2% stroke service,
    - 18.8% neurologic intensive care unit,
    - 2% neurosurgery,
    - 22.9% on a combination of services.

***Trauma resuscitations are a requirement of all programs


unfinished
BUSINESS

Original research

Direct to angiosuite strategy versus standard workflow triage for endovascular therapy: systematic review and meta-analysis

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► Additional supplemental material is published online only. To view, please visit the journal online (http://dx.doi.org/10.1136/neurintsurg-2022-018895).

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ABSTRACT

Background Reducing stroke workflow times when performing endovascular thrombectomy is associated with improvement in clinical outcomes. We compared outcomes among large vessel occlusion (LVO) stroke patients following the direct to angiosuite (DTAS) strategy versus standard workflow (SW) when undergoing endovascular therapy.

Methods We conducted a systematic review and meta-analysis to compare rates of functional outcomes, reperfusion, symptomatic intracranial hemorrhage (sICH) and stroke workflow metrics. We included observational studies and clinical trials that compared the DTAS strategy versus SW, and at least one outcome of interest was assessed. Clinical, methodological and statistical heterogeneity were measured, and a random-effects model was used.

Results 12 studies were included in the systematic review and 8 in the meta-analysis (n=2890). The DTAS strategy was associated with significant higher odds of good functional outcome at 90 days (47.3% vs 34.9%; OR 1.58, 95% CI 1.16 to 2.14) and a significant average reduction of door-to-puncture (mean differences (MD) −35.09, 95% CI −49.76 to −20.41) and door-to-reperfusion times (MD −32.88, 95% CI −50.75 to −15.01). We found no differences in sICH (OR 0.80,

WHAT IS ALREADY KNOWN O

⇒ Reduction in stroke workfl
associated with an increa
neurological recovery aft
thrombectomy.

WHAT THIS STUDY ADDS

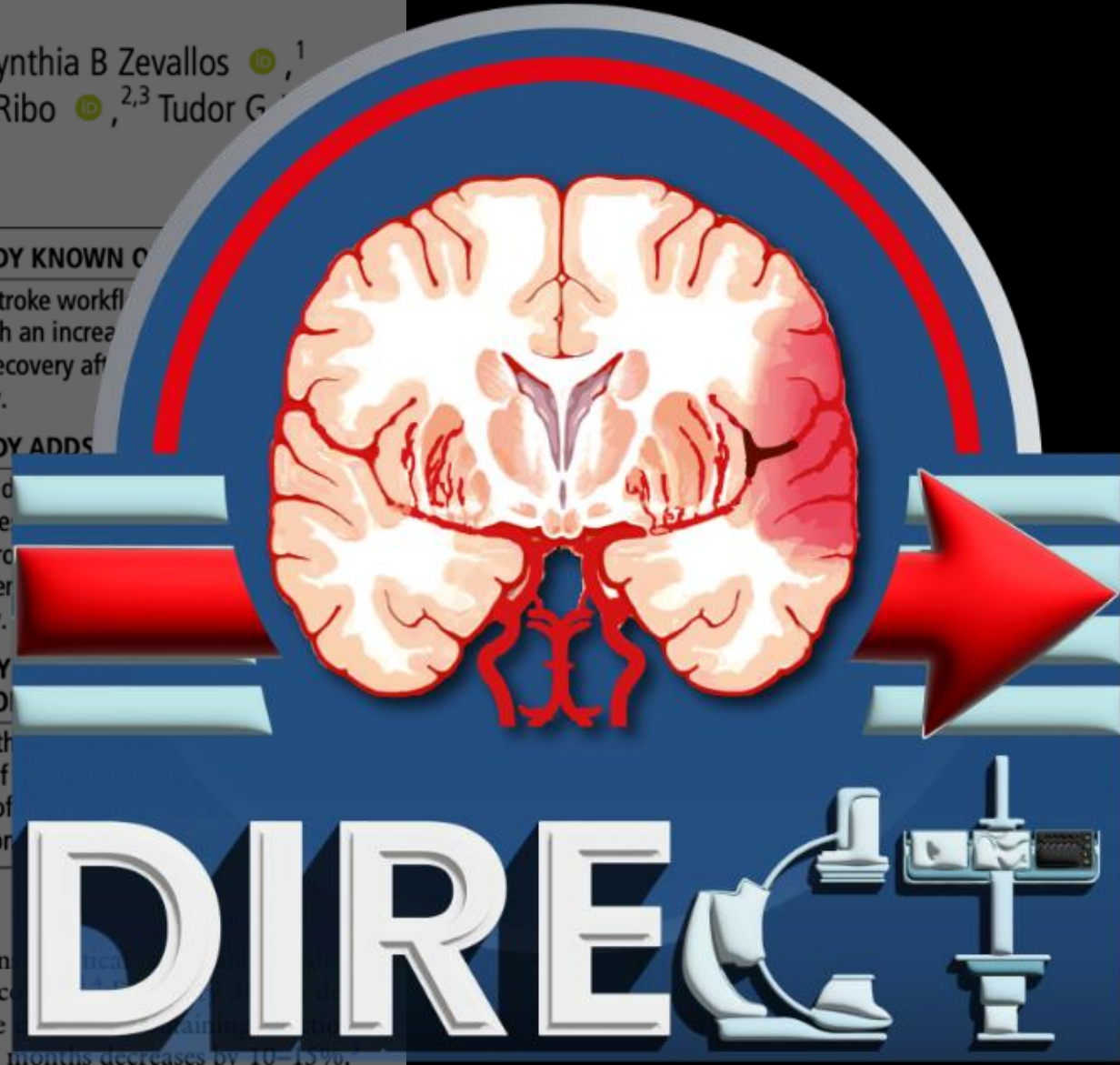
⇒ DTAS strategy d
which translate
without compro
occlusion patier
thrombectomy.

HOW THIS STUDY
PRACTICE AND/O

⇒ The results of th
optimization of
development of
randomized cor

reperfusion remain
of neurological rec
to reperfusion, the
independence at 3 months decreases by 10–15%.

Delay Avo**I**ding Primary Evaluation for Th**R**ombectomy of Acute Strok**E** Patients with Large Vessel O**C**clusion in the Angiography Sui**T**e (**DIRECT**)



Take-Home Message

- Minutes saved = neurons saved
- Optimize:
  - Prenotification
  - Direct-to-CT
  - Parallel workflows
  - Rapid reperfusion decisions
- Areas for Improvement
  - Diagnostic errors
  - Disparities
  - Geographic Destiny