Prehospital Emergency Stroke Care

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October 24, 2025

Objectives

- Explain the importance of prehospital acute stroke recognition.
- Describe how a coordinated stroke system of care facilitates timely diagnosis and treatment for patients with acute stroke.
- Identify capabilities of a mobile stroke unit that facilitate efficient diagnosis and treatment of acute neurological emergencies.

Disclosures

- FINANCIAL DISCLOSURE:
  - Grant Support: NINDS U01-NS131197
  - Project Support: Prehospital Guidelines Consortium
  - Past Travel: American Stroke Association Advisory Committee

- UNLABELED/UNAPPROVED USES DISCLOSURE:
  - Tenecteplase and alteplase for acute ischemic stroke reperfusion in patients with last known well > 3 hours

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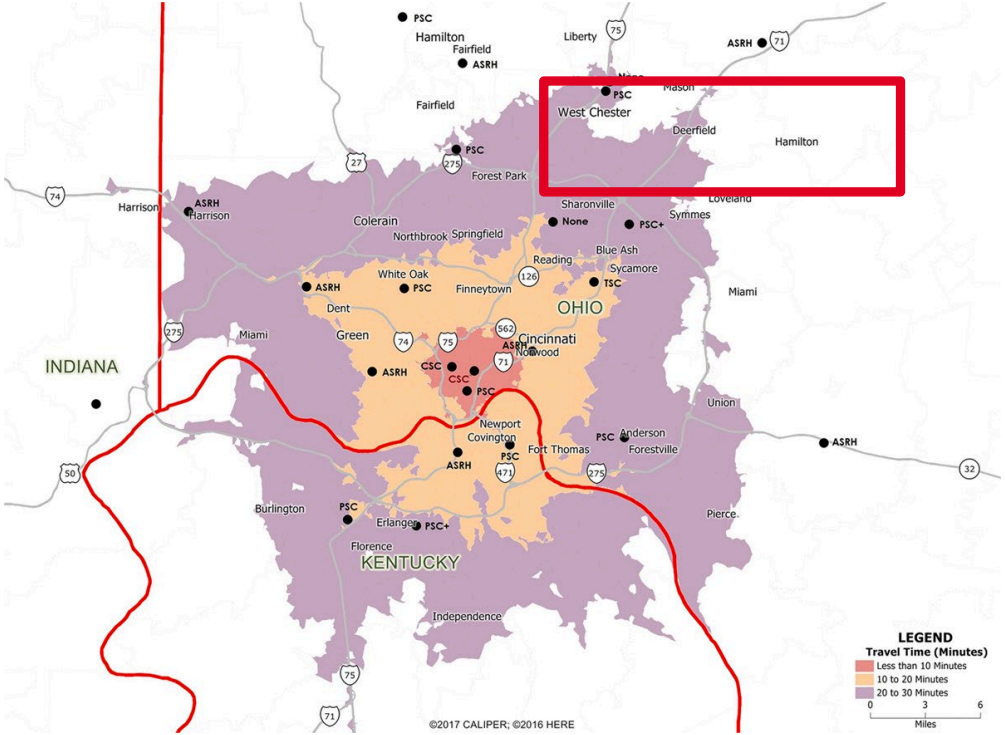
- EMS MEDICAL DIRECTOR
  - UCHealth Mobile Stroke Unit
  - Several EMS Agencies in SW Ohio

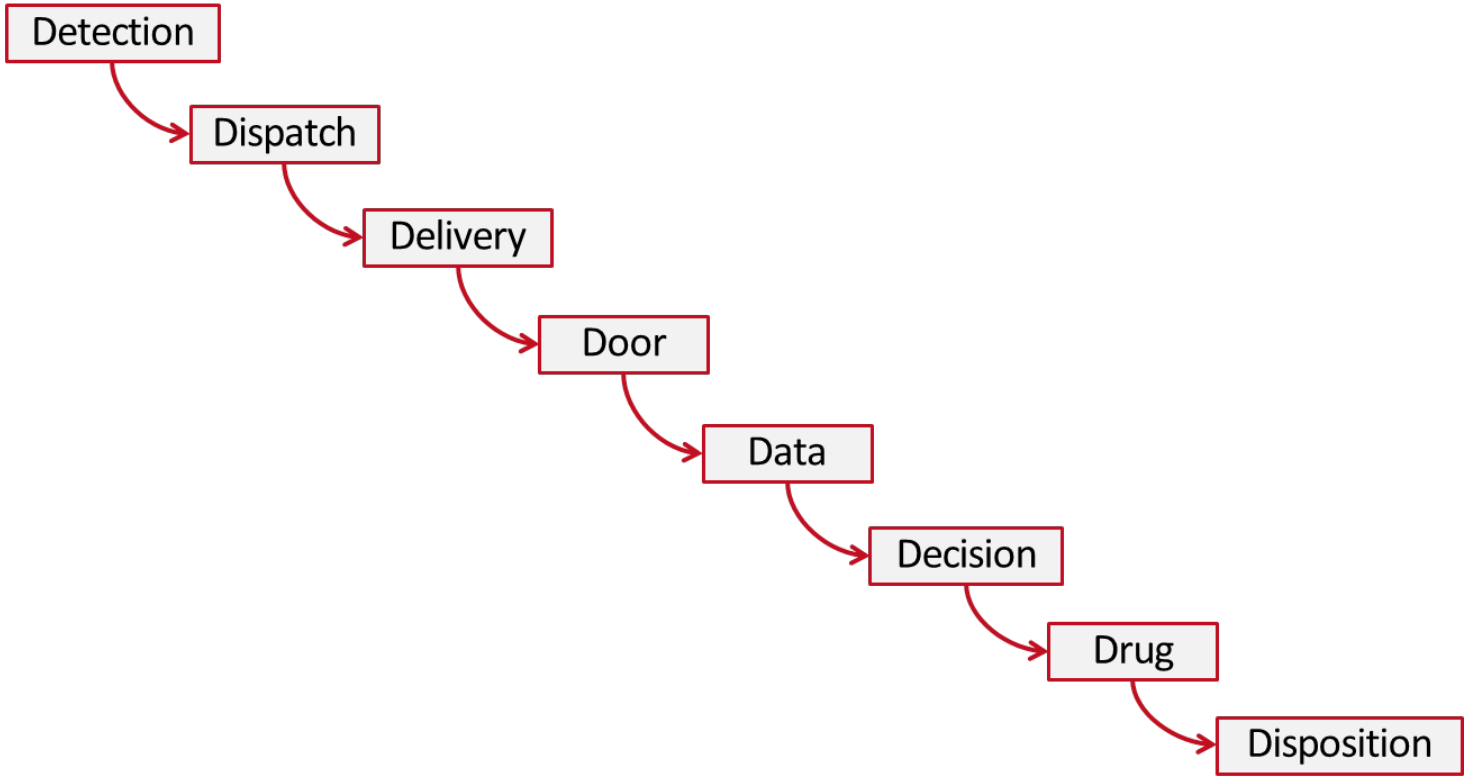
Disclosures



Acute Stroke: Time Matters

- Saver *et al*. *JAMA*. 2013.
  - "Time is brain" adage
    - 2 million brain cells per minute of stroke
  - For every 15-minute increment reduced treatment time:
    - Reduced in-hospital mortality (OR 0.96; 0.95-0.98)
    - Increased discharge home (1.03; 1.02-1.04)
    - Increased independent ambulation at discharge (1.04; 1.03-1.05)
    - Reduced symptomatic ICH (OR 0.96; 0.95-0.98)

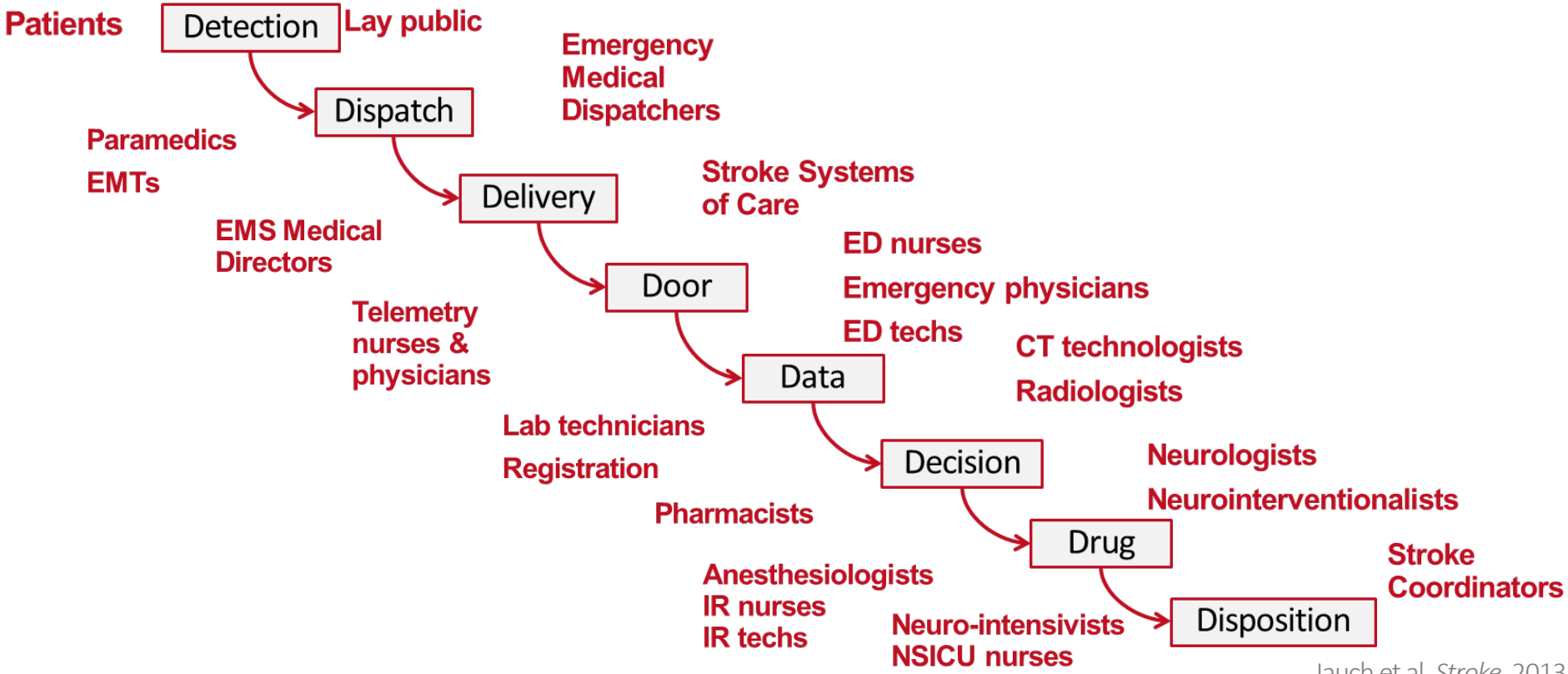
Stroke Chain of Survival



Jauch et al. *Stroke*. 2013

Zachrison et al. *Stroke*. 2023

Stroke Chain of Survival



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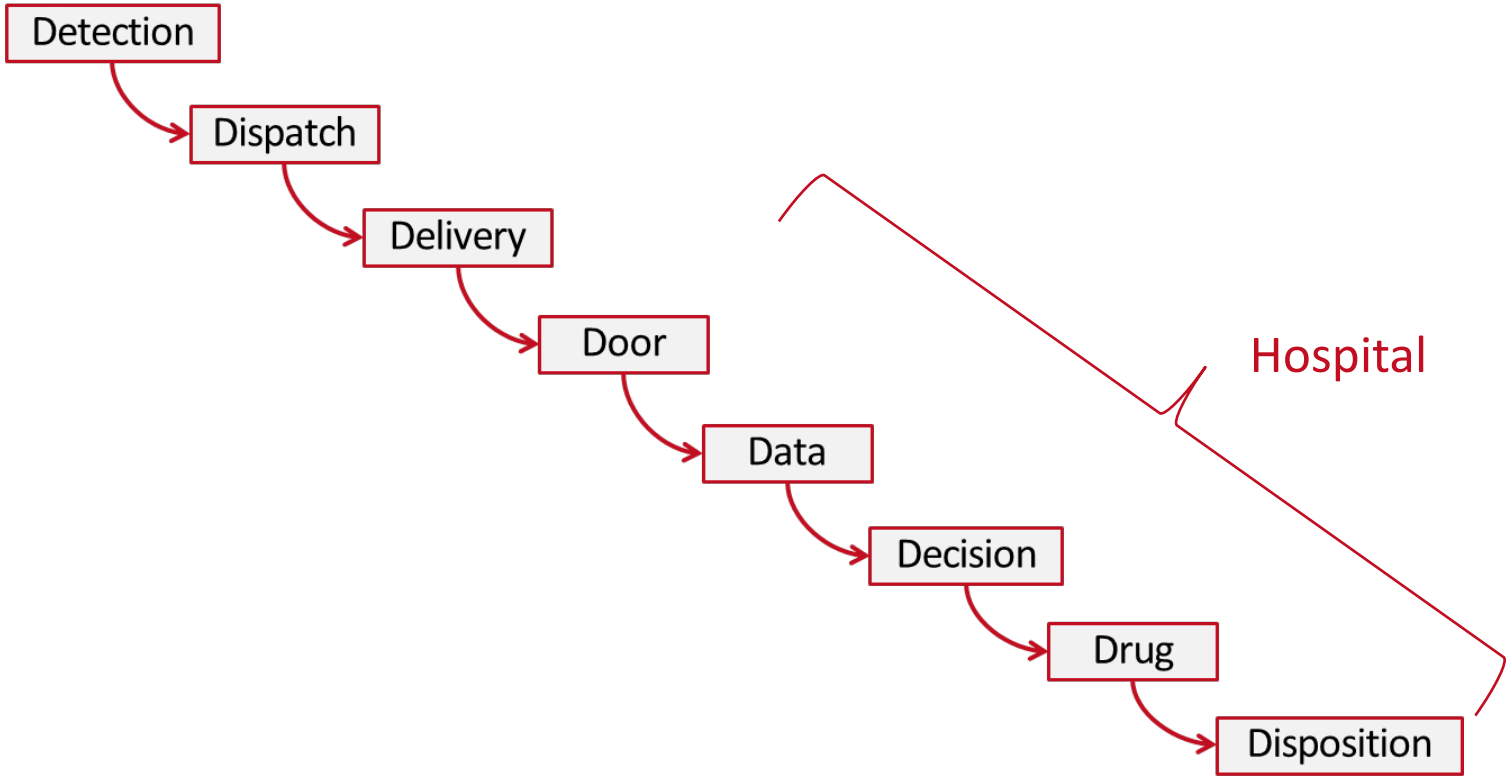

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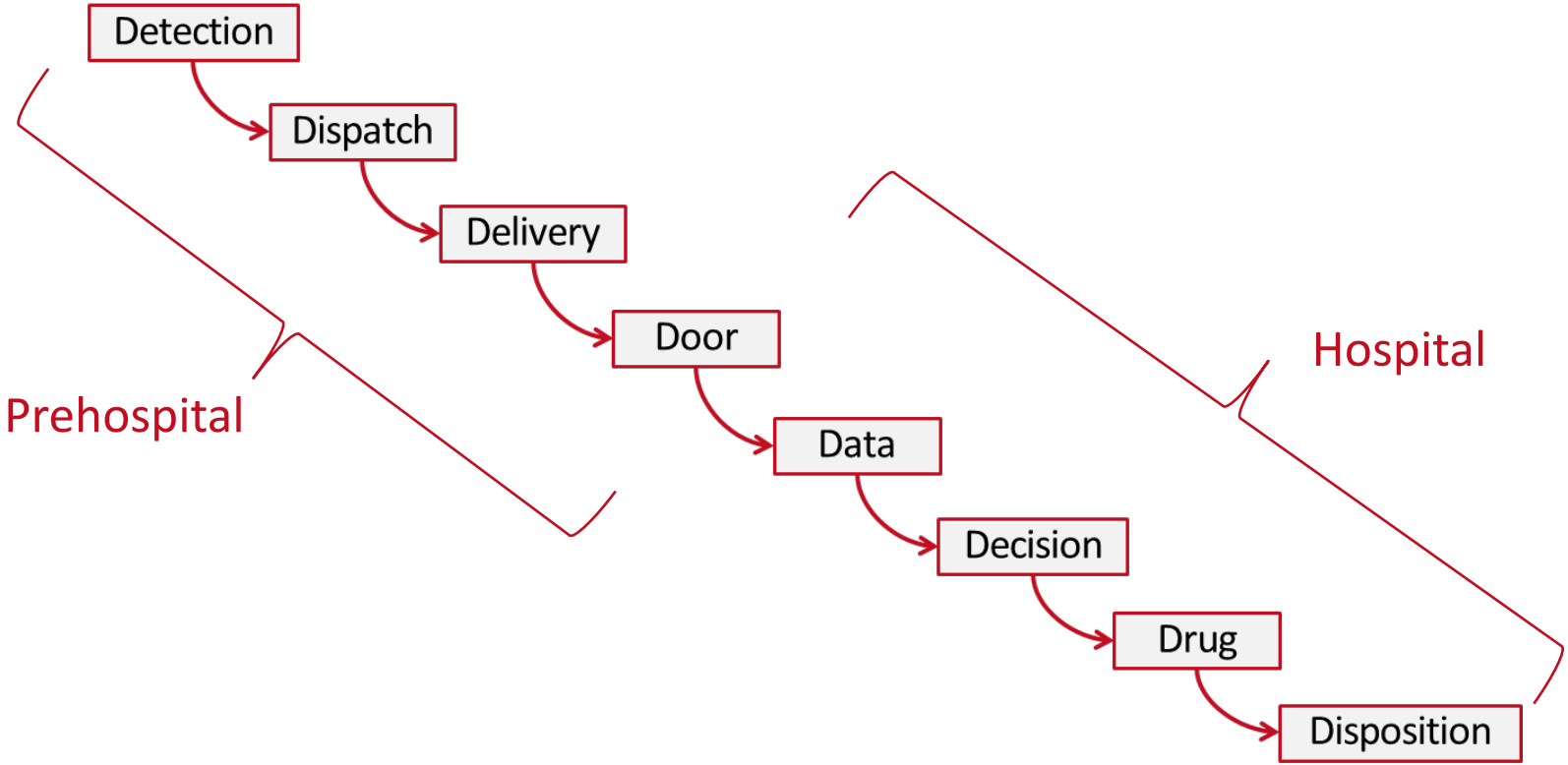

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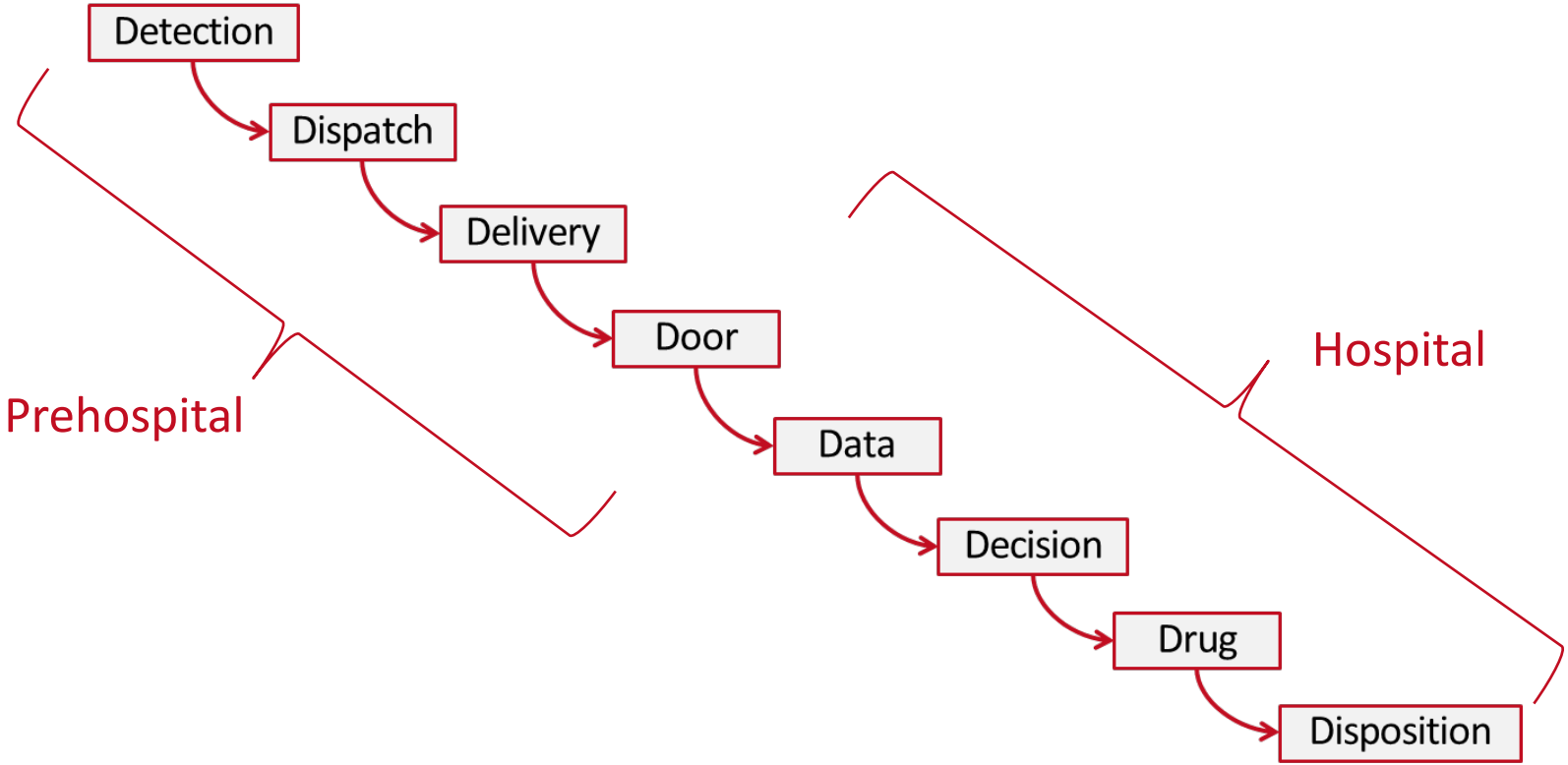
Only as Strong…



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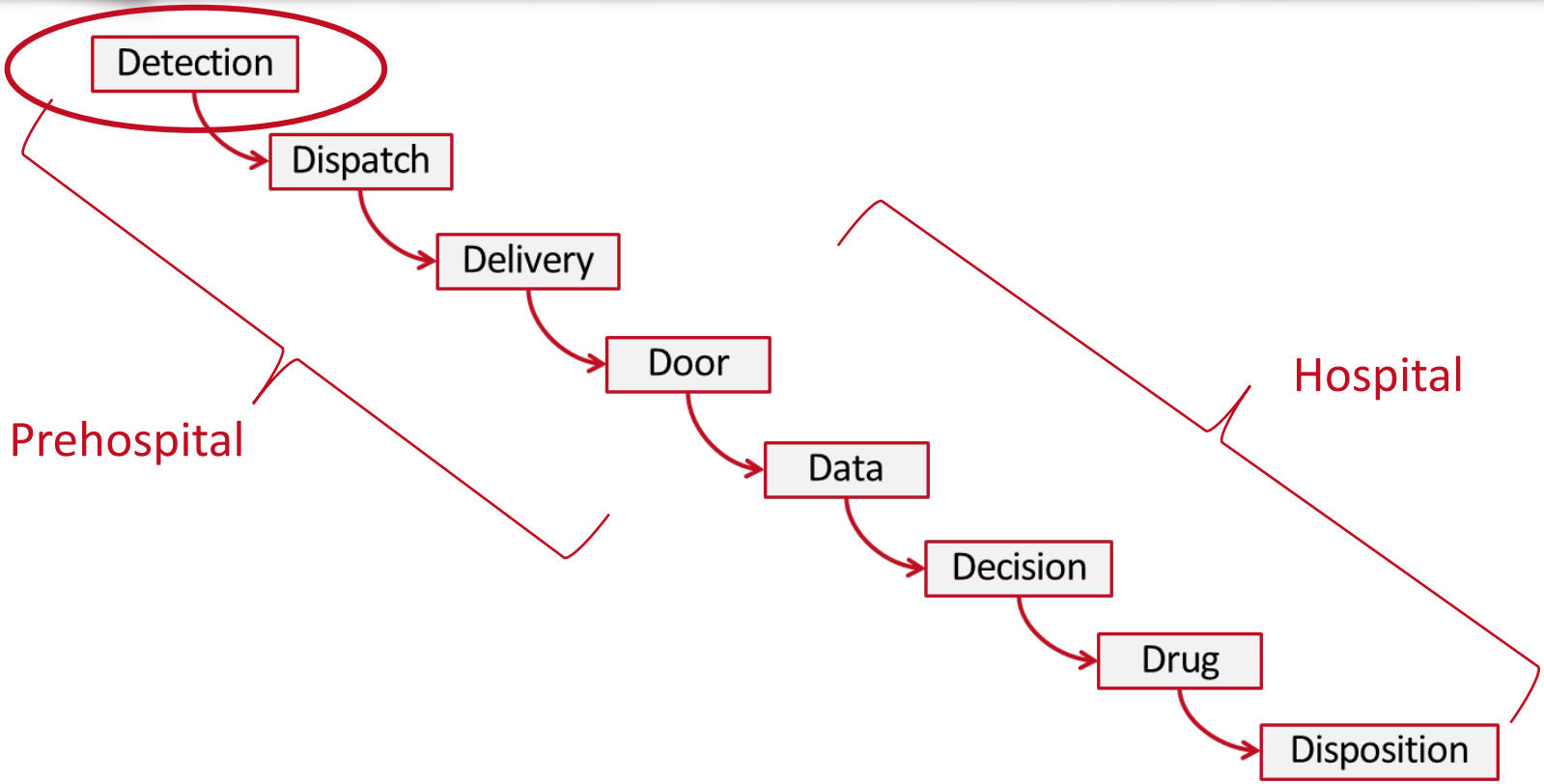
Layperson Stroke Recognition



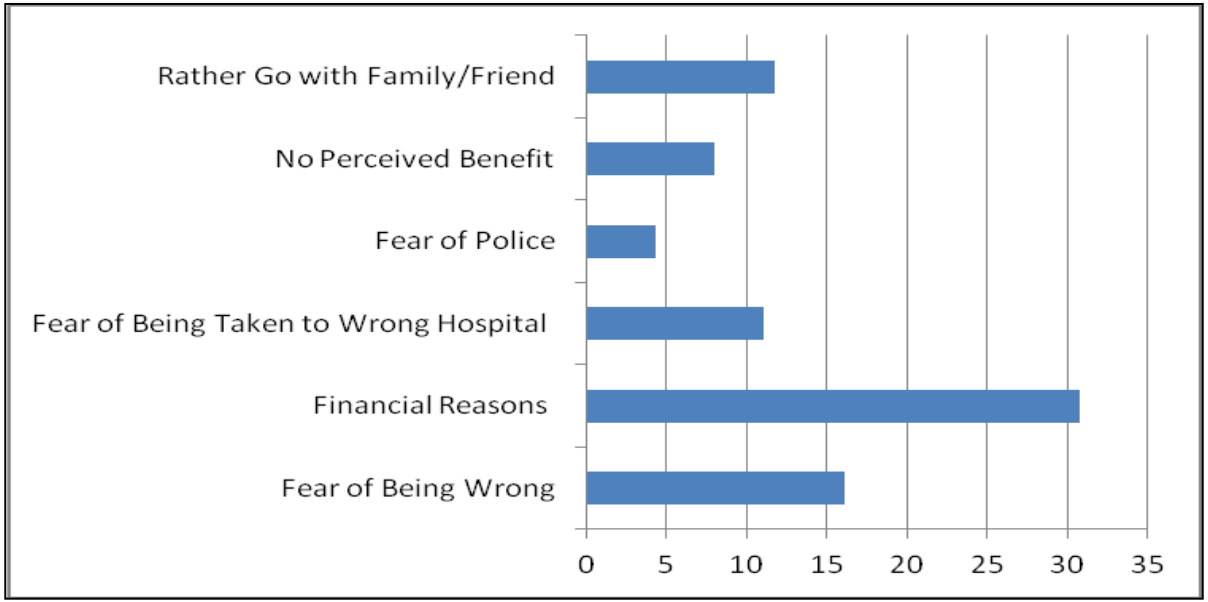
Jauch et al. *Stroke*. 2013

Zachrison et al. *Stroke*. 2023

Layperson Stroke Recognition

R	Á	P	I	D	O
Rostro caído.	Alteración del equilibrio.	Pérdida de fuerza en el brazo o una pierna.	Impedimento visual repentino.	Dificultad para hablar.	Obten ayuda. Llama al 911.

More Than Just Recognition



Eisenstein et al. *AJBR*. 2018

CEERIAS

- Community intervention in two South Side Chicago neighborhoods with proximity to primary stroke centers

- "Stroke promoters"
  - Trained laypersons from the target community
  - Taught peers about 9-1-1 for acute stroke

Prabhakaran et al. *JAHA*. 2020

CEERIAS

CEERIAS

My Personal

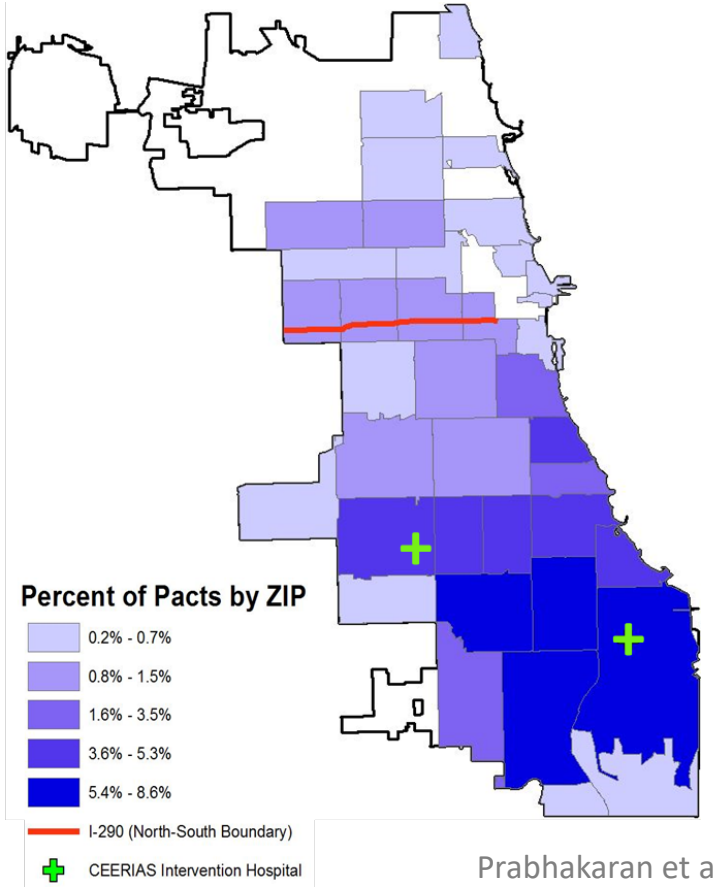
PACT TO ACT F.A.S.T.

signed by:_____

- Anytime, anywhere I observe a person with any of the FAST signs of stroke, **I will call 911 immediately,** even if the person says they want to wait. I know with stroke every second counts and with every second, the average stroke patient loses 32,000 brain cells.
- **F—FACE:** Ask the person to smile. Does one side of the face droop?
- **A—ARMS:** Ask the person to raise both arms. Does one arm drift downward?
- **S—SPEECH:** Ask the person to repeat a simple phrase. Is their speech slurred or strange?
- **T—TIME:** If you observe any of these signs, call 9-1-1 immediately

CEERIAS

- 242 Community Promoters
  - 81 Black Men
  - 133 Black Women
  - 4 Hispanic Men
  - 5 Hispanic Women
  - 3 NH White Men
  - 16 NH White Women
- 39,795 Pact to Act FAST Pledges returned



Prabhakaran et al. *JAHA*. 2020

CEERIAS

- Primary Outcomes:
  - Increase EMS utilization for confirmed stroke
  - Improve early arrival for confirmed stroke

- Overall negative study

- But! Early arrival was significantly improved in certain subgroups:
  - Age < 66 years (0.8%/month increase; p=0.036)
  - African-Americans (0.9%/month increase; p=0.037)
  - Men (1.2%/month increase; p=0.026)

Prabhakaran et al. *JAHA*. 2020

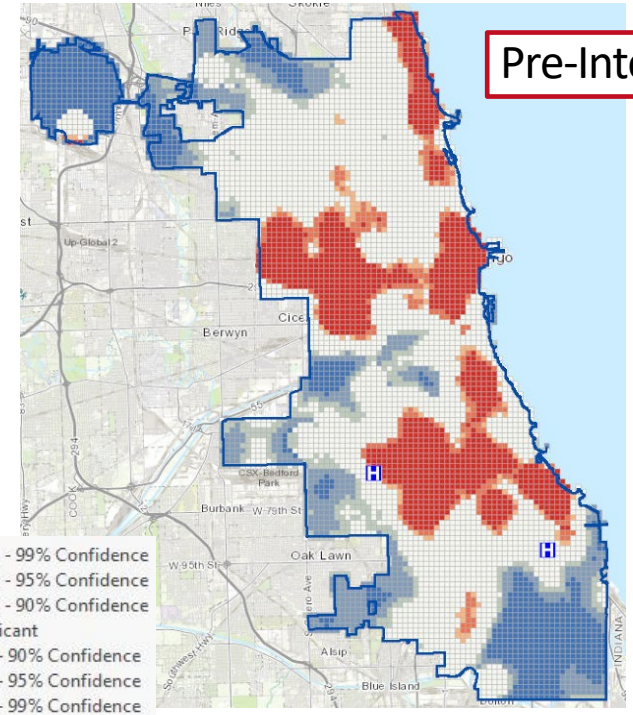
Impact on Stroke-Specific Transports?

- All EMS calls from the municipal EMS provider agency with:
  - Paramedic impression of stroke
  - Direct transport to a stroke center
- No additional training in stroke for EMS providers
- Timeline
  - Pre-intervention: April 2014 through November 2015
  - Post-intervention: April 2016 through November 2017
- GIS hot spot analysis
  - Getis-Ord Gi* analysis was used to identify hot spots for EMS calls with paramedic impression of suspected stroke
  - Statistical hot and cold spots are defined as areas where there is <1% chance of case clusters occurring by chance

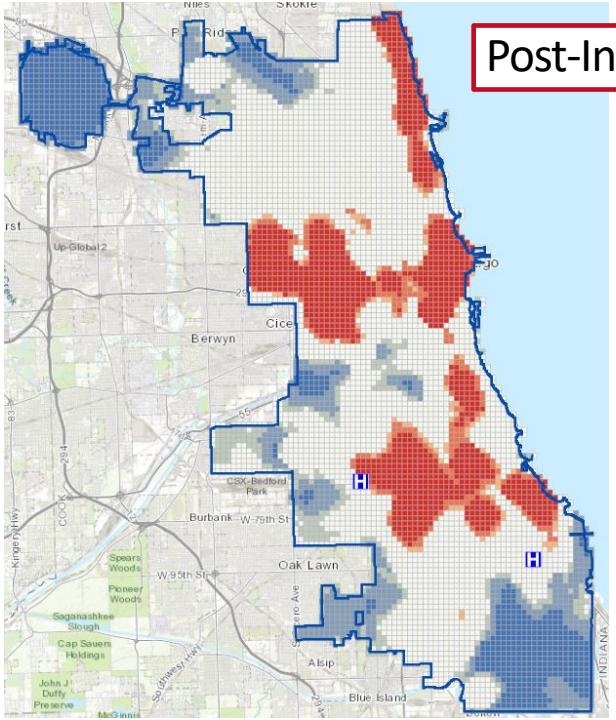
Prabhakaran et al. *JAHA*. 2020

CEERIAS EMS Sub-Analysis

City-wide EMS utilization



n= 418,796

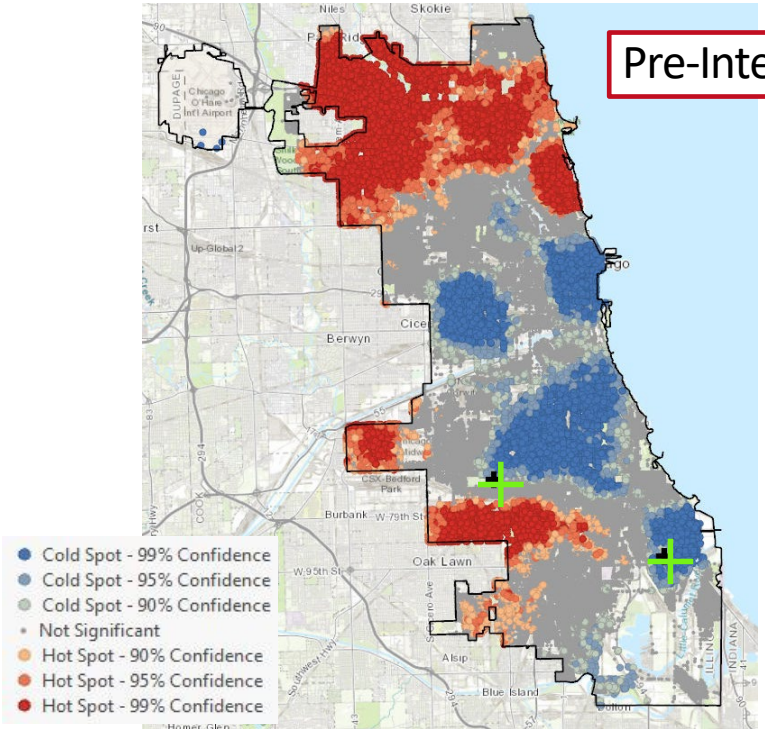


n= 430,426

Prabhakaran et al. *JAHA*. 2020

CEERIAS EMS Sub-Analysis

Paramedic-suspected stroke EMS transports

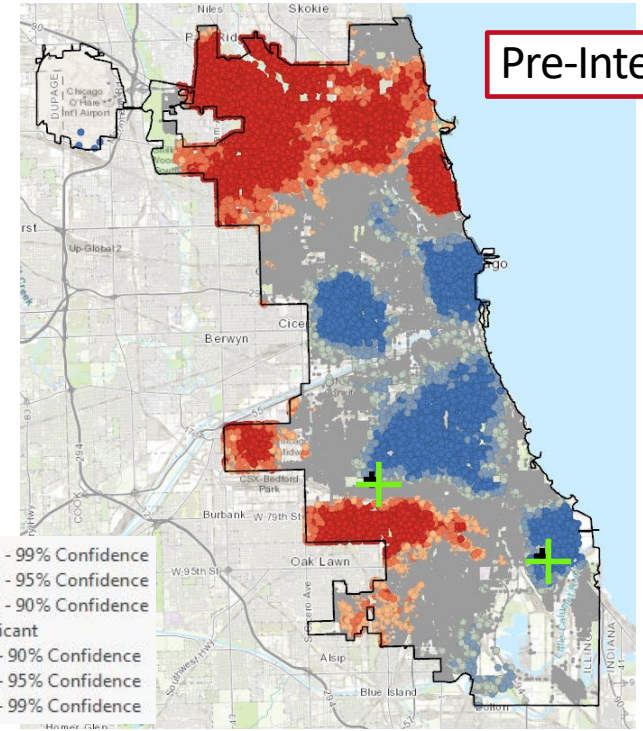


n= 4,246

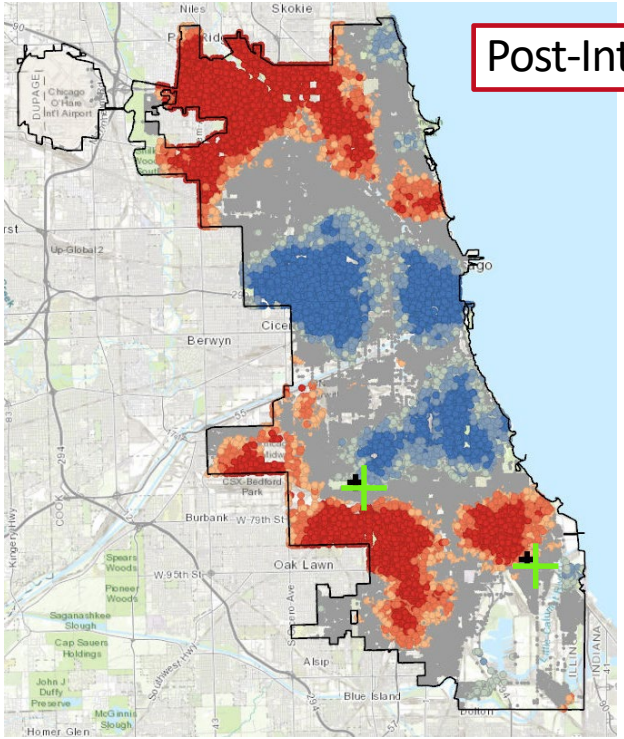
Prabhakaran et al. *JAHA*. 2020

CEERIAS EMS Sub-Analysis

Paramedic-suspected stroke EMS transports



n= 4,246



n= 4,875

Prabhakaran et al. *JAHA*. 2020

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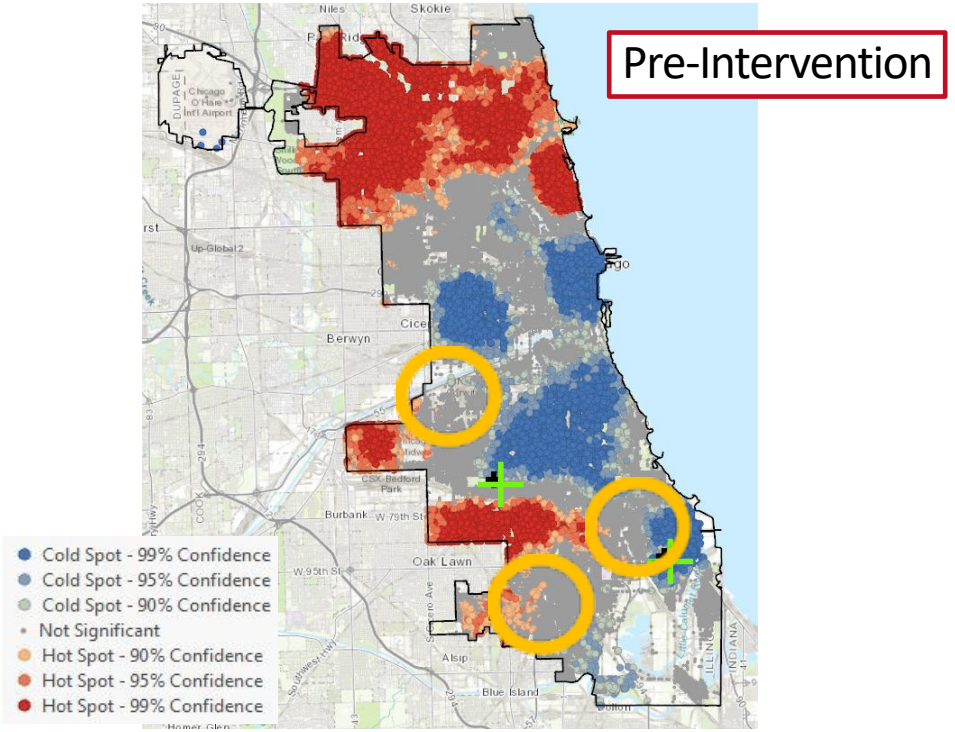

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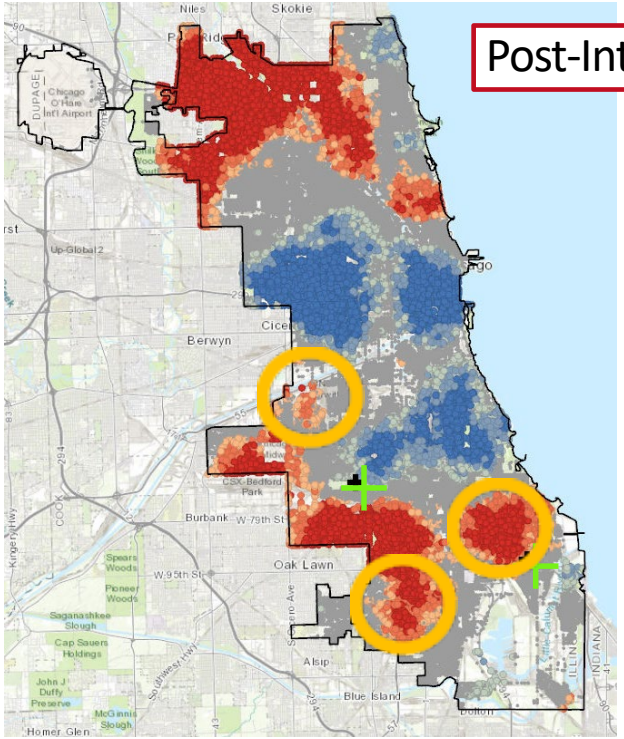


n= 4,875

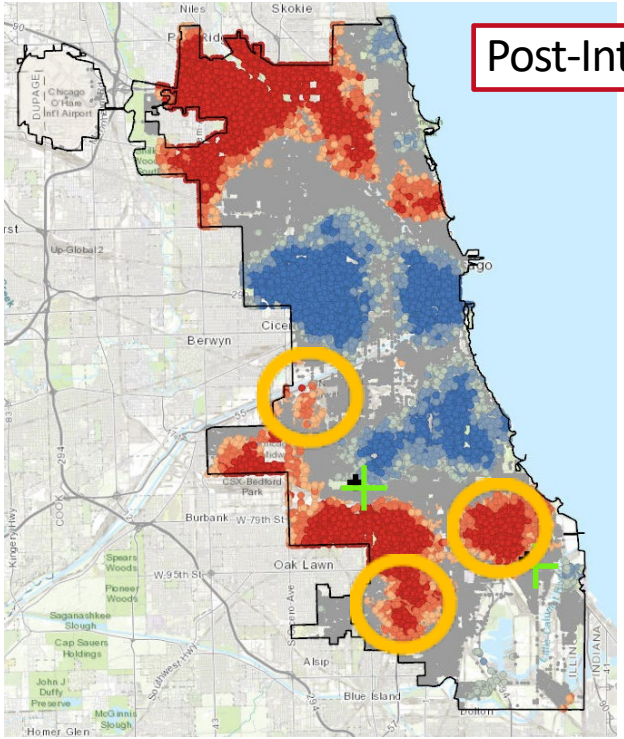
Prabhakaran et al. *JAHA*. 2020

CEERIAS EMS Sub-Analysis

	Pre-intervention (suspected stroke/ total EMS calls)	Post-intervention (suspected stroke/ total EMS calls)	Odds ratio (95%CI)	p value
Near secondary hospital (1.5 mi radius)	92/10,125 (0.91%)	122/9,345 (1.31%)	1.4 (1.1, 1.9)	0.008

	Pre-intervention (suspected stroke/ total EMS calls)	Post-intervention (suspected stroke/ total EMS calls)	Odds ratio (95%CI)	p value
Near included target hospital (1.5 mi radius)	181/19,862 (0.91%)	298/19,862 (1.50%)	1.7 (1.4, 2.0)	<0.001

	Pre-intervention (suspected stroke/ total EMS calls)	Post-intervention (suspected stroke/ total EMS calls)	Odds ratio (95%CI)	p value
Between included hospitals (2 mi radius)	187/18,227 (1.03%)	269/18,849 (1.43%)	1.4 (1.2, 1.7)	<0.001



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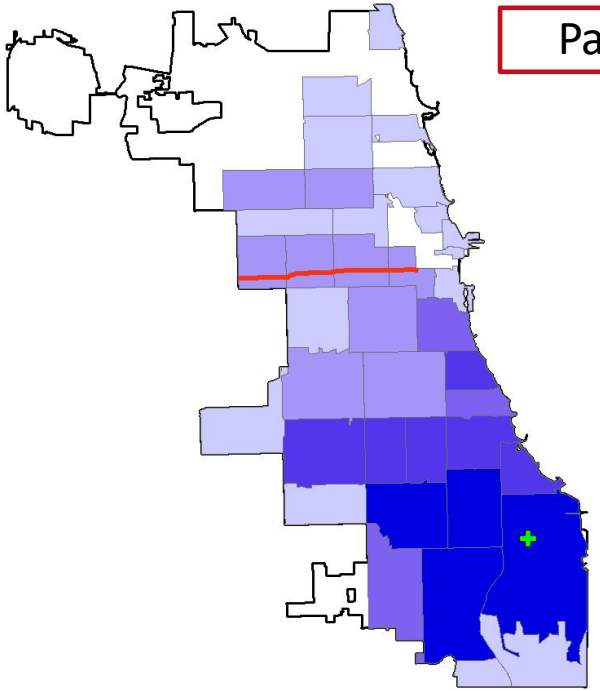
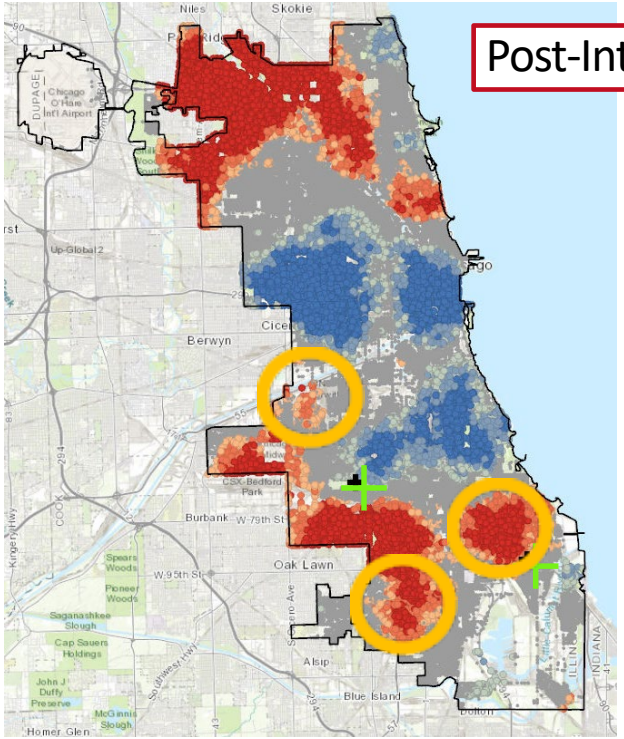


Pacts by ZIP



Post-Intervention

Prabhakaran et al. *JAHA*. 2020

CEERIAS EMS Sub-Analysis

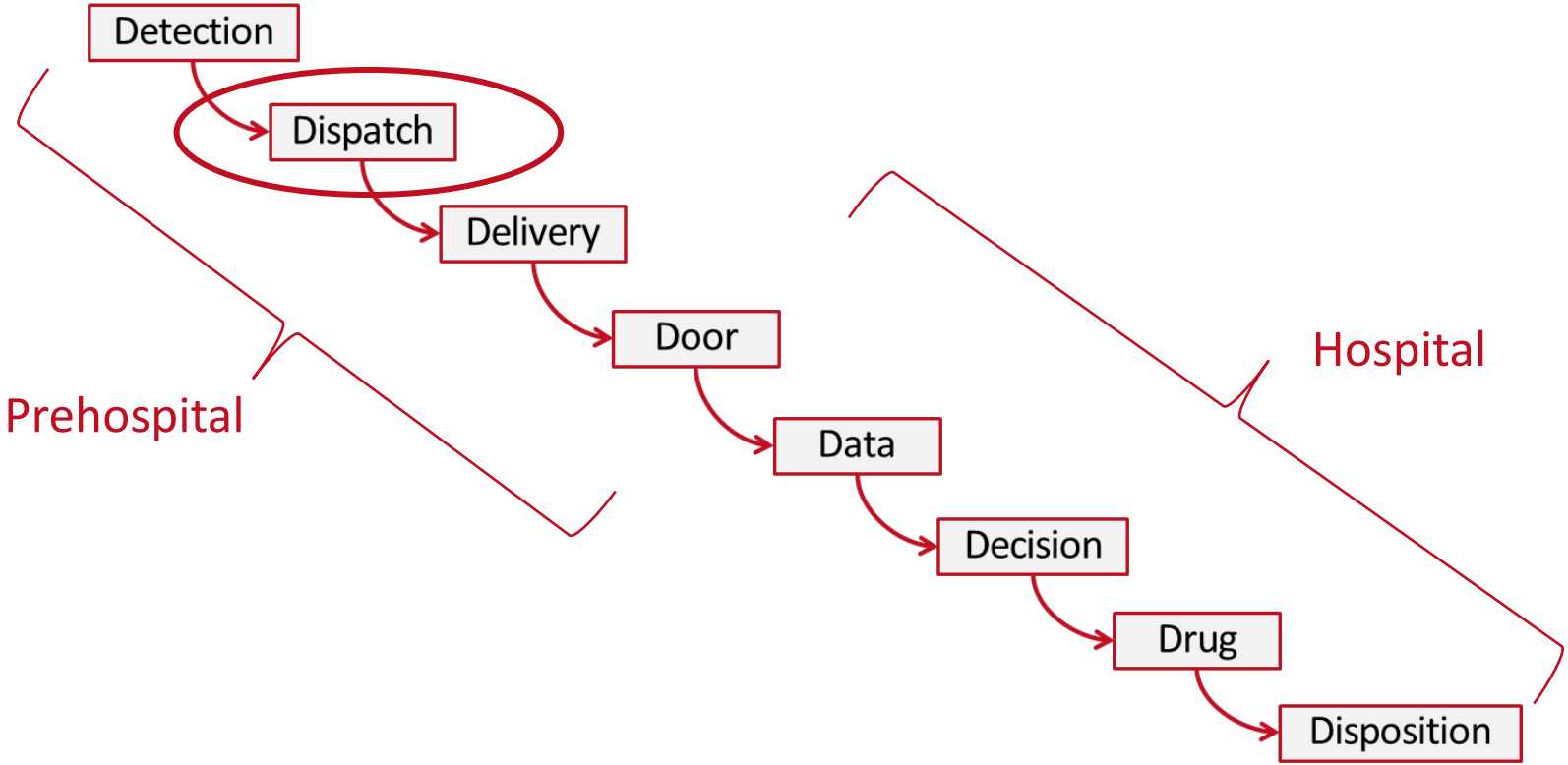
	Pre-intervention (suspected stroke/ total EMS calls)	Post-intervention (suspected stroke/ total EMS calls)	Odds ratio	P value
North Side	1,904/158,408 (1.20%)	1,978/162,947 (1.21%)	1.0	0.757
South Side	2,342/260,388 (0.90%)	2,897/264,582 (1.08%)	1.2	<0.001

Prabhakaran et al. *JAHA*. 2020

CEERIAS EMS Sub-Analysis

- Reasons for the observed increase?
  - Patients with true stroke are calling 9-1-1 more?
  - May be calling from other parts of the city (e.g., from work)?
  - Patients with true emergencies are calling 9-1-1 more?
  - Patients with stroke mimics are calling 9-1-1 more?
  - **Patients are using clearer, more stroke-specific language when interacting with 9-1-1 dispatchers and paramedics?**

Stroke Chain of Survival



Jauch et al. *Stroke*. 2013

Zachrison et al. *Stroke*. 2023

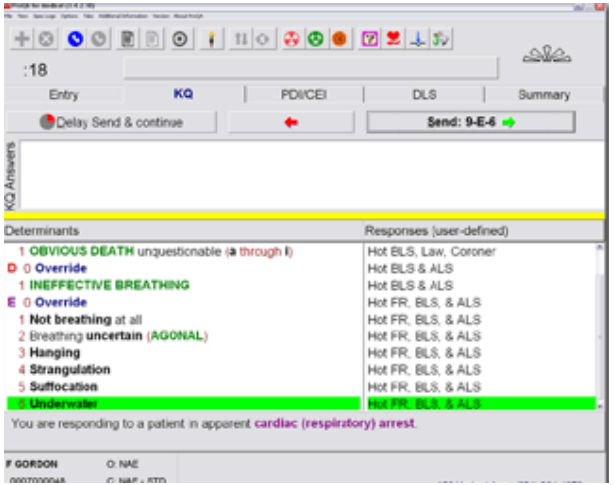
9-1-1 Call Taking

Caller Contacts 9-1-1

Emergency Telecommunicator Determines Type of Emergency

Information Gathering

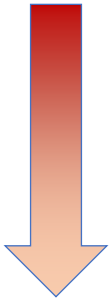
Pre-arrival Instructions



Ambulance Dispatched

9-1-1 Call Taking

Identification of stroke during 9-1-1 call



10-minute reduction in scene-to-hospital-arrival time

Caceres et al. *JSCD*. 2013

9-1-1 Call Interaction

- Transcribed 110 9-1-1 call recordings for confirmed acute stroke
- Content analysis and word frequency analysis
- Telecommunicators recognized stroke in 48% of calls
  - Median call duration was 61 seconds

Richards et al. *PEC*. 2017

Words Matter!

Word/Phrase Used by the 9-1-1 Caller	EMD Recognized Stroke (n=53)	EMD Unrecognized Stroke (n=57)	p-value[a]
Stroke	43 (81.1%)	1 (1.8%)	<0.0005
Think	28 (52.8%)	4 (7.0%)	<0.0005
Having a stroke	21 (39.6%)	1 (1.8%)	<0.0005
Had a stroke	10 (18.9%)	0 (0%)	0.001
Slurred	12 (22.6%)	2 (3.5%)	0.004
Awake	9 (17.0%)	1 (1.8%)	0.006
Mouth	6 (11.3%)	0 (0%)	0.007
Twisted	6 (11.3%)	0 (0%)	0.007
Side	17 (32.1%)	6 (10.5%)	0.011
Face	7 (13.2%)	1 (1.8%)	0.017
Awake and breathing	4 (7.5%)	0 (0%)	0.023

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Richards et al. *PEC*. 2017

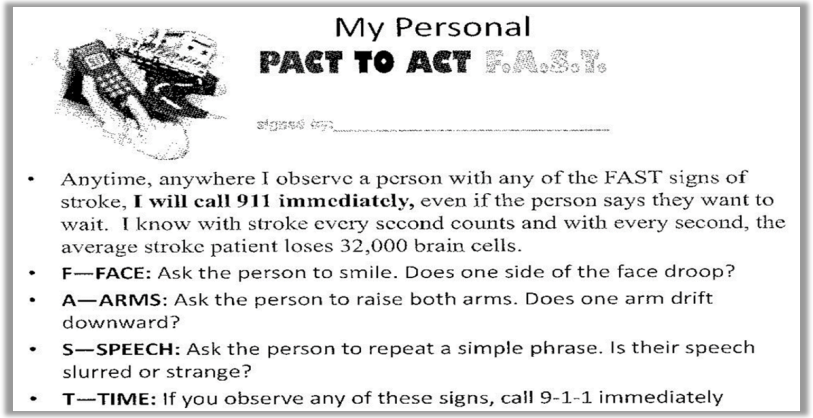
Words Matter!

Callers' Descriptors Used	Percent of Calls
Vague non-specific symptoms described	55%
Stroke mimics and distractors described	45%
Focal neurologic symptoms described	39%
Unprompted use of the word "stroke"	38%
Time of symptom onset given	5%

Richards et al. *PEC*. 2017

Words Matter!

- Encourage 9-1-1 callers to say “stroke”!



My Personal

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signed by:_____

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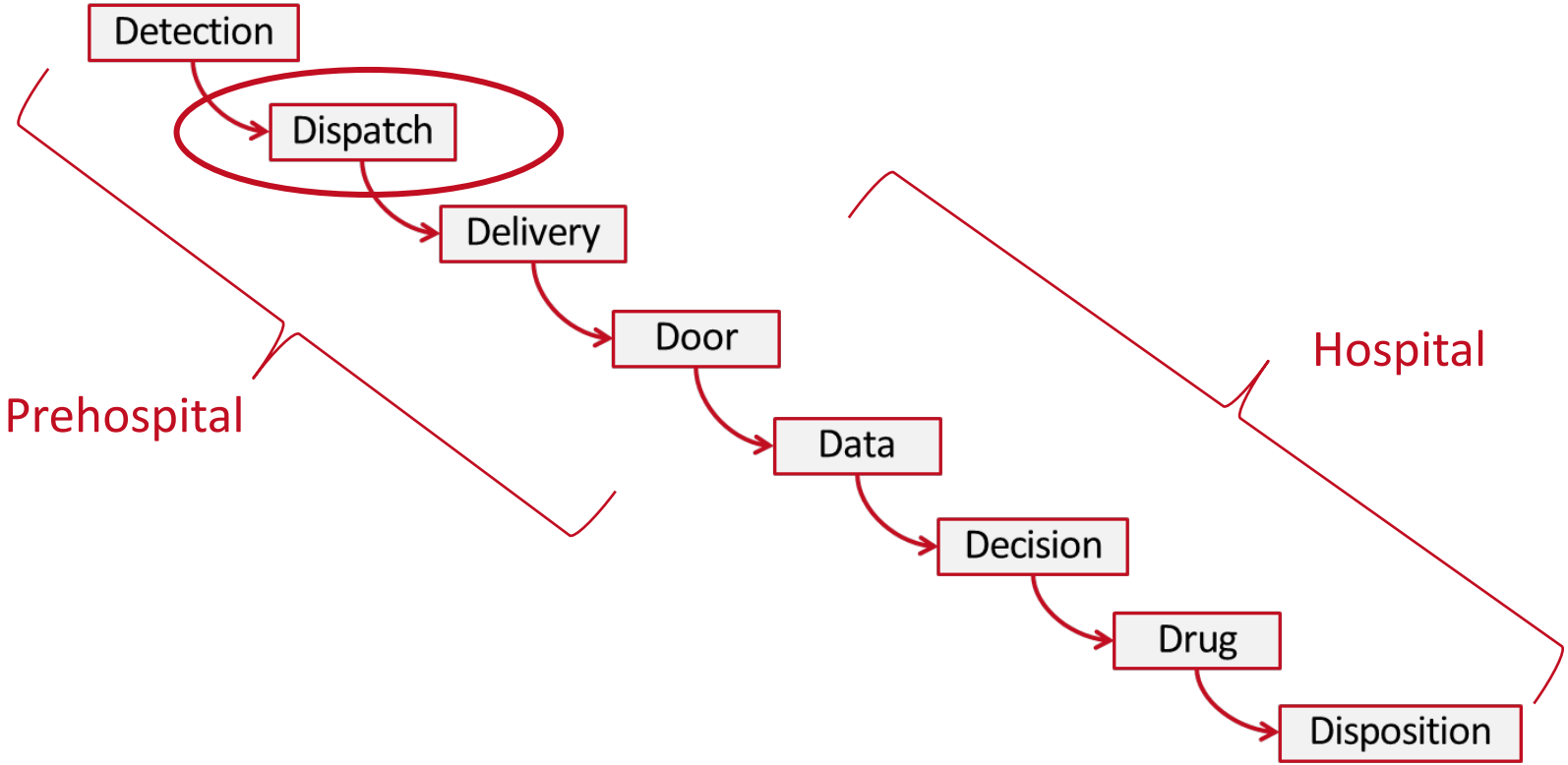
- **F—FACE:** Ask the person to smile. Does one side of the face droop?
- **A—ARMS:** Ask the person to raise both arms. Does one arm drift downward?
- **S—SPEECH:** Ask the person to repeat a simple phrase. Is their speech slurred or strange?
- **T—TIME:** If you observe any of these signs, call 9-1-1 immediately

Stroke Chain of Survival



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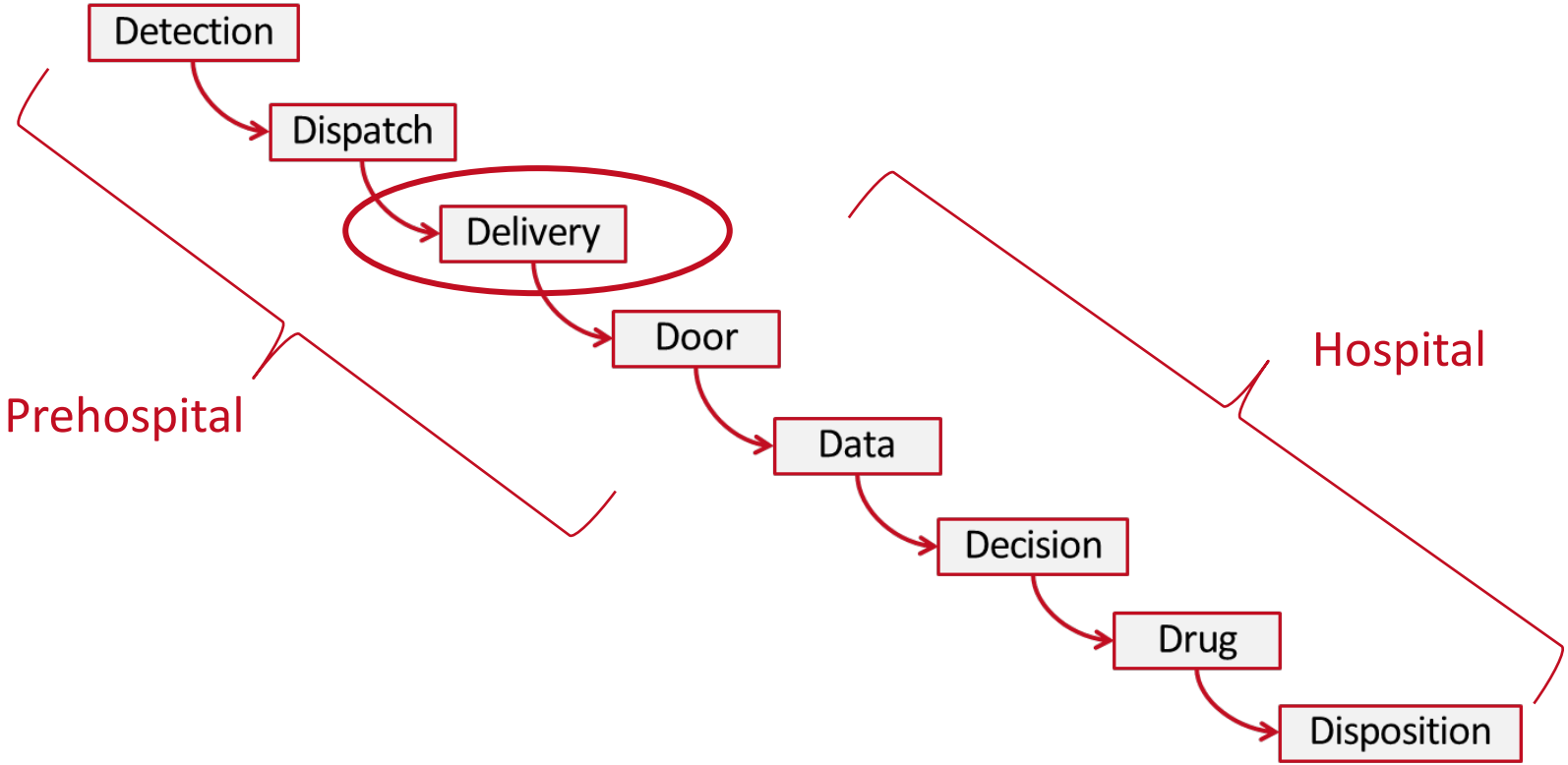

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Zachrison et al. *Stroke*. 2023

EMS Care

- EMS Stroke Recognition
- Prenotification
- Severity Screening
- Destination

EMS Care

- EMS Stroke Recognition

EMS Recognition

	EMS Suspected Stroke (n, %) (n=595)	EMS Non-Suspected Stroke (n, %) (n=273)	Unadjusted p-value	Adjusted p-value*
Received thrombolysis	108 (18%)	21 (8%)	<0.01	<0.01
Thrombolysis among patients with LKN 0-4.5 hours	108 (39%) [n=280]	21 (20%) [n=105]	<0.01	<0.01

OR 2.67, 95% CI 1.63-4.47

*Adjusted for NIHSS, GCS, age, sex, race, and prior stroke history.

Richards et al. ISC. 2021

EMS Recognition

	EMS Suspected Stroke (n, %) (n=595)	EMS Non-Suspected Stroke (n, %) (n=273)	Unadjusted p-value	Adjusted p-value*
ED arrival to thrombolysis, minutes, median (IQR)	64 (49 to 95) [n=108]	83 (72 to 122) [n=21]	0.03	0.02
EMS arrival to thrombolysis, minutes, median (IQR)	91 (76 to 127) [n=105]	118 (95 to 165) [n=20]	0.03	<0.01

*Adjusted for NIHSS, GCS, age, sex, race, and prior stroke history.

Richards et al. ISC. 2021

Association with Outcomes

- Retrospective analysis
- ESO Data Collaborative
  - Linked EMS and ED/hospital electronic medical records from across the US
  - Dispatch, paramedic report, ED/hospital diagnosis, and disposition
- 608 EMS agencies across the US

Association with Outcomes

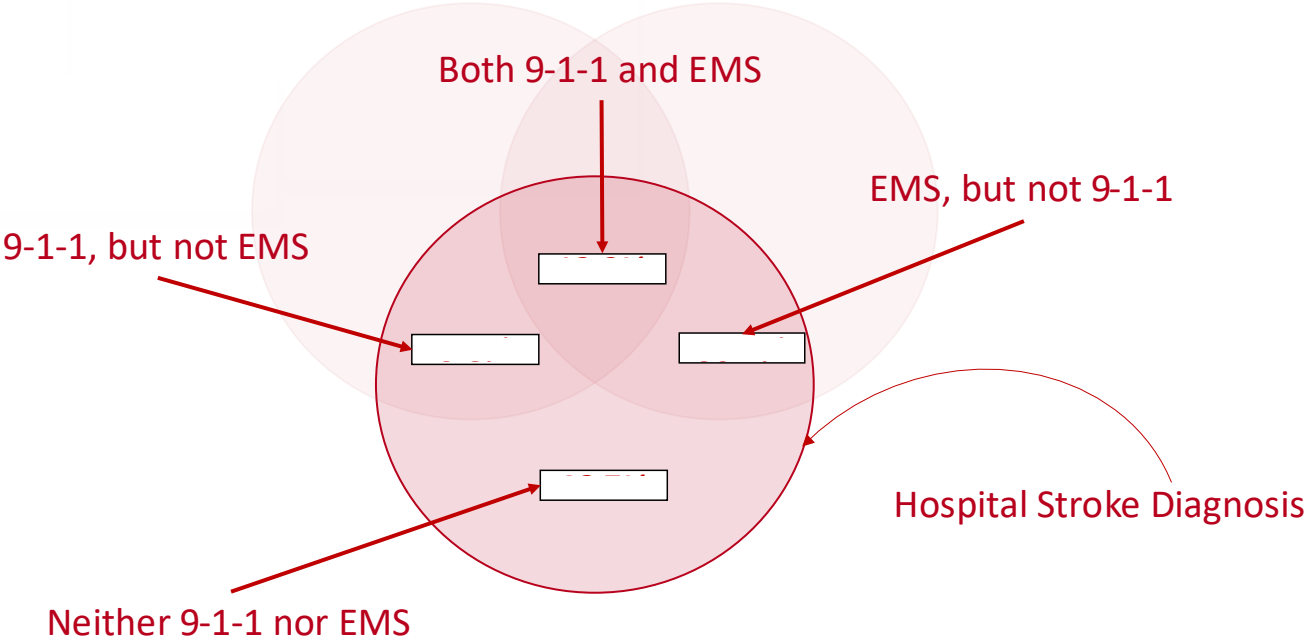
- Inclusion criteria
  - Emergency ground transports
  - Patients ≥ 18 years old
  - “Stroke” or “TIA” in any of:
    - 9-1-1 Dispatch Impression
    - EMS Impression
    - ED or Hospital ICD-10
  - Calendar Year 2021
- Exclusion criteria
  - Duplicate encounter
  - Missing any ED/Hospital ICD-10
  - Interfacility transports
- Outcomes
  - Home or short-term acute rehabilitation were considered favorable hospital dispositions
- Statistical Analysis
  - Univariable odds ratios and 95% confidence intervals (95% CI) were used to assess the association between prehospital recognition and hospital disposition

Association with Outcomes

- Transported from home/community site
  - n=25,461

- Odd ratio for home/short term rehabilitation if stroke recognized by:
  - On-scene EMS: 1.43 (95%CI 1.34-1.52)
  - 9-1-1 Dispatch: 1.55 (95%CI 1.41-1.70)
  - **Both: 1.80** (95%CI 1.62-2.01)

Identification of Confirmed Stroke



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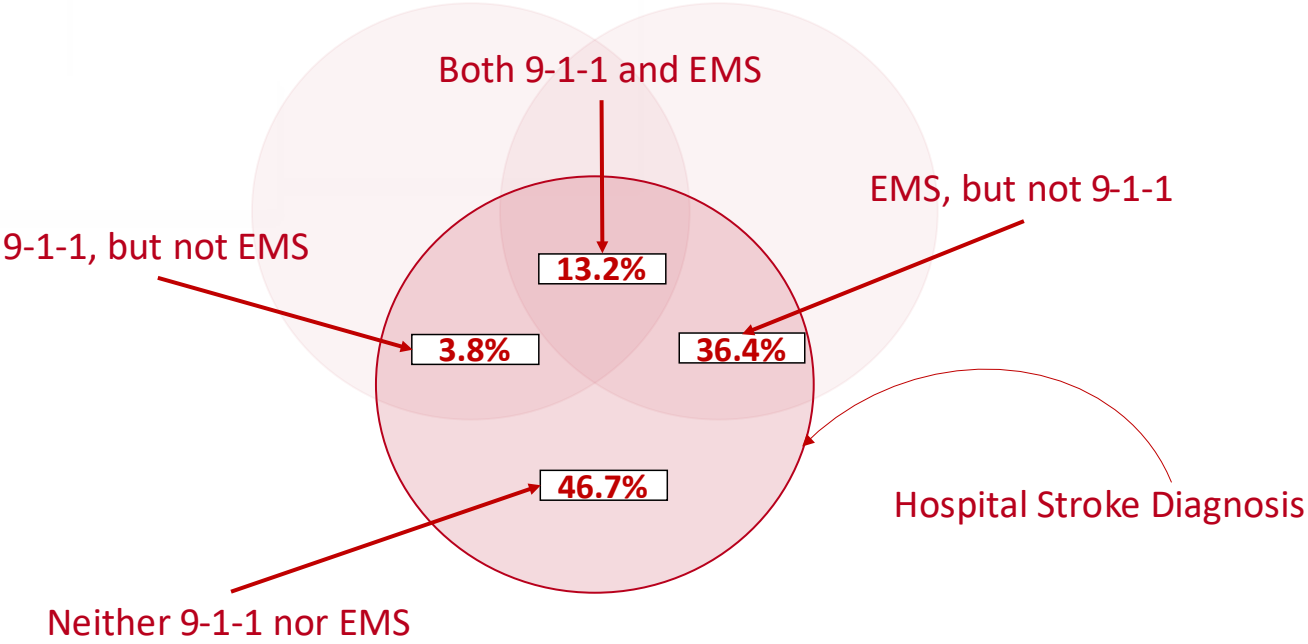


EMS Care

- Prenotification

EMS Care

- *Stroke-Specific* Prenotification

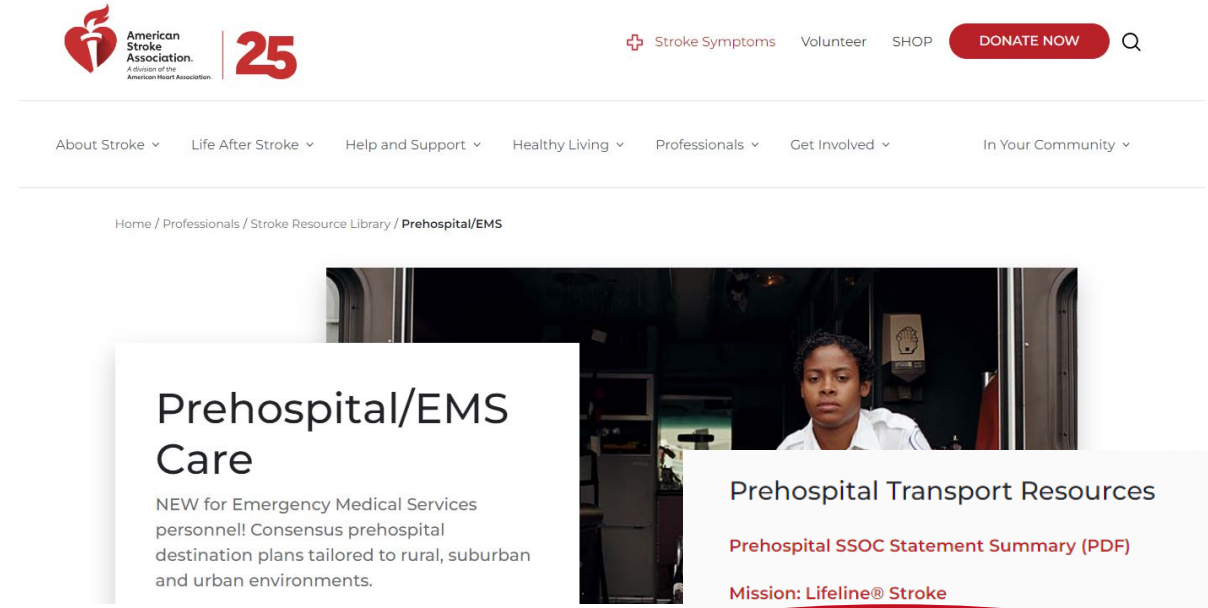
Stroke-Specific Prenotification

Table 2 Comparison of time parameters and clinical outcomes after iv t-PA use between patients with and without pre-hospital notification

	Without notification	With notification	*P*
Number	61	30	
Age (year)	62.9 ± 10.9	63.6 ± 12.2	0.78
Men (%)	41	20	< 0.01
Time to onset (min)	74.7 ± 38.5	121.5 ± 34.8	< 0.01
Door to needle (min)	47.7 ± 22.8	28.9 ± 11.4	< 0.01
Time to needle (min)	122.6 ± 37.8	150.4 ± 34.9	< 0.01
CT based (%)	35	10	< 0.01
CT based D to N (min)	42.2 ± 19.8	26.6 ± 13.8	0.02

Kim et al. *EJN*. 2009

Stroke-Specific Prenotification



stroke.org/en/professionals/stroke-resource-library/pre-hospitalems

Stroke-Specific Prenotification

EMS Stroke Alert

Patient Name: _____ Date of Birth: ___/___/___

	PATIENT/FAMILY EMERGENCY CONTACT	PERSON WHO DISCOVERED SIGNS/SYMPTOMS
Name:		
Phone Number:		

STROKE SIGNS & SYMPTOMS (CIRCLE ANY THAT APPLY)	
Slurred speech [yes / some / no]	Ataxia [body] [right / left] [arm / leg / both]
Aphasia [mute / garbled / confused]	Vision impairment [one eye / both eyes] [right / left]
Weakness [right / left] [arm / leg / both]	Other:
Facial droop [right / left]	

DATE & TIME	
Last Known Well Time:	AM / PM
Symptom Discovery Time:	AM / PM

PATIENT HISTORY			
Recent surgery or bleeding episodes	NO	YES	Details:
Previous brain hemorrhage	NO	YES	Details:
Brain cancer	NO	YES	Details:
Recent head trauma	NO	YES	Details:
Previous stroke (if so when)	NO	YES	Details:
Blood thinning medications	NO	YES	[e.g., (warfarin (Coumadin), apixaban (Eliquis), rivaroxaban (Xarelto), dabigatran (Pradaxa)]

ASSESSMENT	
Glucose:	Cardiac Rhythm: [Sinus / Atrial Fibrillation / Other]
Blood Pressure:	Stroke Severity Screen findings (C-STAT, FAST-ED, LAMS, RACE, etc.):

ADVANCE NOTIFICATION SCRIPT:

- This is Ambulance XX calling with a CODE STROKE
- Patient is a YY year old with [stroke signs & symptoms]
- Symptoms started [give last known well time] and discovered [give symptom discovery time]
- Pertinent medical history includes: [any "Yes" answers from "Patient History" above]
- Our assessment showed:
  - [BP], [glucose], [rhythm on monitor]
  - Stroke Screen was: [list any abnormalities on stroke screen (e.g., CPSS, FAST, LAPSS)]
  - Stroke Severity screen was: [list any abnormalities on stroke severity screen (e.g., C-STAT, FAST-ED, LAMS, RACE)]
  - [If any interventions provided en route, include those (e.g, supplemental O2, etc)]
- Our ETA is ZZ minutes

EMS STROKE ALERT!

Name: _____ DOB: _____

LKW TIME _____:_____ AM / PM

SYMPTOM DISCOVERY TIME _____:_____ AM / PM

WITNESS CONTACT PHONE NUMBER

Individual who saw the person at LKW or any symptom discover time.

(_____) _____ - _____

CPSS ☐ Positive ☐ Negative

C-STAT ☐ Positive ☐ Negative

FSBS _____

Has the patient taken any blood thinners in the past 48 hours?

☐ Coumadin (warfarin) ☐ Xarelto (rivaroxaban)

☐ Pradaxa (dabigatran) ☐ Eliquis (apixaban)

☐ Lovenox (enoxaparin) Other _____

ACTIVATE ED STROKE ALERT ASAP

EMS Care

- Severity Screening
- Destination

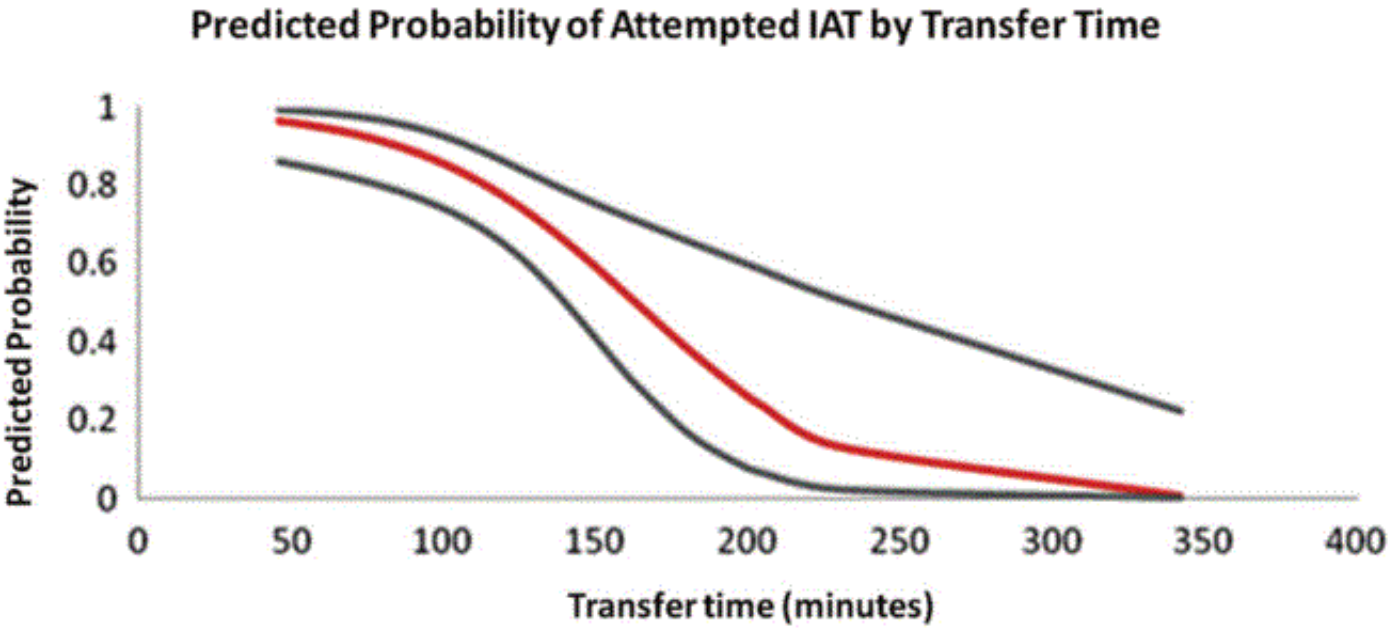
EMS Mantra

Severe Stroke Screening

- Since 2015, focus has shifted to prehospital screening for severe stroke

- Direct transport to comprehensive stroke centers:
  - ASRH: thrombolysis → transfer
  - PSC: thrombolysis → inpatient admission
  - TSC: thrombolysis, endovascular → inpatient admission
  - CSC: thrombolysis, endovascular, hemorrhagic stroke → Neuro ICU

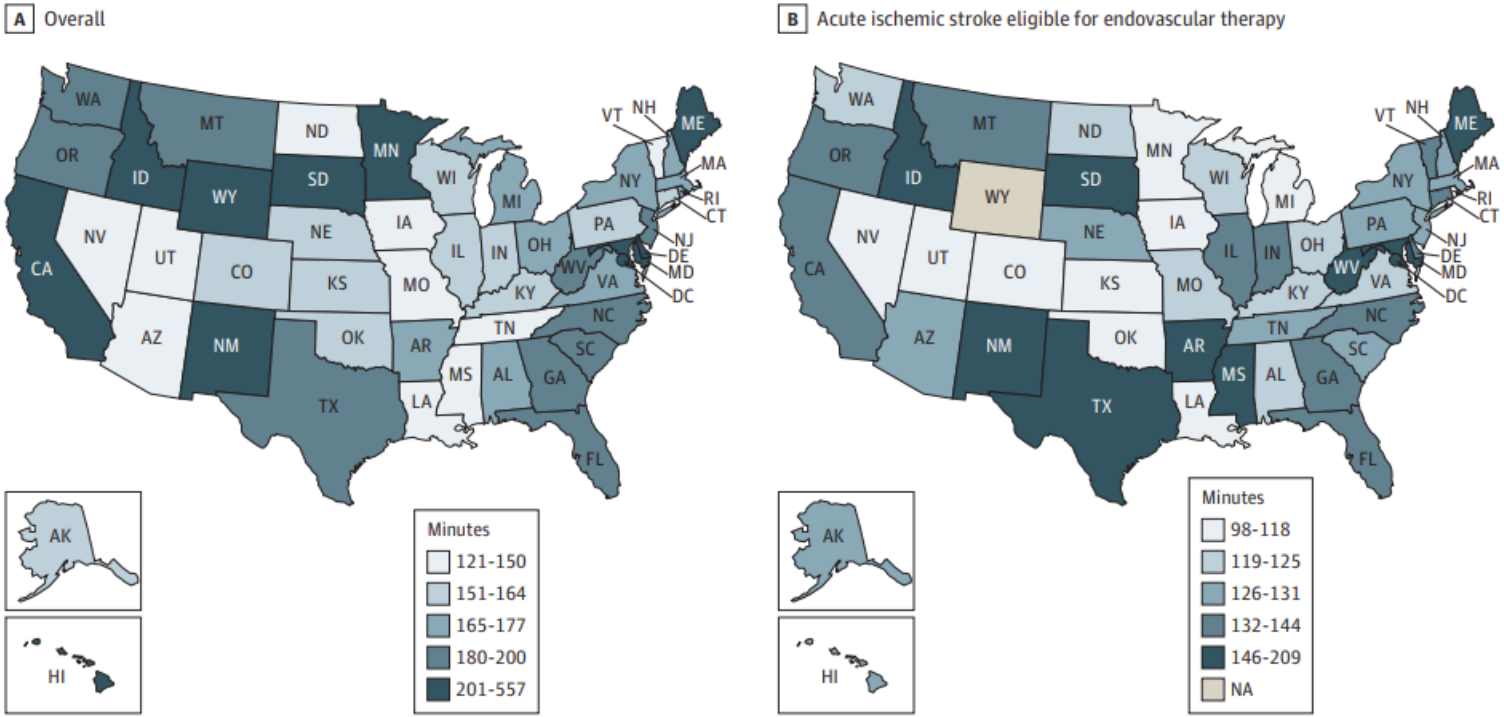
Interfacility Transfer Times



Prabhakaran et al. *Stroke*. 2011

Interfacility Transfer Times

Figure 2. Median Door-in-Door-out Times by State



Stamm et al. *JAMA*. 2023

Destination Recommendations

SPECIAL REPORT

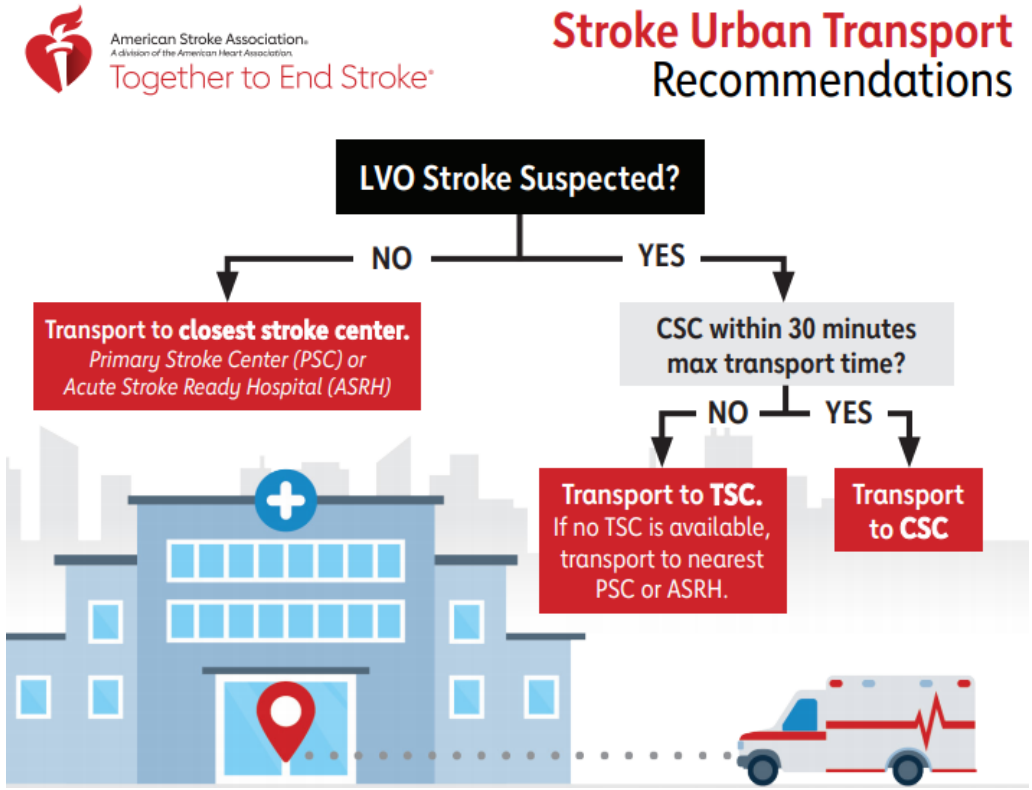
Recommendations for Regional Stroke Destination Plans in Rural, Suburban, and Urban Communities From the Prehospital Stroke System of Care Consensus Conference

A Consensus Statement From the American Academy of Neurology, American Heart Association/American Stroke Association, American Society of Neuroradiology, National Association of EMS Physicians, National Association of State EMS Officials, Society of NeuroInterventional Surgery, and Society of Vascular and Interventional Neurology: Endorsed by the Neurocritical Care Society

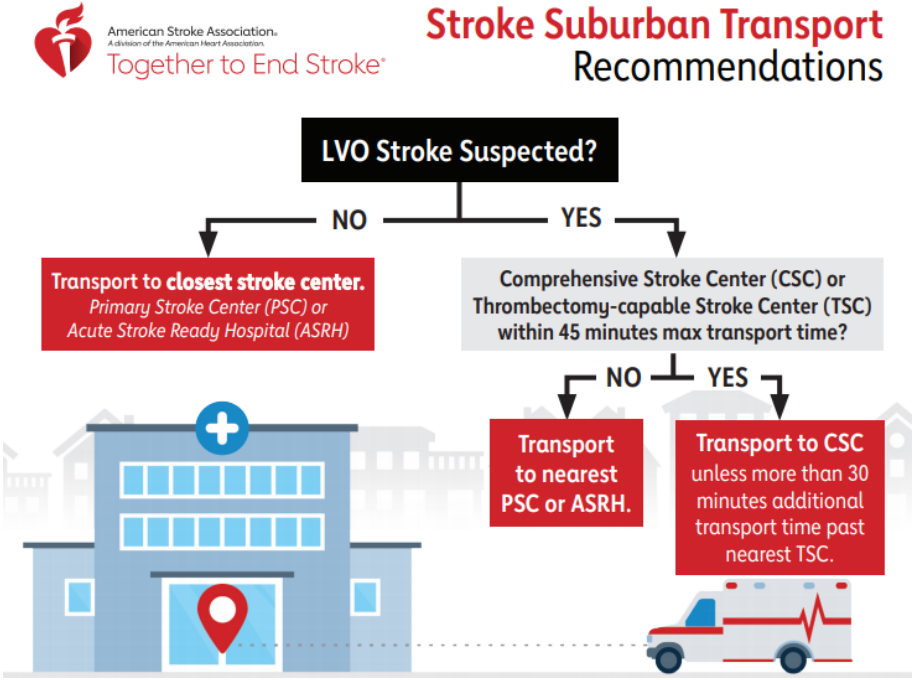
Edward C. Jauch, MD; Lee H. Schwamm, MD; Peter D. Panagos, MD; Jolene Barbazzeni, RN; Robert Dickson, MD; Robert Dunne, MD; Jenevra Foley, MSL, RHIA, CCP; Justin F. Fraser, MD; Geoffrey Lassers, PMD, AAS; Christian Martin-Gill, MD; Suzanne O'Brien, MSN, BSN, RN; Mark Pinchalk, MS; Shyam Prabhakaran, MD; Christopher T. Richards, MD; Peter Taillac, MD; Albert W. Tsai, PhD; Anil Yallapragada, MD; on behalf of the Prehospital Stroke System of Care Consensus Conference

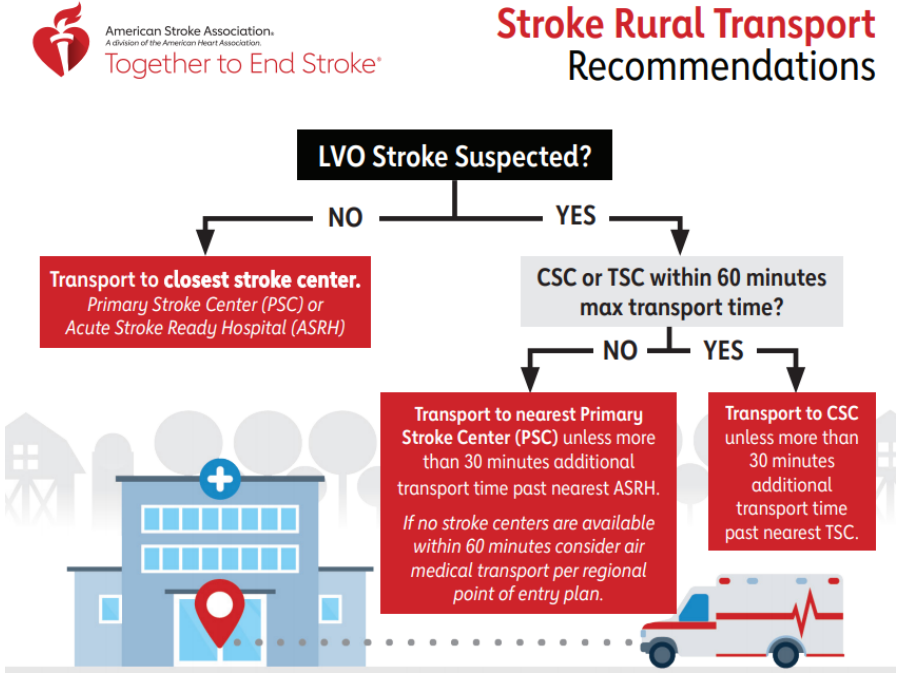
Stroke. 2021;52:e133–e152. DOI: 10.1161/STROKEAHA.120.033228

Destination Recommendations



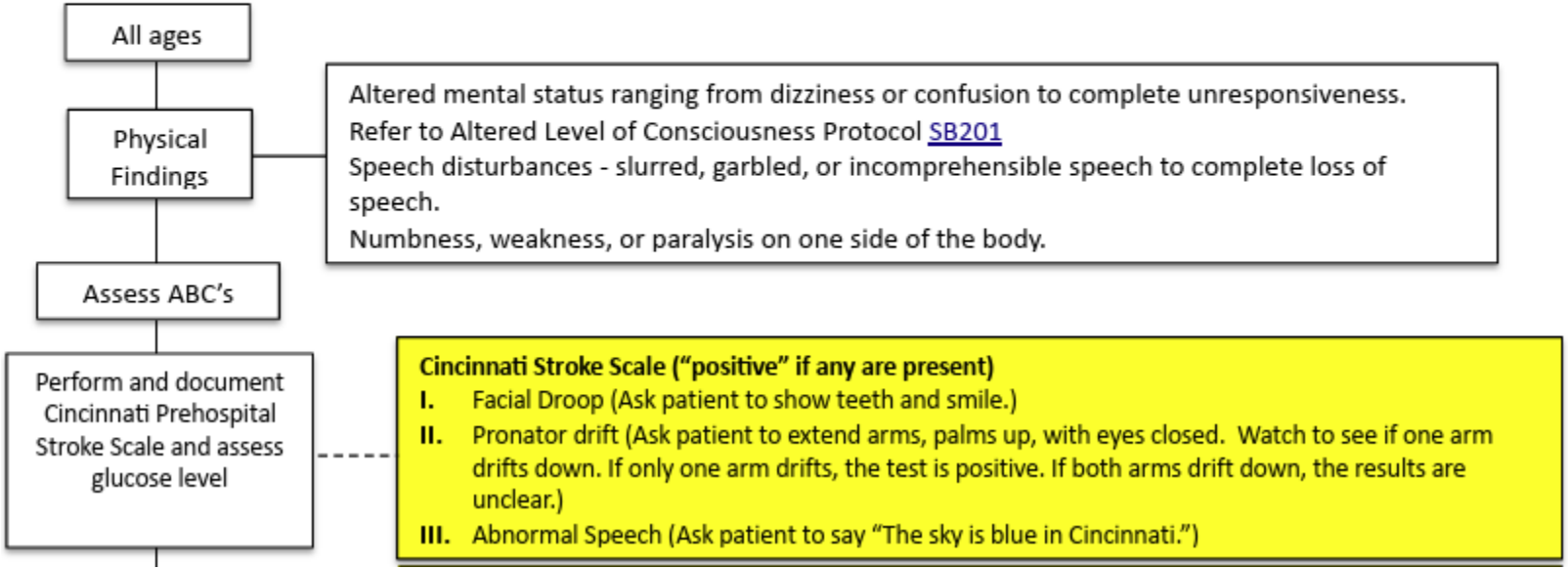
Destination Recommendations



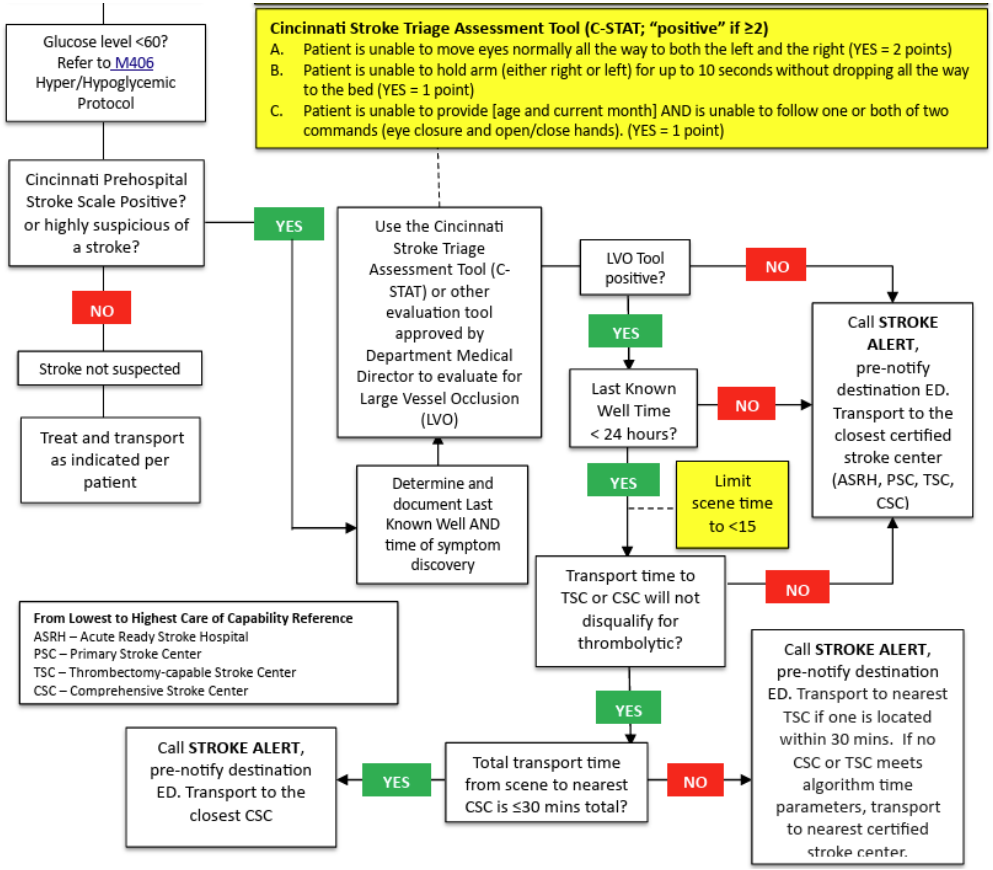


Basic Stroke Screening

M414	Stroke	M414
Last Modified: 2024	Academy of Medicine of Cincinnati Prehospital Care Clinical Practice Guidelines	2025



Severe Stroke Screening



Severe Stroke Screening

Cincinnati Stroke Triage Assessment Tool (C-STAT; "positive" if ≥2)

A. Patient is unable to move eyes normally all the way to both the left and the right (YES = 2 points)

B. Patient is unable to hold arm (either right or left) for up to 10 seconds without dropping all the way to the bed (YES = 1 point)

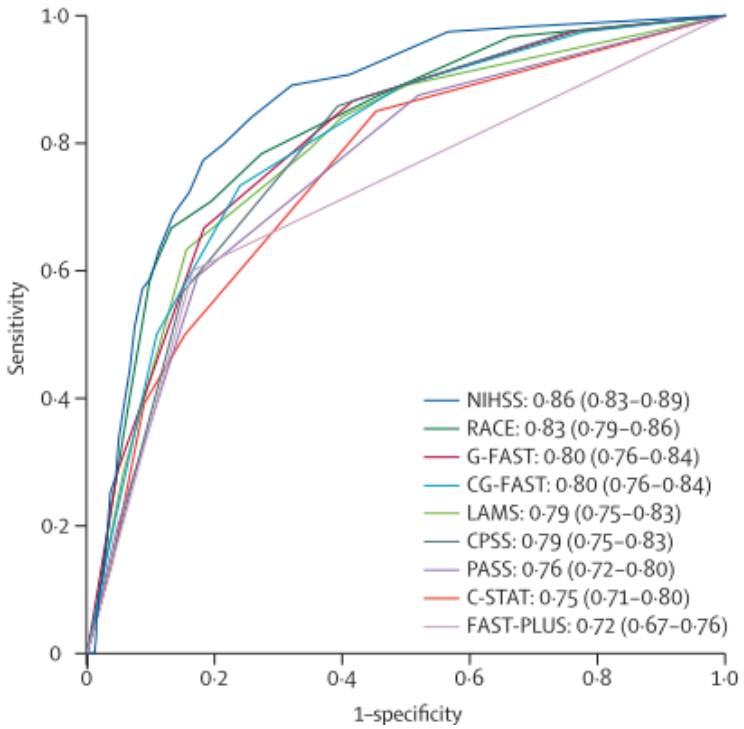
C. Patient is unable to provide [age and current month] AND is unable to follow one or both of two commands (eye closure and open/close hands). (YES = 1 point)

Severe Stroke Screening

- Many exist
  - RACE, LAMS, C-STAT, etc, etc, etc
- Most prehospital severity screens try to boil down the NIHSS into short, easy to administer screening test
- NIHSS is the “gold standard”
- Make the screen shorter and simpler

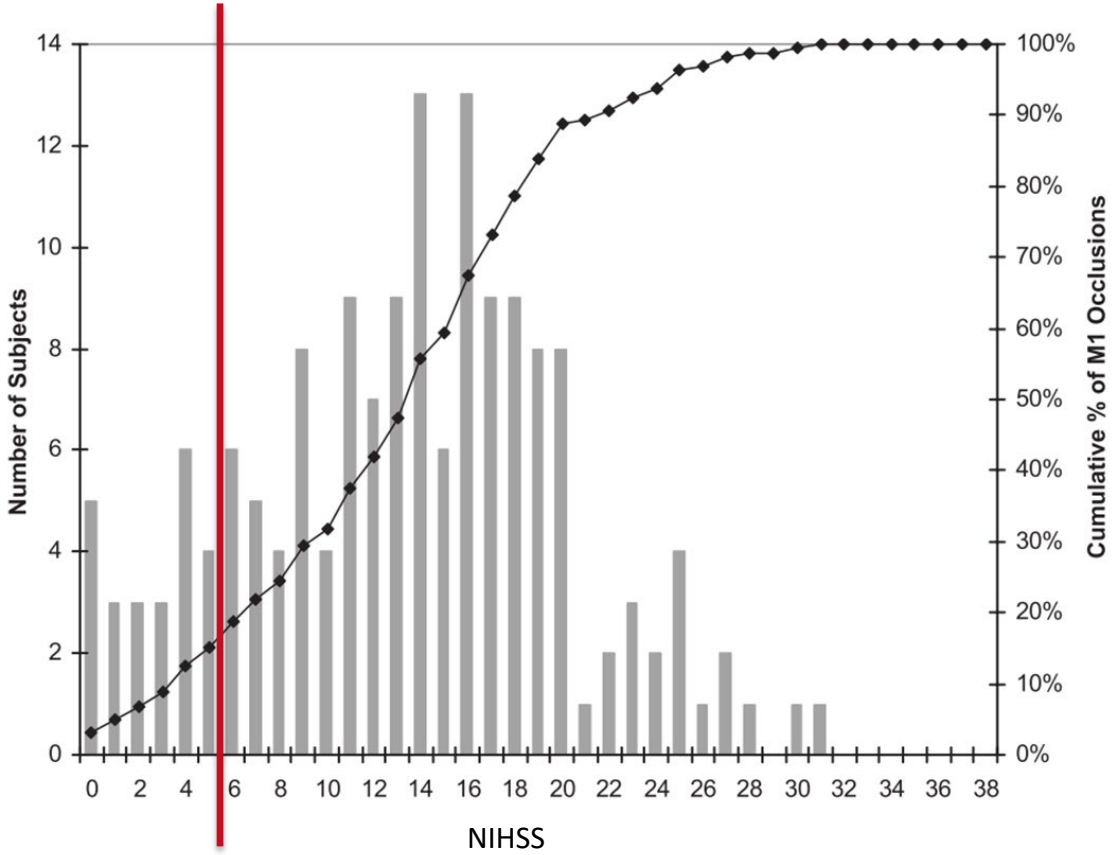
Severe Stroke *Screening*

- They are “screens,” not “diagnosis”
  - Balance Sensitivity and Specificity
- Trade off between missing some stroke patients and over-triage of non-strokes to stroke centers
- Gaps
  - Posterior circulation
  - SAH



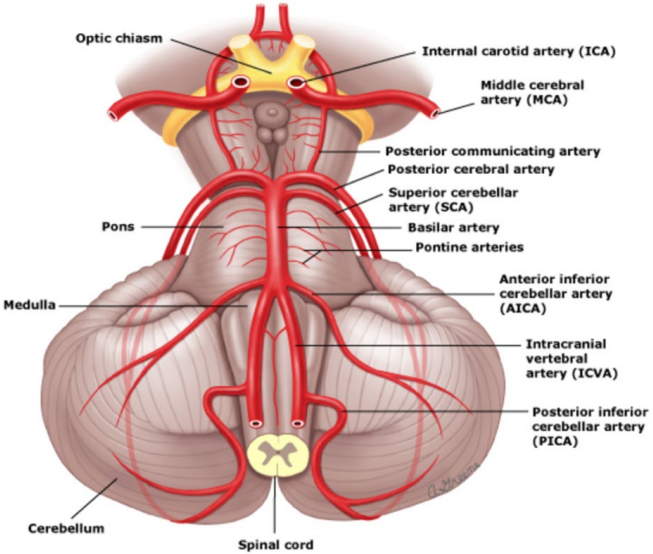
Duvekot et al. *Lancet Neurology.* 2021

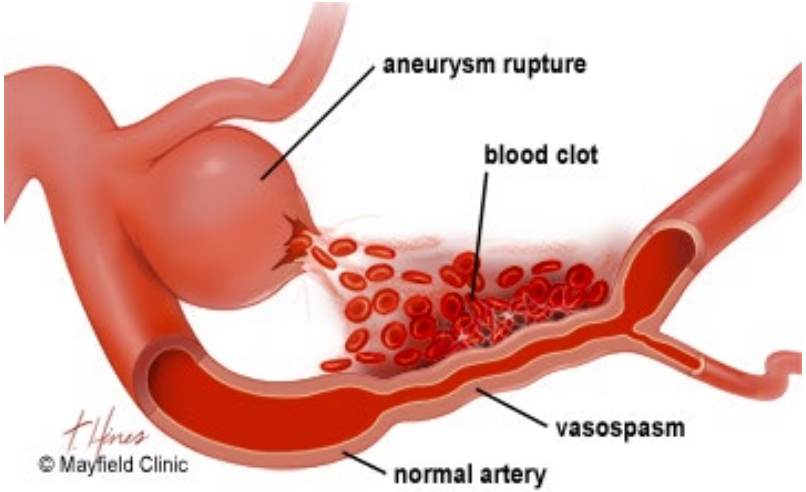
Severe Stroke *Screening*



Maas et al. *Stroke*. 2009

Severe Stroke *Screening*





Outcome of Interest?

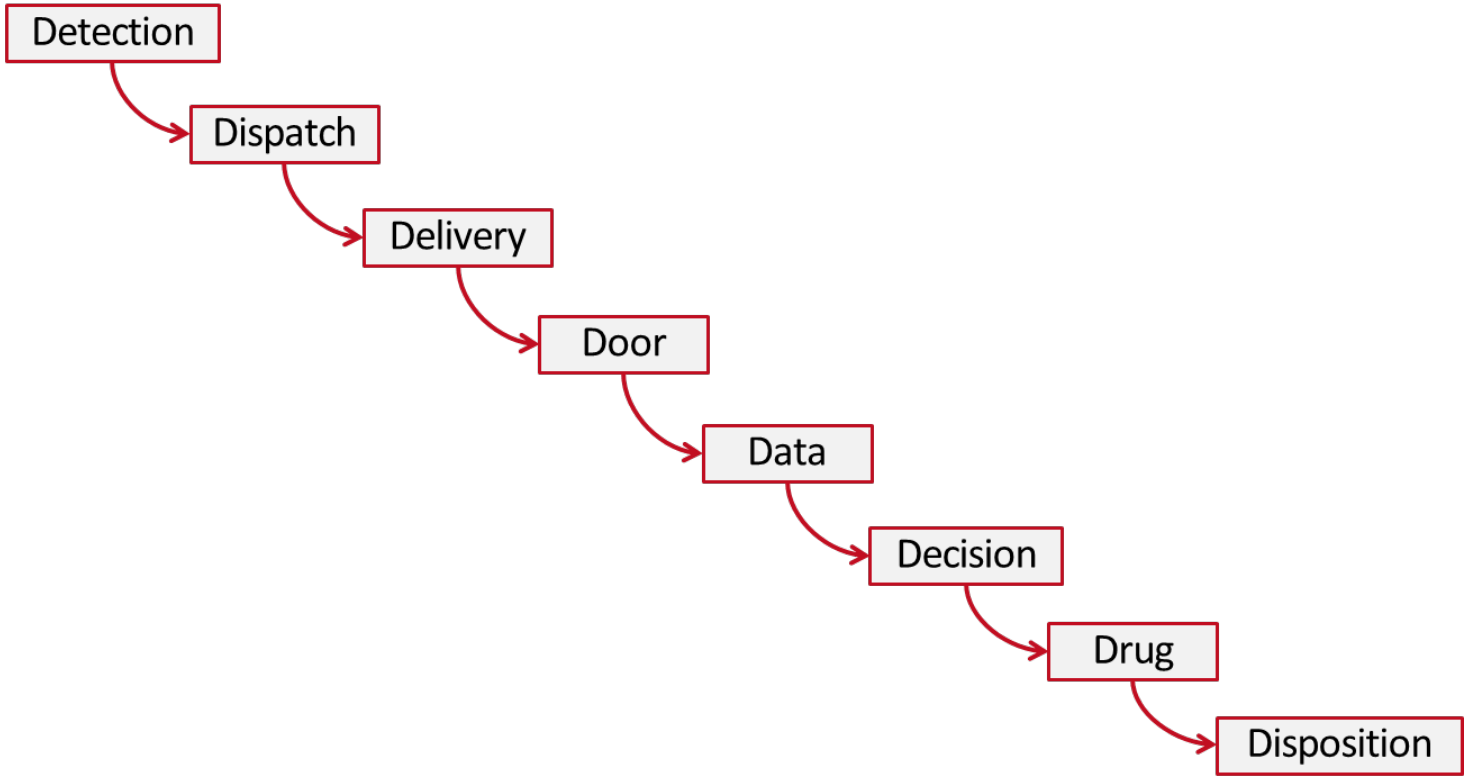
- What is the best diagnosis to screen for?

- LVO?
  - TSC or CSC

- LVO with severe syndrome?
  - EVT candidates
    - TSC or CSC
  - AIS with high likelihood of decompressive craniectomy
    - CSC

- LVO or ICH?
  - CSC

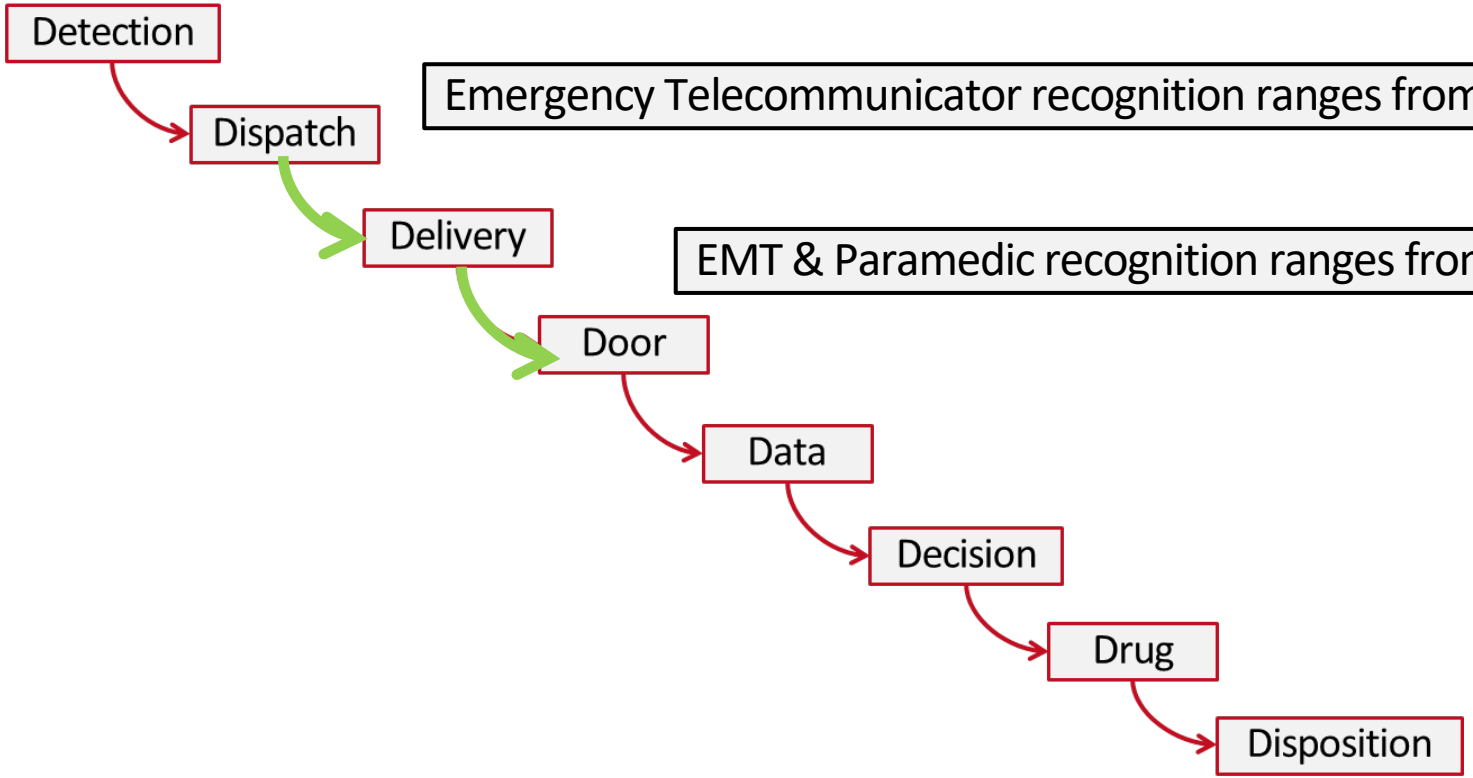
Optimization



Jauch et al. *Stroke*. 2013

Zachrison et al. *Stroke*. 2023

Optimization



Jauch et al. *Stroke*. 2013

Zachrison et al. *Stroke*. 2023

Optimization

- Detection
- Dispatch
- Delivery
- Door
- Data
- Decision
- Drug
- Disposition

Jauch et al. *Stroke*. 2013

Zachrison et al. *Stroke*. 2023

Optimization

- Detection
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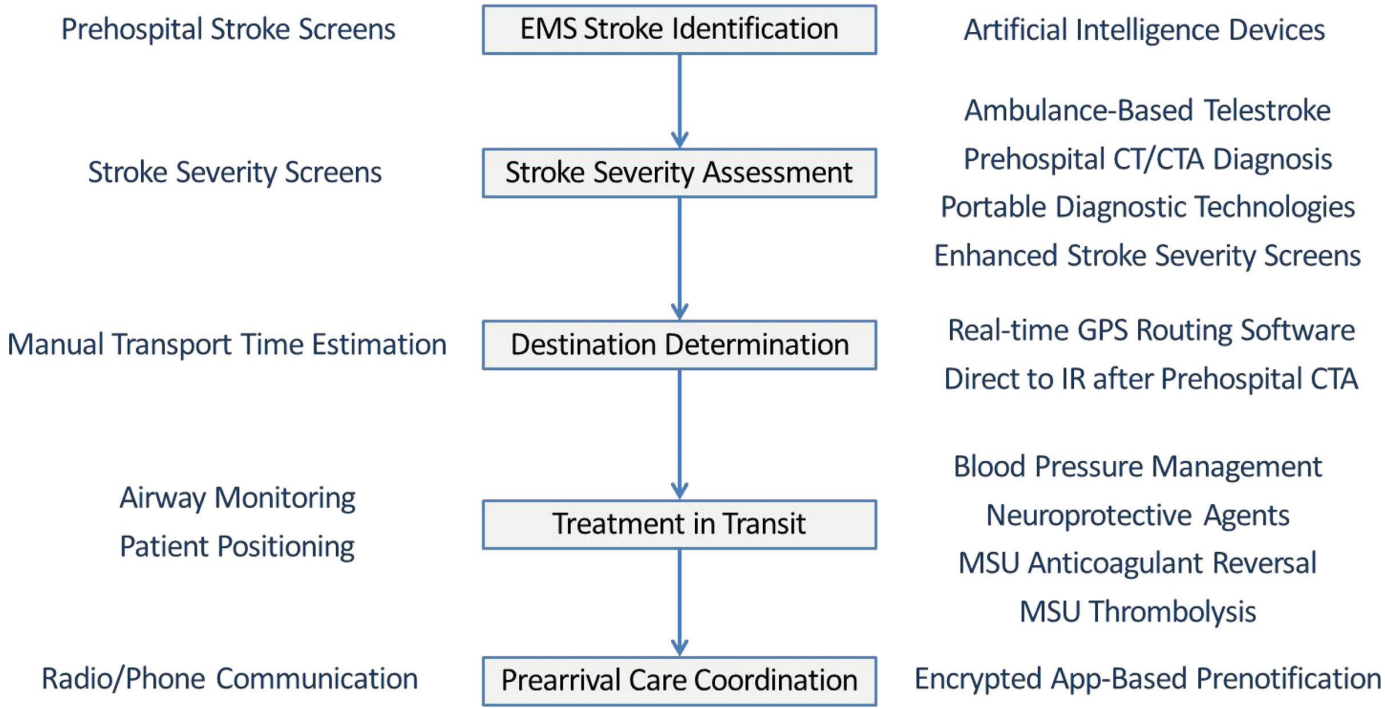
Jauch et al. *Stroke*. 2013

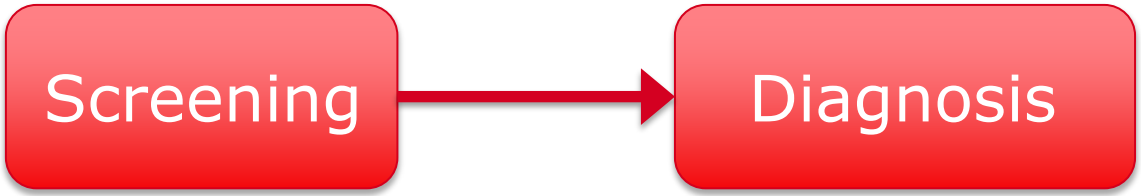
Zachrison et al. *Stroke*. 2023

Optimization



Richards et al. *Stroke*. 2023

Optimization



Optimization

Optimization

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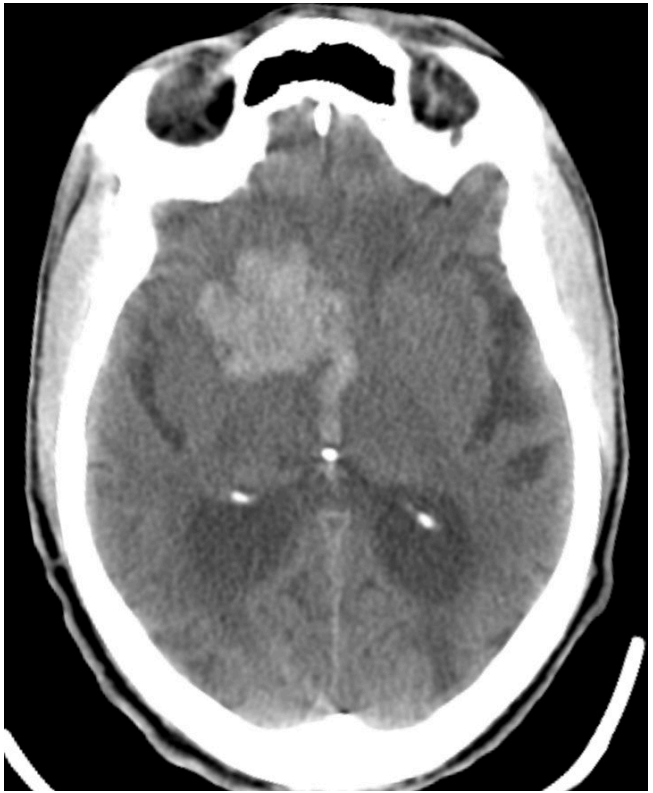
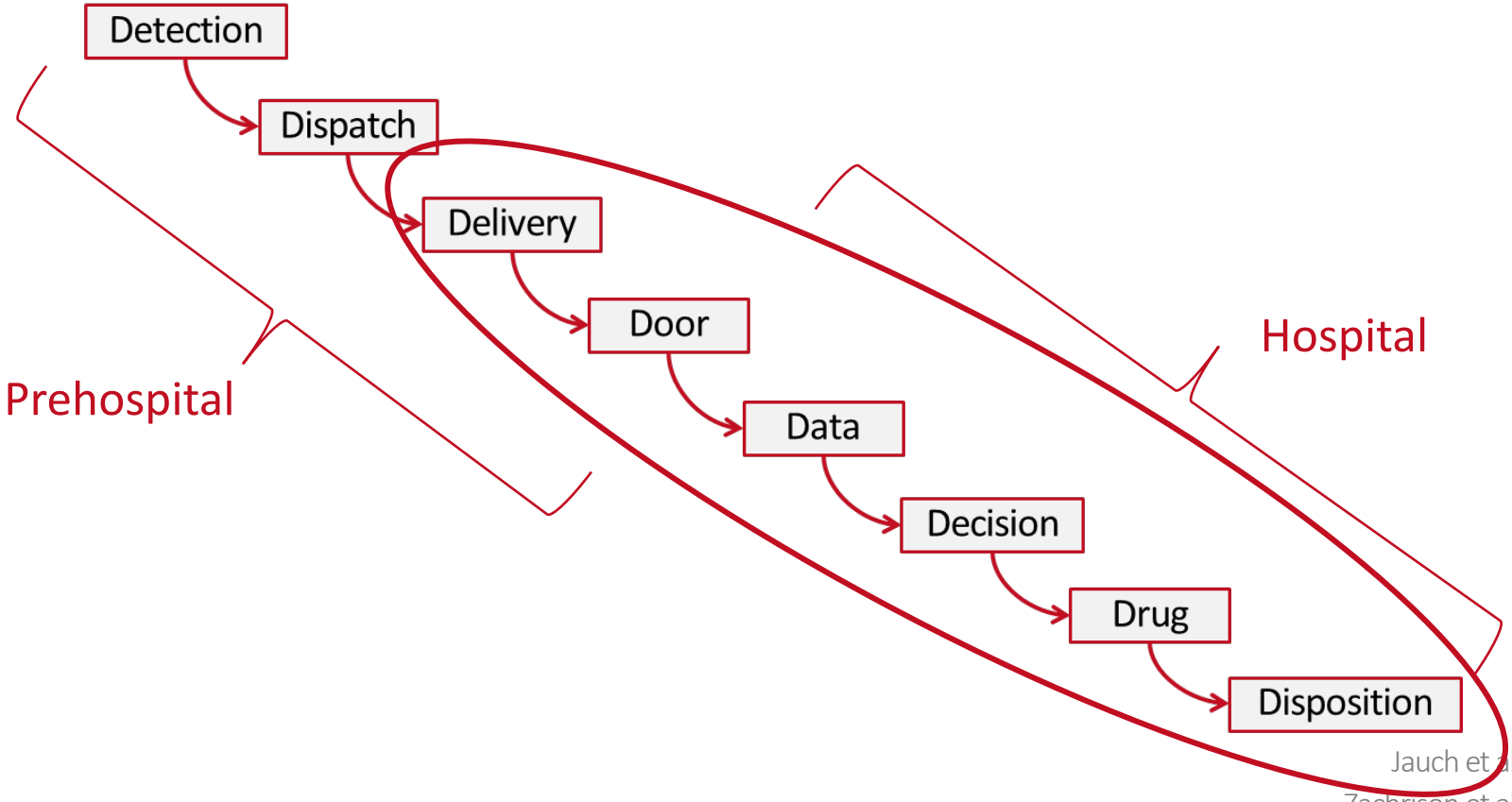
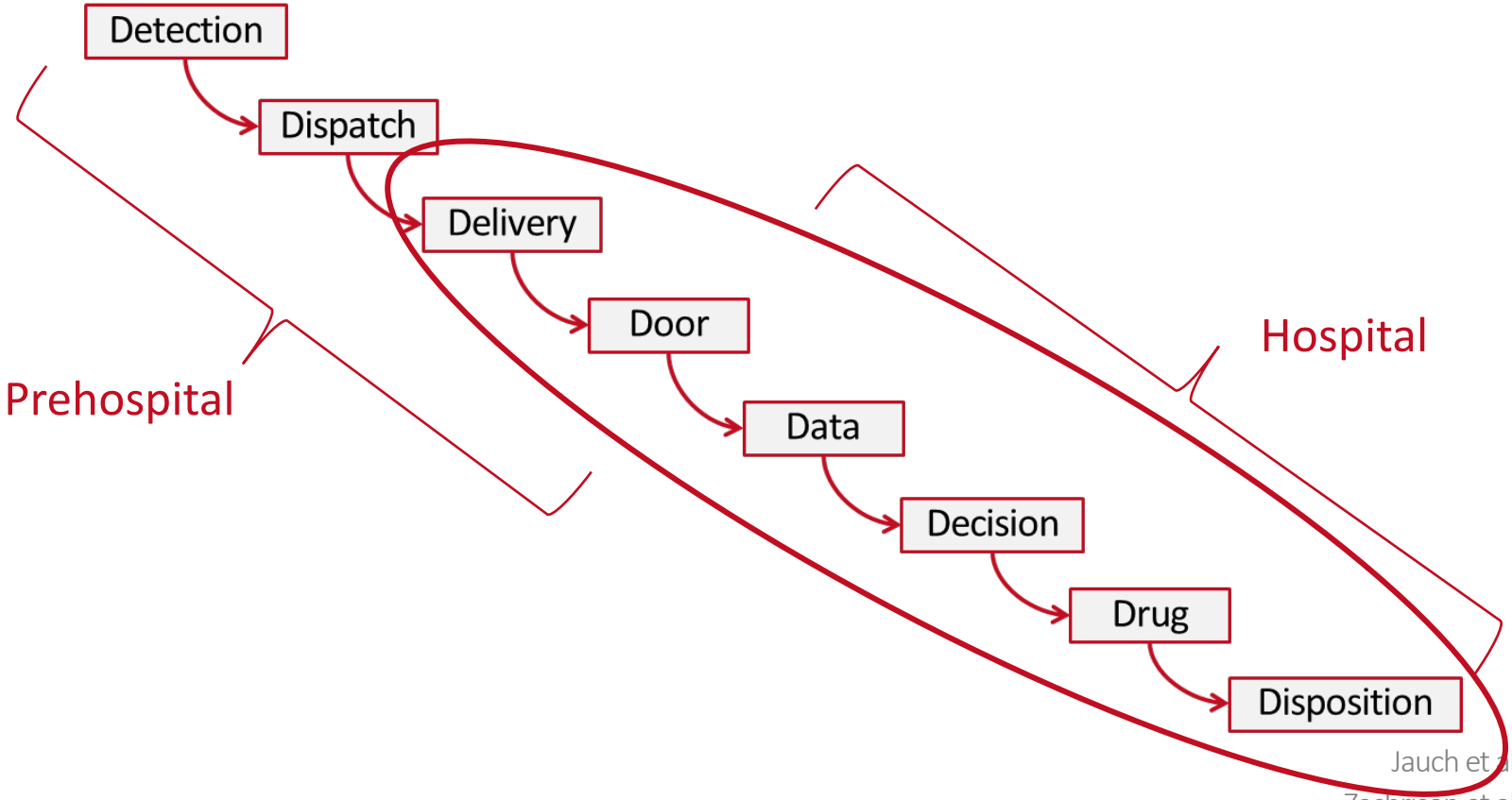


Stroke Chain of Survival



Jauch et al. *Stroke*. 2013
Zachrison et al. *Stroke*. 2023

ASRH on Wheels



Jauch et al. *Stroke*. 2013
Zachrison et al. *Stroke*. 2023

ASRH on Wheels

Mobile Stroke Unit

Capabilities

- Diagnostics
  - Non-contrast CTH
  - (CTA Head)
  - POC glucose, VBG, INR, creatinine

- Therapeutics
  - Thrombolytic
  - K-Centra, Vitamin K, TXA
  - Labetalol, nicardipine gtt, 3% saline, Keppra
  - Midazolam, allergy cocktail, RSI meds, routine ALS meds

Time Savings

- PHANTOM-S (Berlin)
  - 25-minute quicker alarm-to-treatment time
  - 33% tPA treatment in STEMO vs 21% in control
  - No increased ICH

- BEST-MSU (Houston)
  - First five months of data
  - Symptom onset to needle time <60 min in 45% of patients
  - 178 minute average symptom onset to groin for IA patients

- PHAST (Cleveland)
  - Average last known well to needle: 123 min → 97 min

Patient Outcomes

Association Between Dispatch of Mobile Stroke Units and Functional Outcomes Among Patients With Acute Ischemic Stroke in Berlin

Martin Ebinger, MD; Bob Siegerink, PhD; Alexander Kunz, MD; Matthias Wendt, MD; Joachim E. Weber, MD; Eugen Schwabauer, MD; Frederik Geisler, MD; Erik Freitag, MD; Julia Lange, MD; Janina Behrens, MD; Hebun Erdur, MD; Ramanan Ganeshan, MD; Thomas Liman, MD; Jan F. Scheitz, MD; Ludwig Schlemm, MD; Peter Harmel, MD; Katja Zieschang, MD; Irina Lorenz-Meyer, MSc; Ira Napierkowski, Dr rer nat; Carolin Waldschmidt, MD; Christian H. Nolte, MD; Ulrike Grittner, DrPhil; Edzard Wiener, MD; Georg Bohner, MD; Darius G. Nabavi, MD; Ingo Schmehl, MD; Axel Ekkernkamp, MD; Gerhard J. Jungehulsing, MD; Bruno-Marcel Mackert, MD; Andreas Hartmann, MD; Jessica L. Rohmann, MScPH; Matthias Endres, MD; Heinrich J. Audebert, MD; for the Berlin_PRehospital Or Usual Delivery in stroke care (B_PROUD) study group

B_PROUD

JAMA. 2021;325(5):454-466. doi:10.1001/jama.2020.26345

BEST-MSU

The NEW ENGLAND JOURNAL of MEDICINE

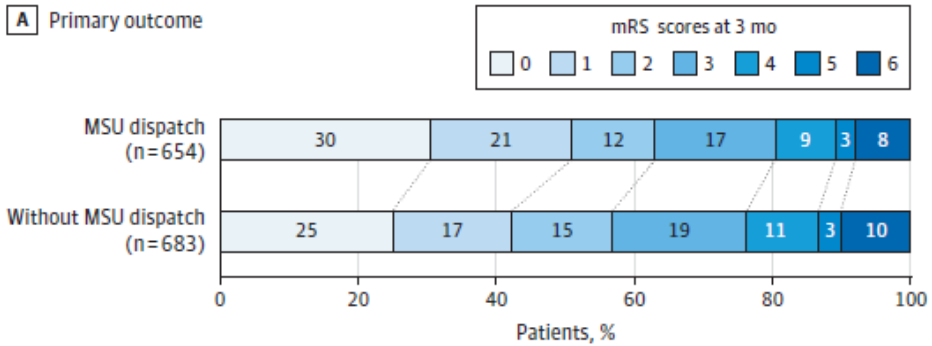
ESTABLISHED IN 1812 SEPTEMBER 9, 2021 VOL. 385 NO. 11

Prospective, Multicenter, Controlled Trial of Mobile Stroke Units

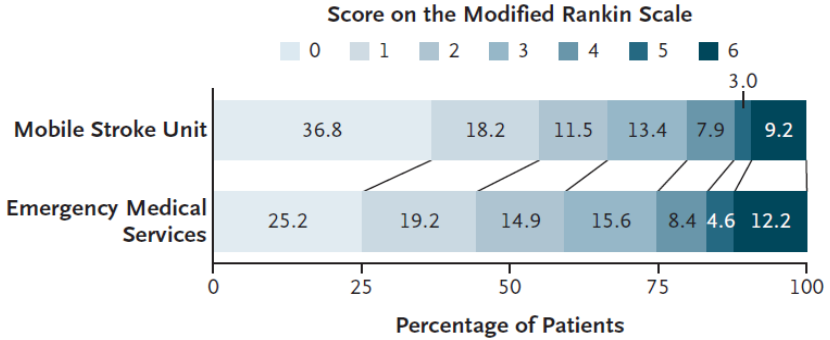
J.C. Grotta, J.-M. Yamal, S.A. Parker, S.S. Rajan, N.R. Gonzales, W.J. Jones, A.W. Alexandrov, B.B. Navi, M. Nour, I. Spokoyny, J. Mackey, D. Persse, A.P. Jacob, M. Wang, N. Singh, A.V. Alexandrov, M.E. Fink, J.L. Saver, J. English, N. Barazangi, P.L. Bratina, M. Gonzalez, B.D. Schimpf, K. Ackerson, C. Sherman, M. Lerario, S. Mir, J. Im, J.Z. Willey, D. Chiu, M. Eisshofer, J. Miller, D. Ornelas, J.P. Rhudy, K.M. Brown, B.M. Villareal, M. Gausche-Hill, N. Bosson, G. Gilbert, S.Q. Collins, K. Silnes, J. Volpi, V. Misra, J. McCarthy, T. Flanagan, C.P.V. Rao, J.S. Kass, L. Griffin, N. Rangel-Gutierrez, E. Lechuga, J. Stephenson, K. Phan, Y. Sanders, E.A. Noser, and R. Bowry

Patient Outcomes

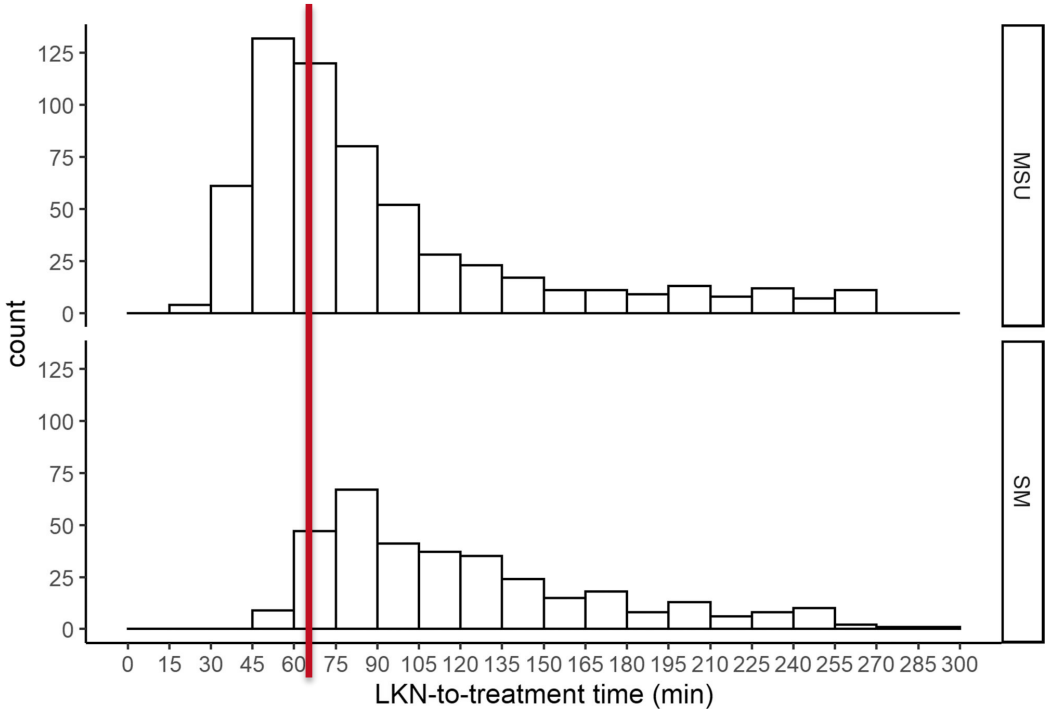
B_PROUD



BEST-MSU



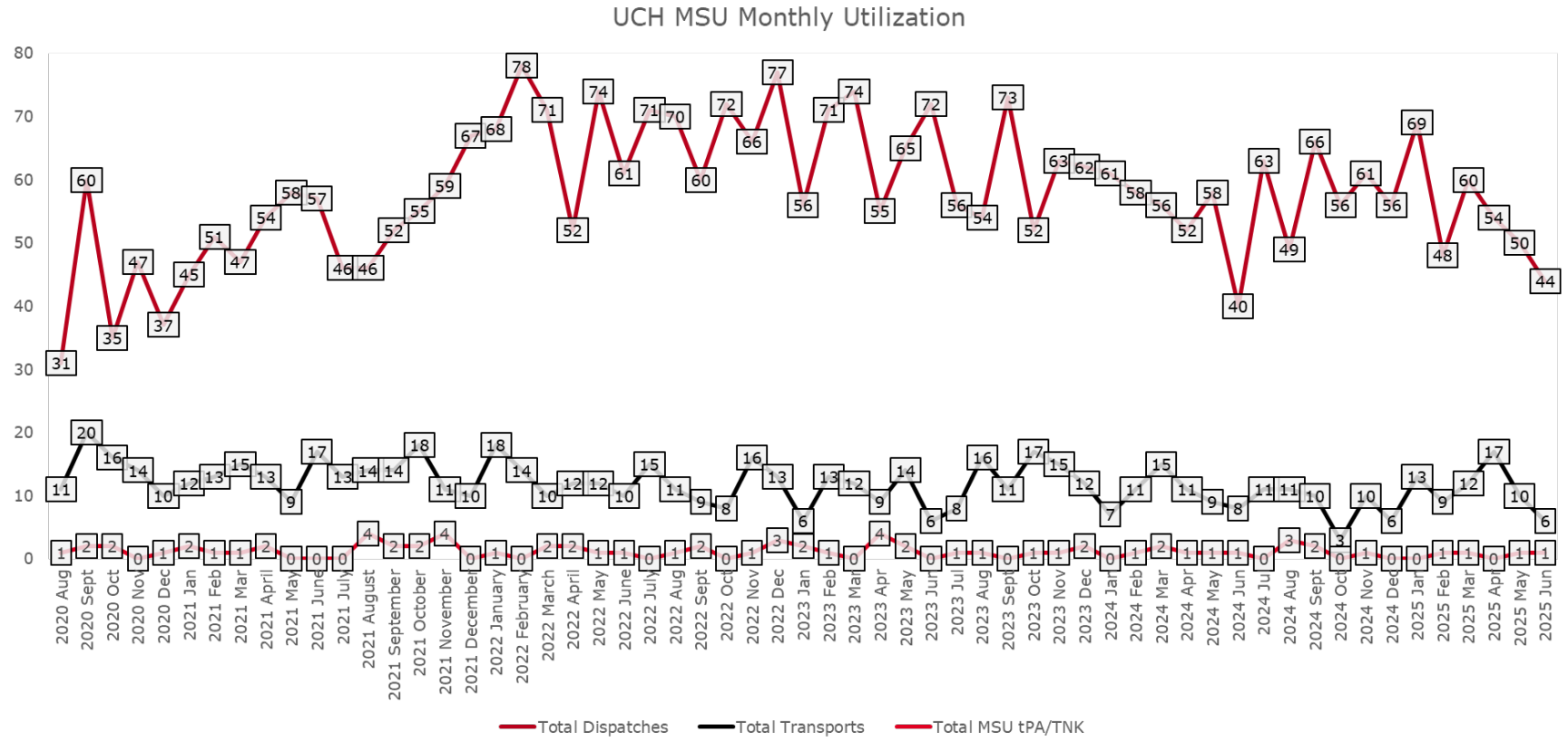
Patient Outcomes



Mackey et al. *Stroke* 2023

UCH Mobile Stroke Unit

UCH MSU Utilization



Treatment Times

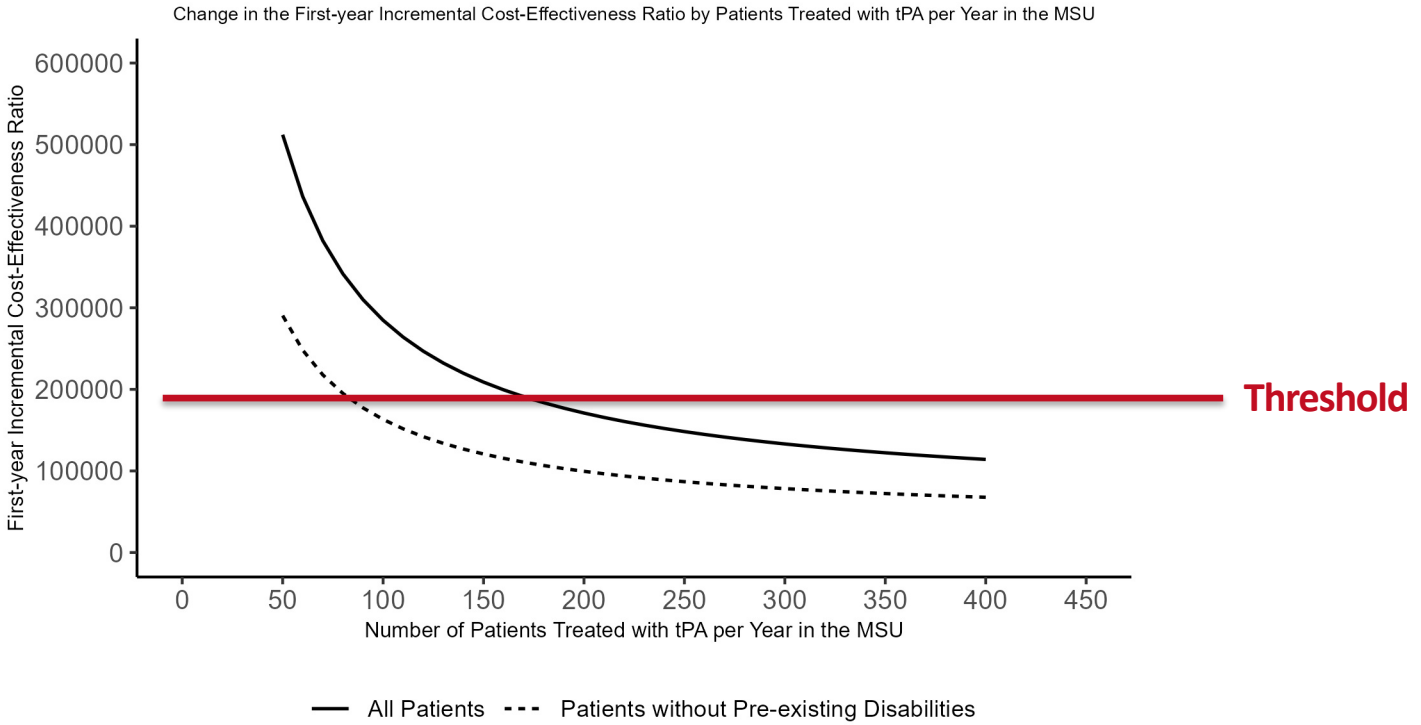
27% Golden Hour Thrombolysis

Median Times (Minutes)	UCH MSU*	BEST-MSU	Difference
LKW to Thrombolysis	79	72	+7
Dispatch to Thrombolysis	50	46	+4
MSU Door to Thrombolysis	33	37	-4
Dispatch to EVT Artery Access	139	141	-2
MSU Door to EVT Artery Access	119	131	-12

*IVT = 69; EVT = 53

MSU Sustainability

MSU Sustainability



Rajan et al. *Ann Neurol*. 2025

MSU Sustainability

- BEST-MSU cost analysis conclusions:
  - MSU is cost effective
  - But, dependent on a few factors:
    - Pre-existing disability (more favorable for baseline mRS 0-1)
    - Number (& proportion) of thrombolysis administrations
    - Incidence of stroke in the community
    - Cost assumptions

MSU Sustainability

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  - MSU is cost effective
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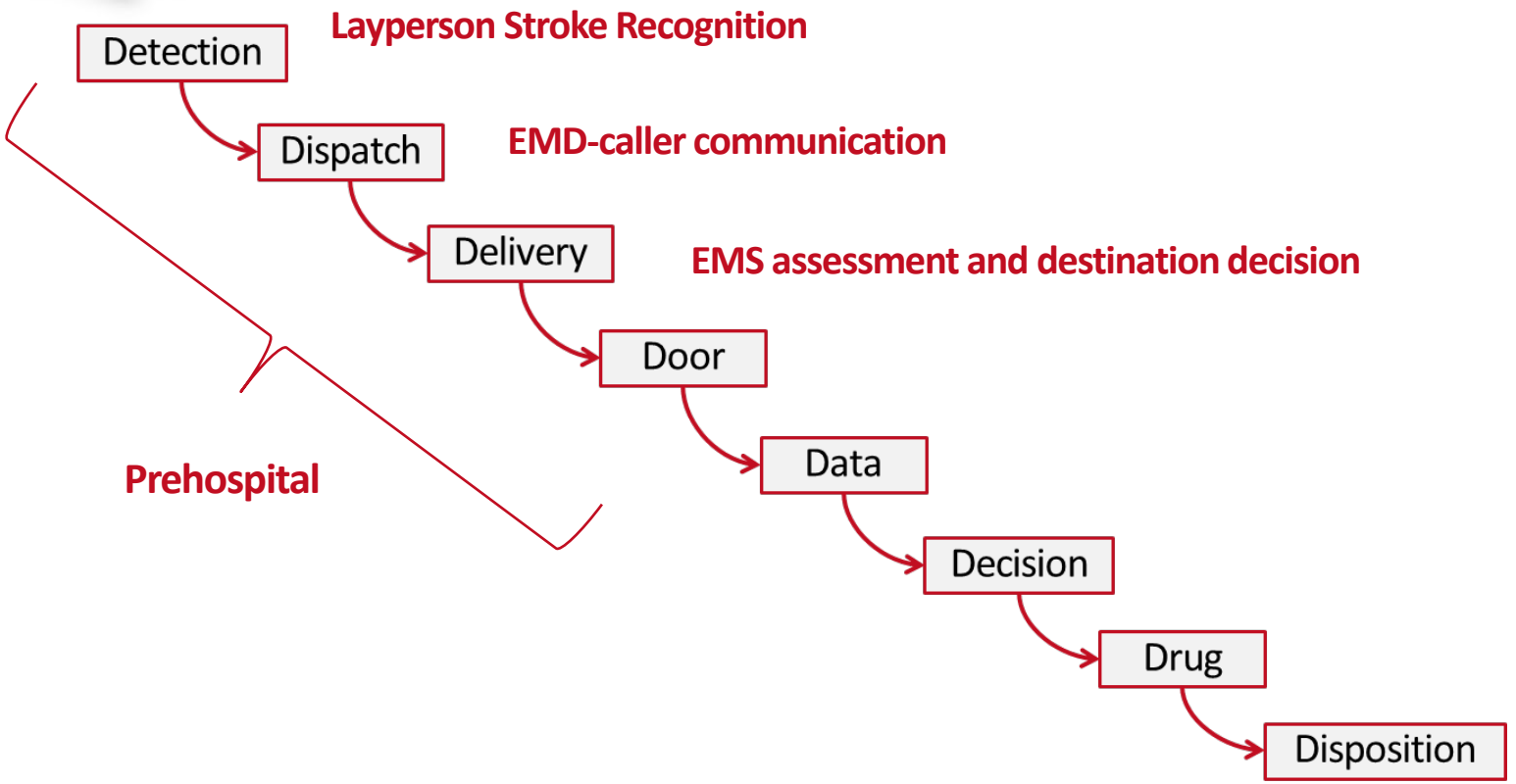
    - Pre-existing disability (more favorable for baseline mRS 0-1)
    - Number (& proportion) of thrombolysis administrations
    - Incidence of stroke in the community
    - Cost assumptions
- MSU Reimbursement
  - Ambulance Fee Schedule doesn't allow for itemized medication
  - PRESTO & others are advocating for changes, but that's a process

Conclusion



Jauch et al. *Stroke*. 2013

Zachrison et al. *Stroke*. 2023

Thanks!

- Questions?