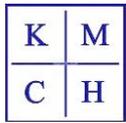


Are Mobile Stroke Units Practical in India

Dr Mathew Cherian

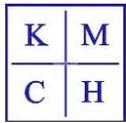
Kovai Medical Center and Hospital

Coimbatore



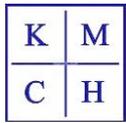
DISCLOSURE STATEMENT OF FINANCIAL INTEREST

Within the past 12 months, I or my spouse/partner have had no financial interest/arrangement or affiliation with any organization(s) .



DISCLOSURE STATEMENT OF FINANCIAL INTEREST

I, Dr. Mathew Cherian DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.



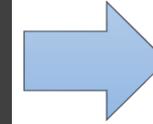
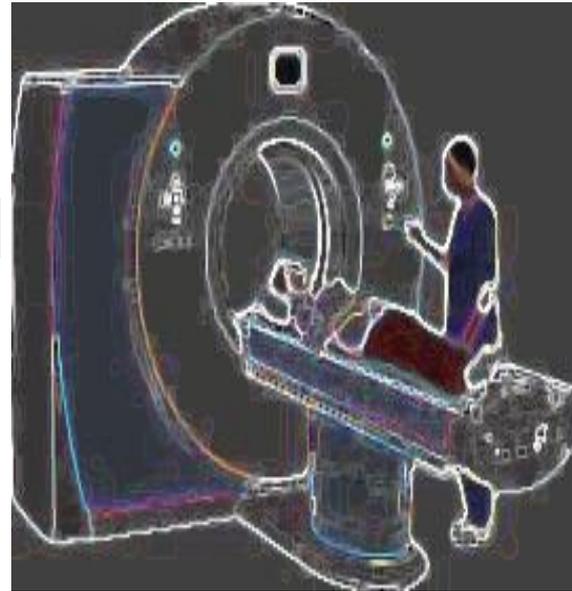
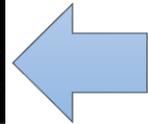
Maximum benefit to patient is 'earlier treatment'

We cannot expect patient biology to match our system. Because time window to treatment for acute stroke is so short with most, we must match our system to biology.

Michael Hill,
MD Stroke Neurologist
University of Calgary

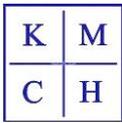


Stroke treatment decision is based on CT scan



- Assess suitability for IV thrombolysis
- Transport to comprehensive stroke center

- BP control <140
- Mannitol
- Anti-epileptic
- Transport to comprehensive Stroke center



PubMed.gov
US National Library of Medicine
National Institutes of Health

PubMed

Advanced

Format: Abstract

Ann Intern Med. 1998 Aug 1;129(3):190-6.

Delayed hospital arrival for acute stroke

Smith MA¹, Doliszny KM, Shahar E, McGovern PG, Arnesen J

Abstract

BACKGROUND: Although recent advances have to receive the maximum benefit from these new

OBJECTIVE: To investigate characteristics that ir acute stroke.

DESIGN: Retrospective medical record review.

SETTING: Minneapolis-St. Paul metropolitan hos

PATIENTS: A 50% random sample of all patients

MEASUREMENTS: Patients were identified throu Revision. Trained nurses abstracted the medical clinical criteria (1895 patients). An accelerated fe delay time. For 70% of patients (n = 1334), delay symptom onset from the admission time. For the an approximate delay time was estimated from a **RESULTS:** Among patients with a calculated delc Patients with approximated delay times tended to symptom onset. Some characteristics associate activities of daily living before stroke, and severa included admission through the emergency depe abnormal mental status, and greater disability at

CONCLUSIONS: Most patients arrive at the hosp reduce delays in hospital arrival after acute strok risk for longer delay.

NCBI Resources How To

PubMed.gov
US National Library of Medicine
National Institutes of Health

PubMed

Advanced

Format: Abstract

Neurology. 1996 Aug;47(2):383-7.

Factors delaying hospital admission in acute stroke

Jørgensen HS¹, Nakayama H, Reith J, Raaschou HO, Olsen TS.

Abstract

Medical treatment of stroke is dependent on a narrow therape medical, and pathophysiologic factors on admission delay in 1, within 3 1/2 hours, 35% within 6 hours, 50% within 14 hours, a 1.75, 95% CI 1.3 to 2.3) and retired working status (OR 1.61, 95% CI 1.1 to 2.3). Age seems important to early admission. The milder the stroke, the in stroke severity [Scandinavian Neurological Stroke Scale score]. Other factors associated with delayed admission were heart disease, other comorbidity, previous stroke, headache, a status (Mini-Mental State Examination) and type of stroke (hemorrhagic or ischemic). Admission was markedly delayed in most patients. This represents that a history of TIA reduced admission time indicates that an inpatient history of TIA is a precious time.

PMID: 8757008

[Indexed for MEDLINE]



PubMed.gov
US National Library of Medicine
National Institutes of Health

PubMed

Advanced

Format: Abstract

Stroke. 1999 Jan;30(1):40-8.

Factors associated with delayed admission to hospital and in-hospital delays in acute stroke and TIA: a prospective, multicenter study. Seek- Medical-Attention-in-Time Study Group.

Wester P¹, Rådberg J, Lundgren B, Peltonen M.

Abstract

BACKGROUND AND PURPOSE: Early admission to hospital followed by correct diagnosis with minimum delay is a prerequisite for successful intervention in acute stroke. This study aimed at clarifying in detail the factors related to these delays.

METHODS: This was a prospective, multicenter, consecutive study that explored factors influencing the time from stroke or transient ischemic attack (TIA) onset until patient arrival at the emergency department, stroke unit, and CT laboratory. Within 3 days of hospital admission, the patients and/or their relatives were interviewed by use of a standardized structured protocol, and the patients' neurological deficits were assessed. No information about this study was given to the public or to the staff.

RESULTS: Patients (n=329) were studied at 15 Swedish academic or community-based hospitals: 252 subjects with brain infarct, 18 with intracerebral hemorrhage, and 59 with TIA. Among stroke and TIA patients, the median times from onset to hospital admission, stroke unit, and CT scan laboratory were 4.8 and 4.0 hours, 8.8 and 7.5 hours, and 22.0 and 17.5 hours, respectively. From multivariate ANOVA with logarithmically transformed time for increasing delay to hospital admission as the dependent variable, a profile of significant risk factors was obtained. This included patients with a brain infarct, gradual onset, mild neurological symptoms, patients who were alone and did not contact anybody when symptoms occurred, patients who lived in a large catchment area, those who did not use ambulance transportation, and those who visited a primary care site. These factors explained 45.3% of the variance in delayed hospital admission. The median time from arrival at the emergency department to arrival at the stroke unit or CT scan laboratory (whichever occurred first) was 2.6 and 2.7 hours in the stroke and TIA groups, respectively. A large catchment area, moderate to mild neurological deficit, and waiting for the physician at the emergency department were all significantly related to in-hospital delay.

CONCLUSIONS: Increased public awareness of the need to seek medical or other attention promptly after stroke onset, to use an ambulance with direct transportation to the acute-care hospital, and to have more effective in-hospital organization will be required for effective acute treatment options to be available to stroke patients.

K	M
C	H

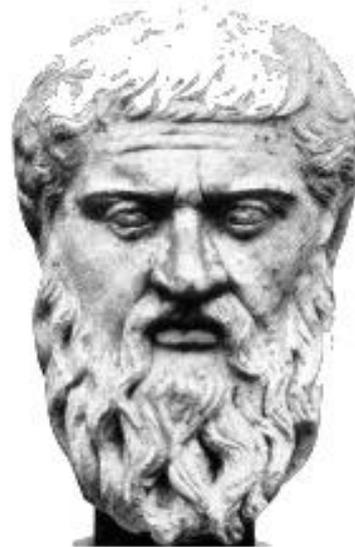
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World stroke survey : Median time to reach to hospital is 3.5 to 14 hours (<5% pts reaches within tPA window period even in specialized stroke center)



Necessity is the mother of invention.
& innovation



The Republic, Book II, 369BC, Plato

K	M
C	H

2003

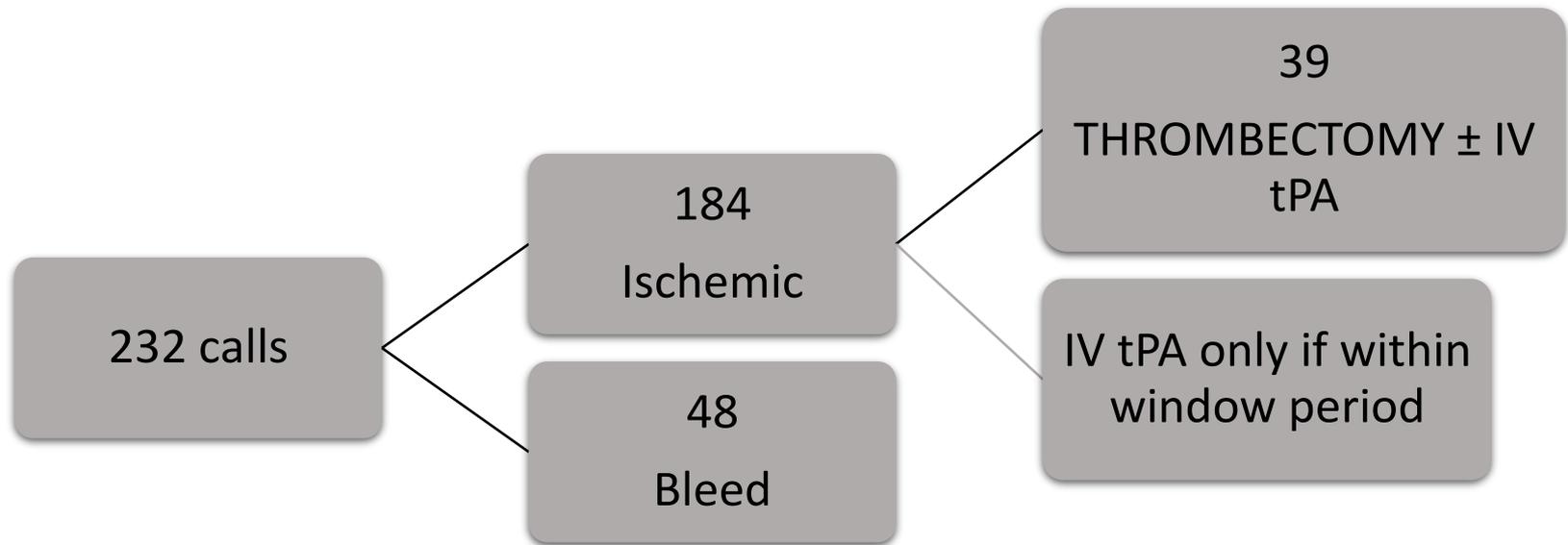




First MSU: University of Saarland, homburg, Germany,



KMCH – before the MSU in a year





Time metrics – in hospital arrival KMCH

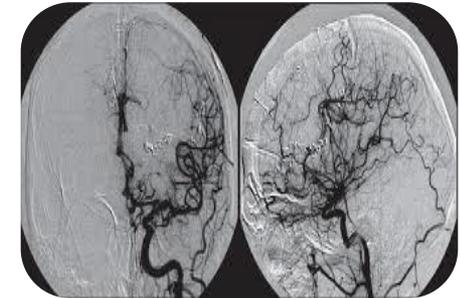
F.A.S.T.



Door to image



Door to
puncture

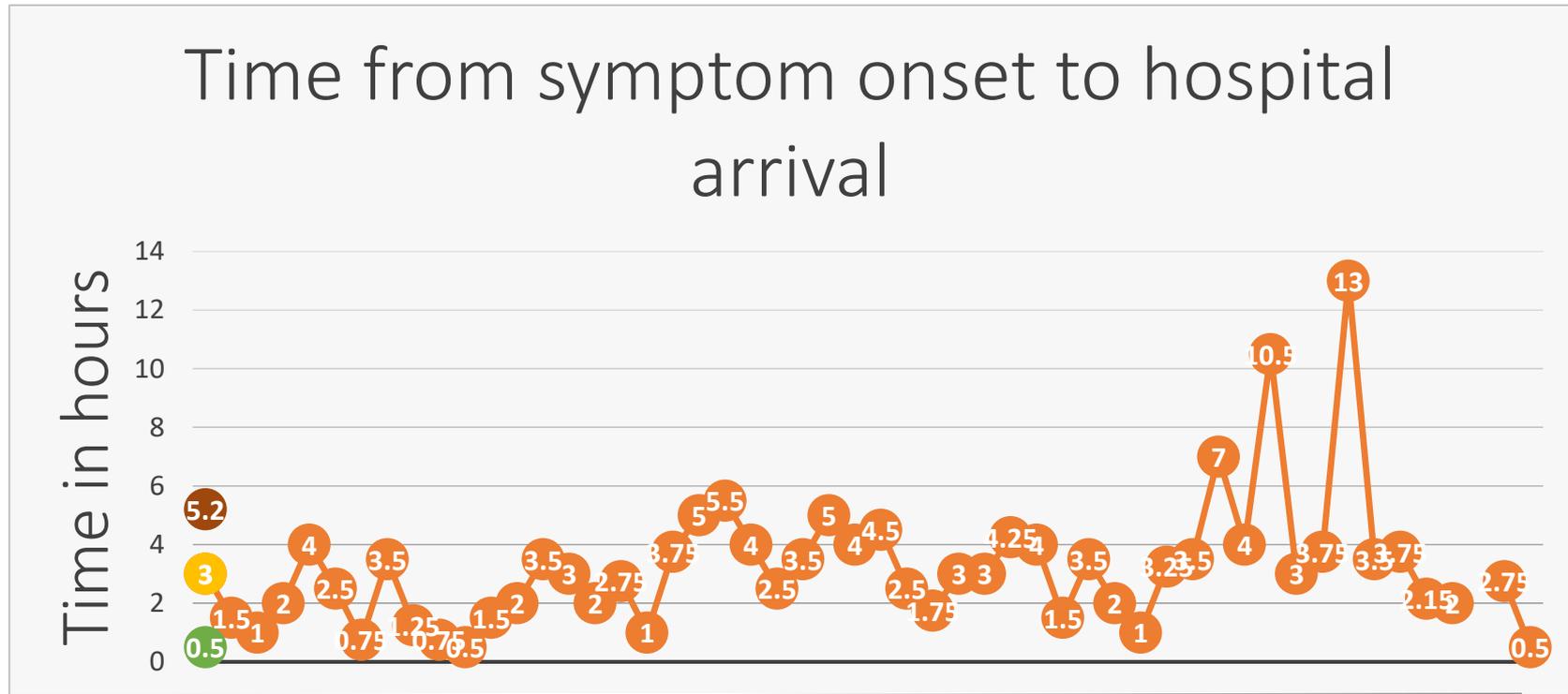


Puncture to
recanalization

Duration of
symptoms

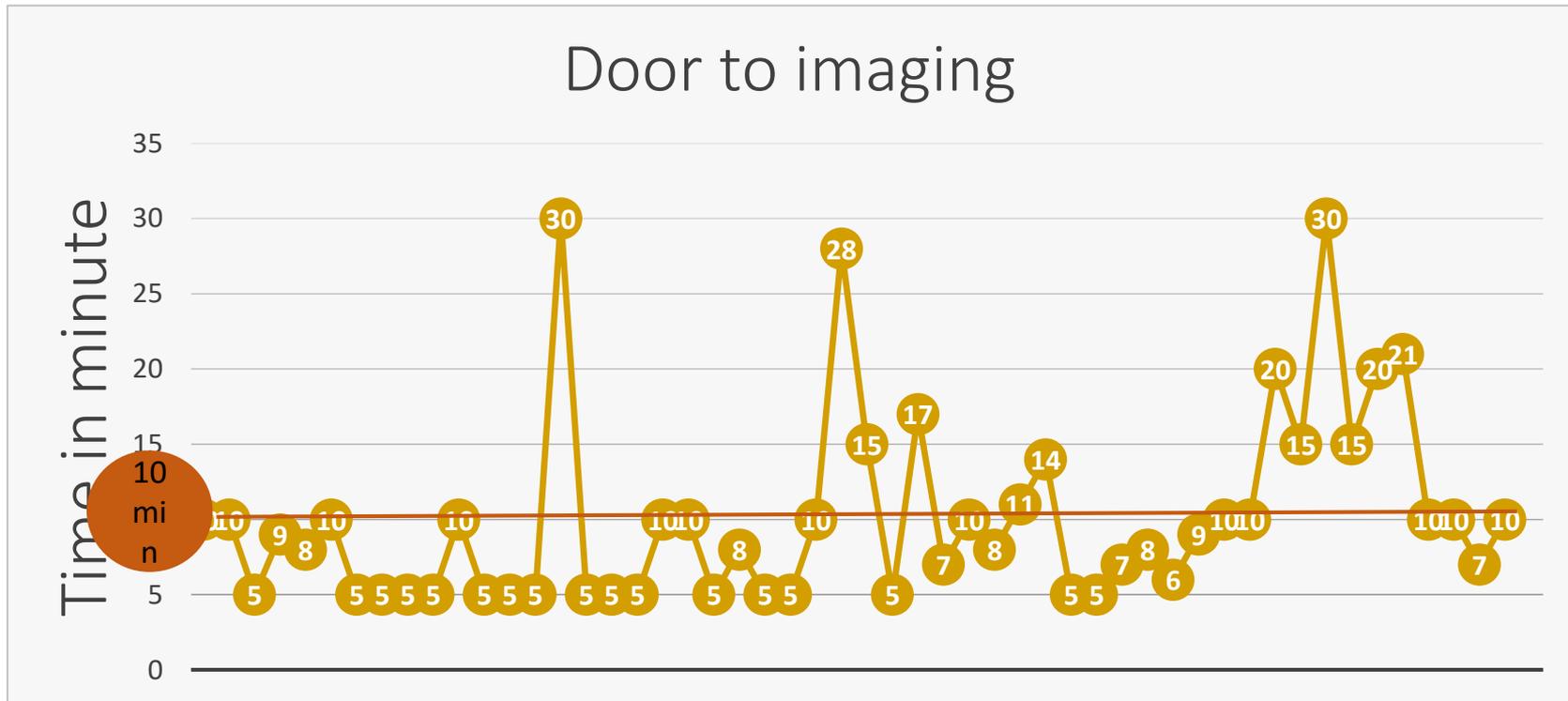


Duration of symptoms



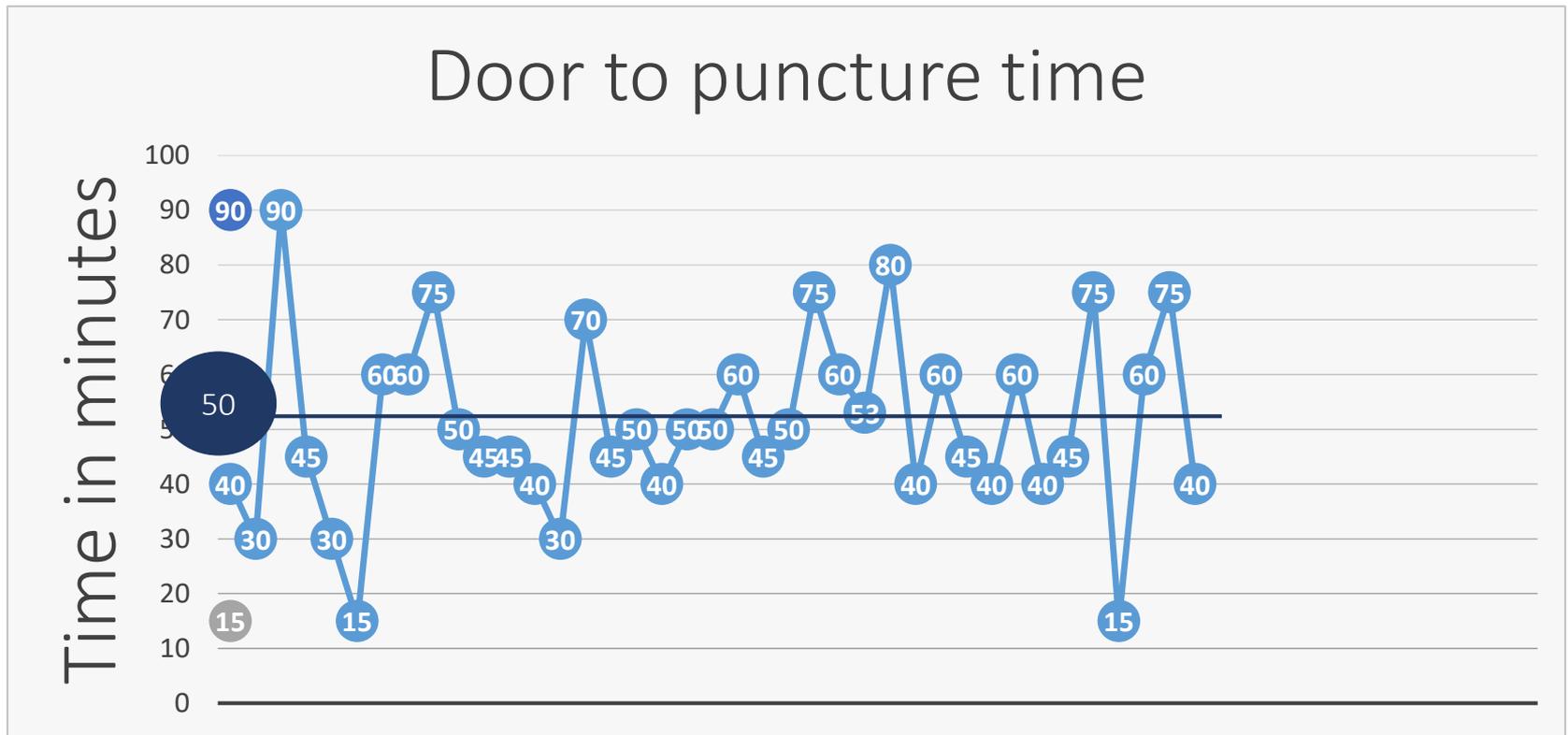


Door to imaging



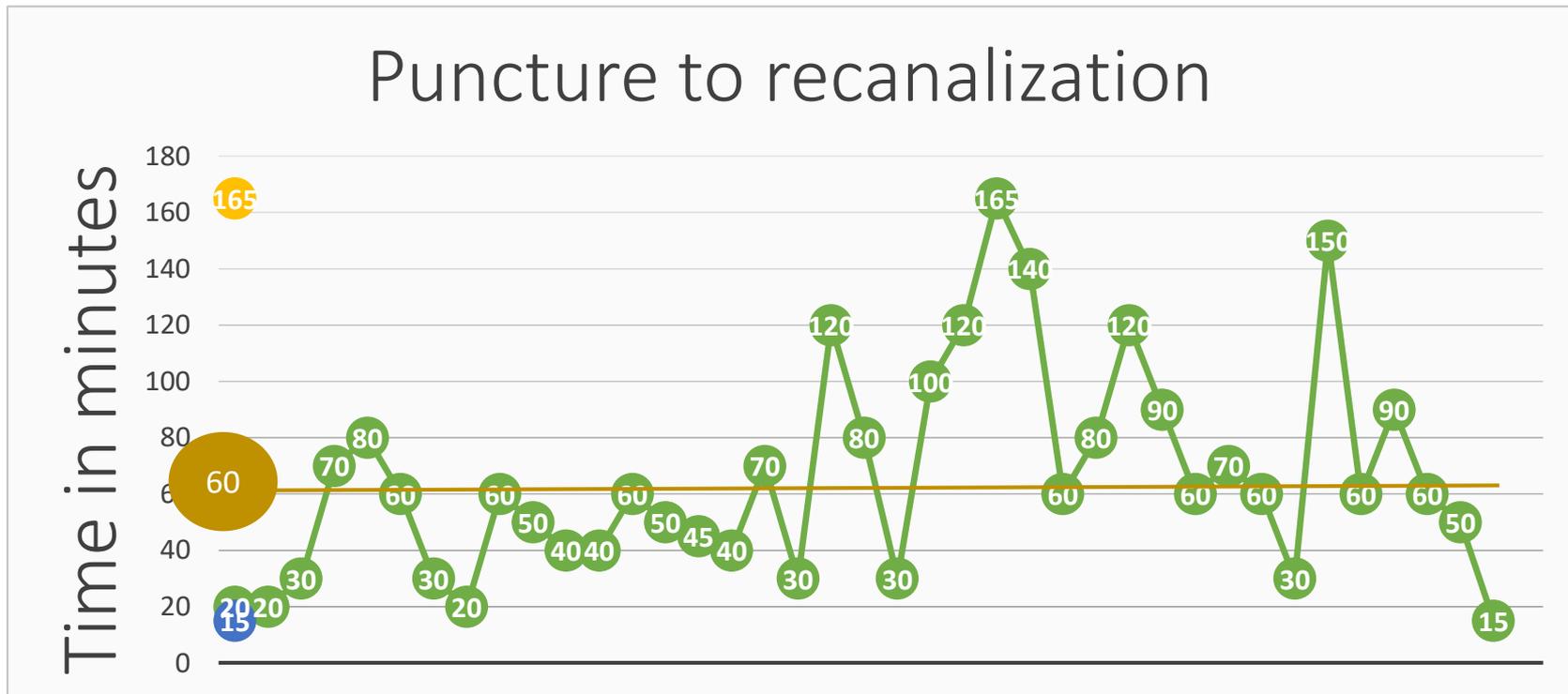


Door to puncture



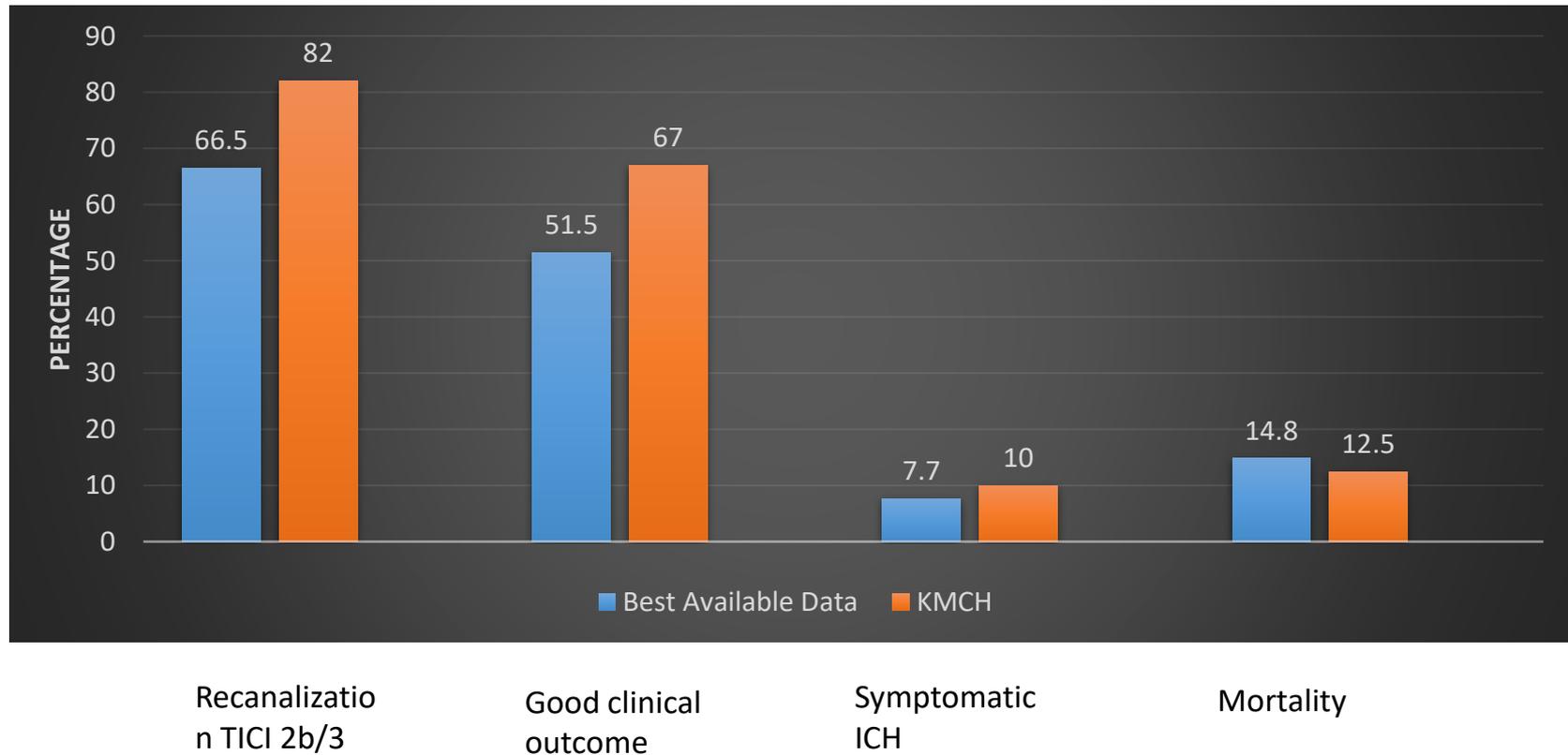


Puncture to recanalization





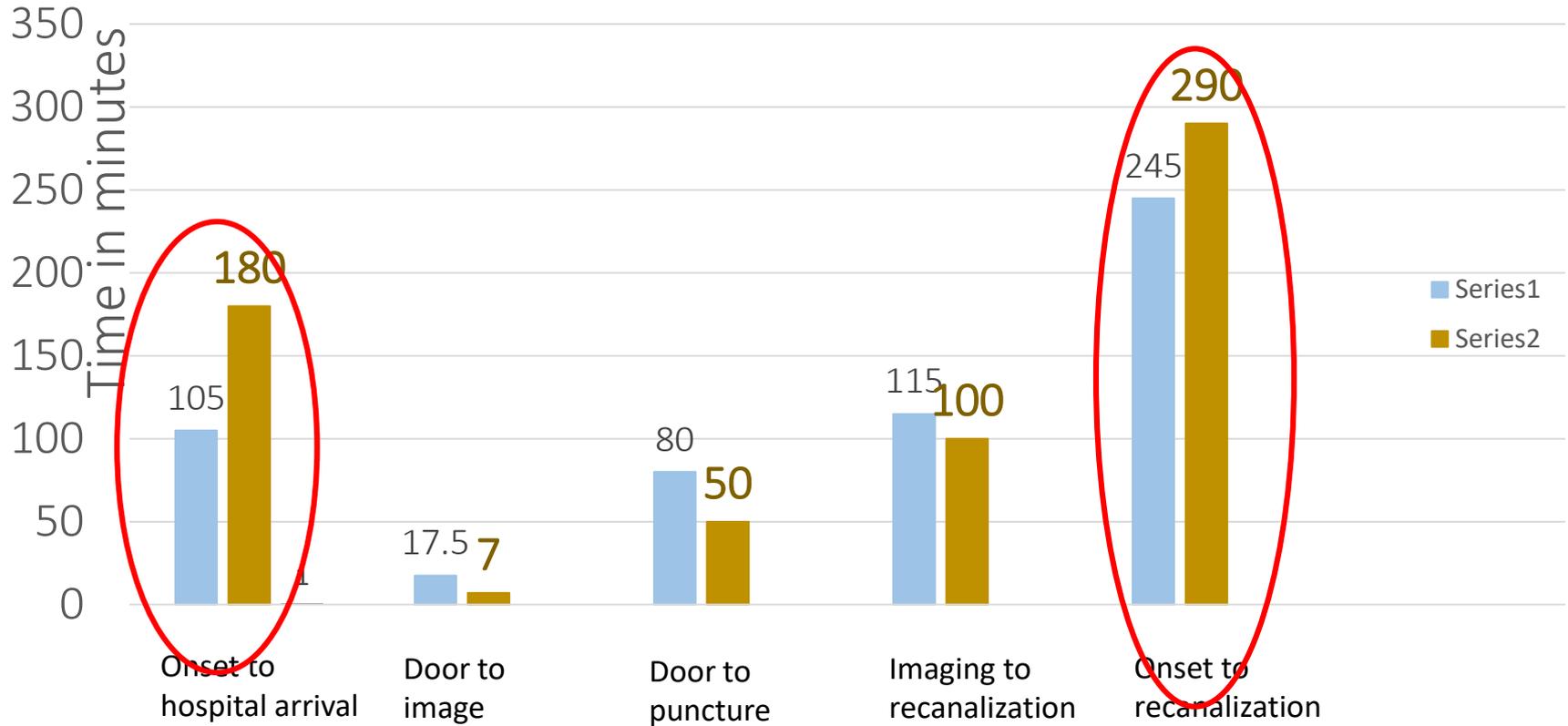
Mechanical thrombectomy outcome: Comparison with best available data





Time metrics :

Comparison with best available evidence





March, 2017 the first prototype – TATA 7T



Chassis of
Vehicle

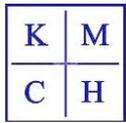
Heavy weight
of vehicle
(Gov
regulation: 2
mm lead
lining)

Bad Indian
roads, high
ground
clearance (12
inch)

Lift for patient
loading
(18 inch)

Feb 2018 version -2





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Other facilities in MSU



Mini ICU set up



Oxygen supply



IV set and syringes



Cardiac monitor,
defibrillator



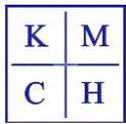
Mini laboratory



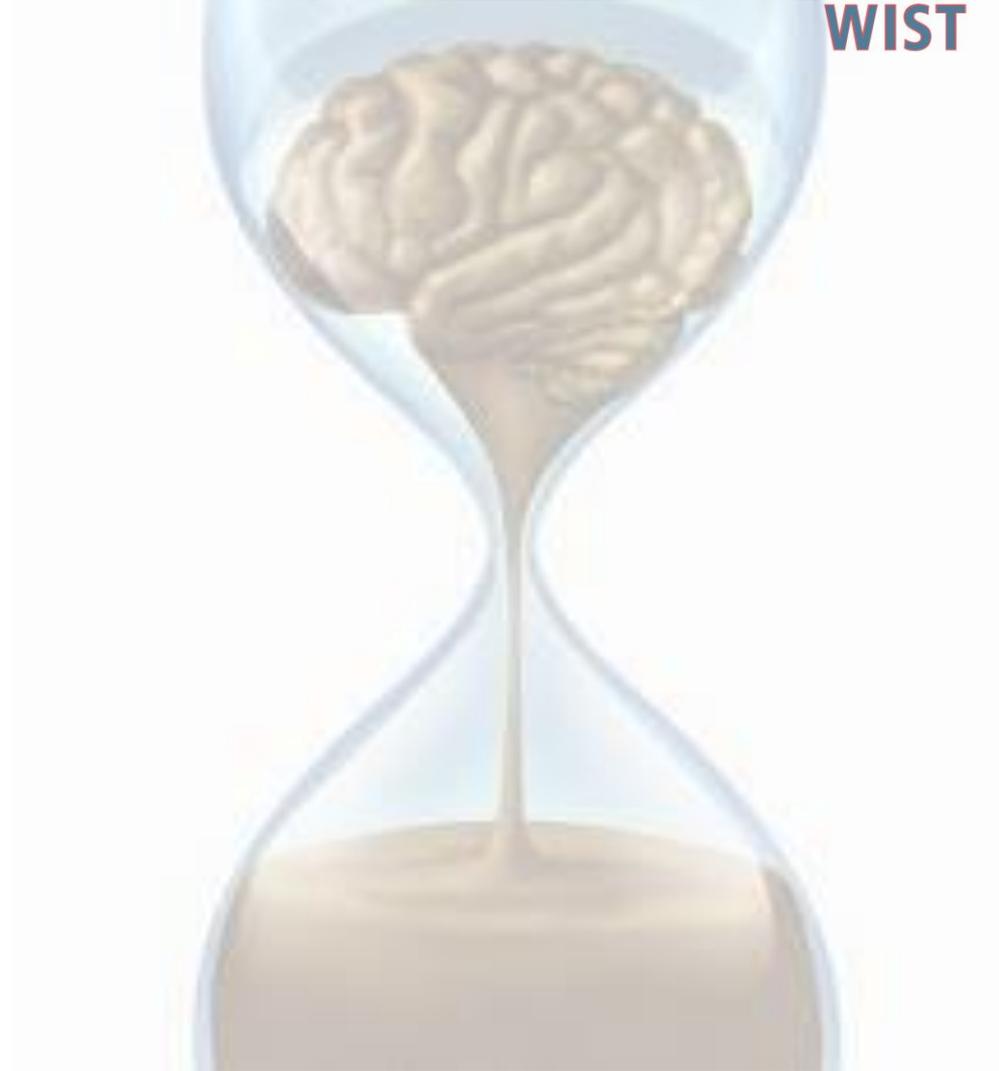
Teleradiology

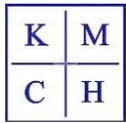


rtPA and
essential
medication



KMCH MSU stroke
system





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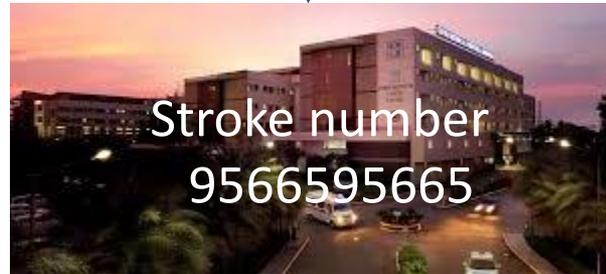
Patient home



PHC/CHC



Hospital with no stroke care facility

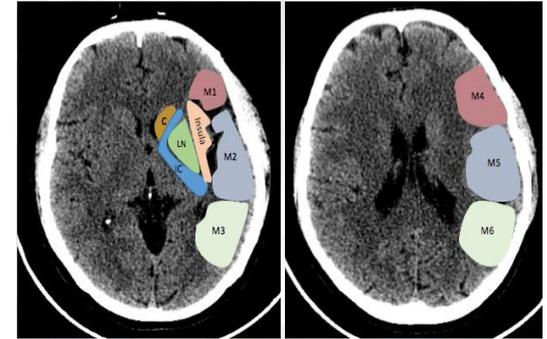


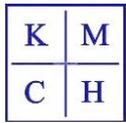
Stroke number
9566595665





Assess the severity
Alberta Stroke Program Early CT Score





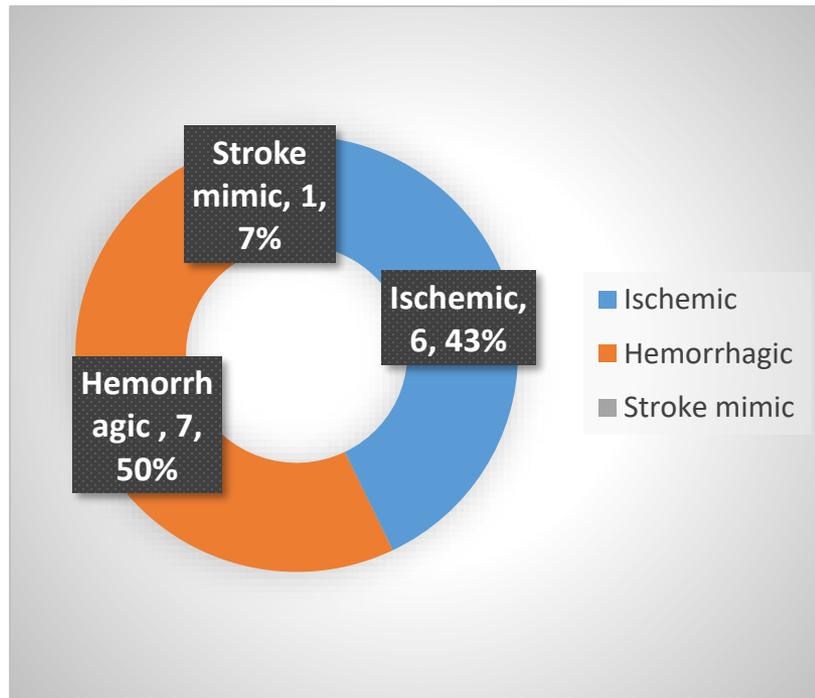
Our Data



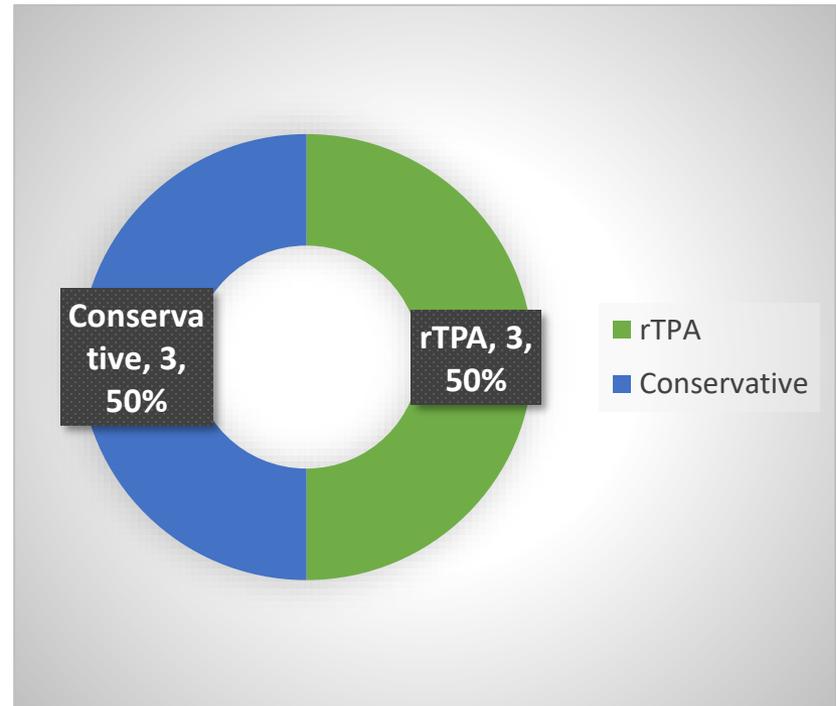
S. No	Gender	Age	Types of stroke	MSU Management	Reason for management	Symptoms to call (mins)	Call to departure (mins)	Departure to CT (mins)	Arrival to Management (mins)	Arrival to t-PA (mins)	Window period (hrs)
1	M	70	Stroke mimic	Conservative	-	58	7	55	5		2
2	F	82	Infarct	Conservative	CT ASPECT-2	345	5	45	3		7
3	M	45	Infarct	Conservative	Not affordable	145	10	22	6		2
4	M	55	Infarct	t-PA	WWP + NC	170	10	81	14	14	4
5	F	29	Infarct	t-PA	WWP + NC	201	9	20	5	5	4
6	M	79	Infarct	t-PA	WWP+NC	26	4	15	20	20	1
7	M	54	Bleed	Conservative		70	10	35	10		2
8	M	60	Bleed	Conservative		15	5	85	5		2
9	F	65	Bleed	Conservative		68	7	210	2		5
10	F	65	Bleed	Conservative		18	2	55	7		1
11	M	58	Bleed	Conservative		75	5	45	1		2
12	F	48	Bleed	Conservative		30	3	109	3		2
13	F	80	Infarct	Conservative	Old age + minor stroke	90	5	125	4		3.5
14	M	58	Bleed	Conservative		15	5	65	5		1



Types of strokes

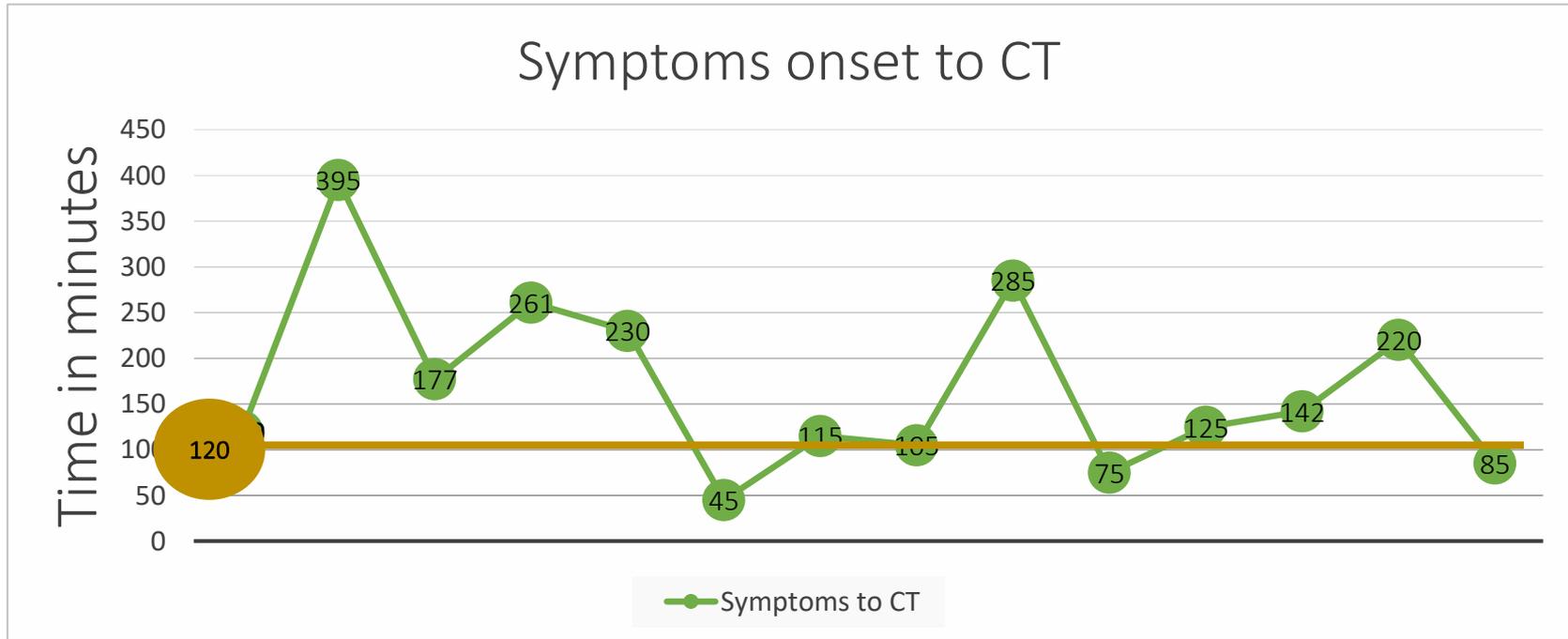


IV thrombolysis



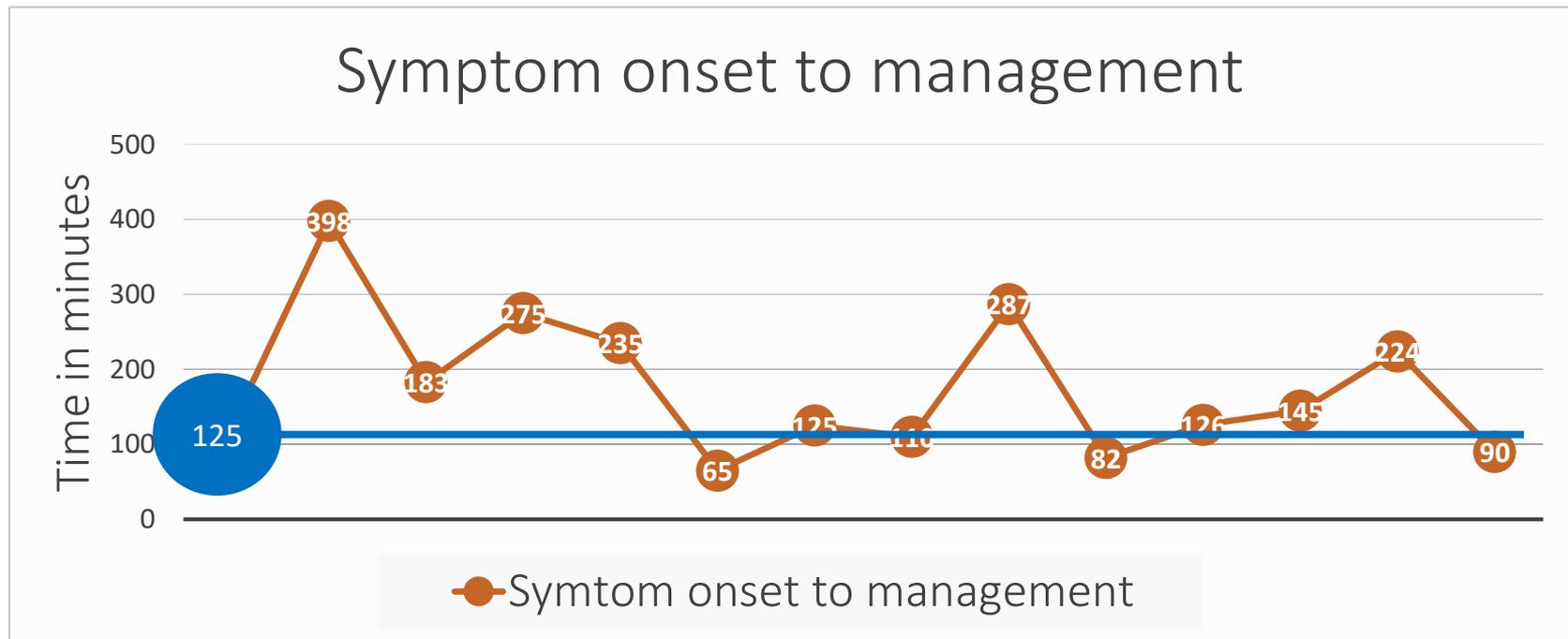


Symptoms onset to CT



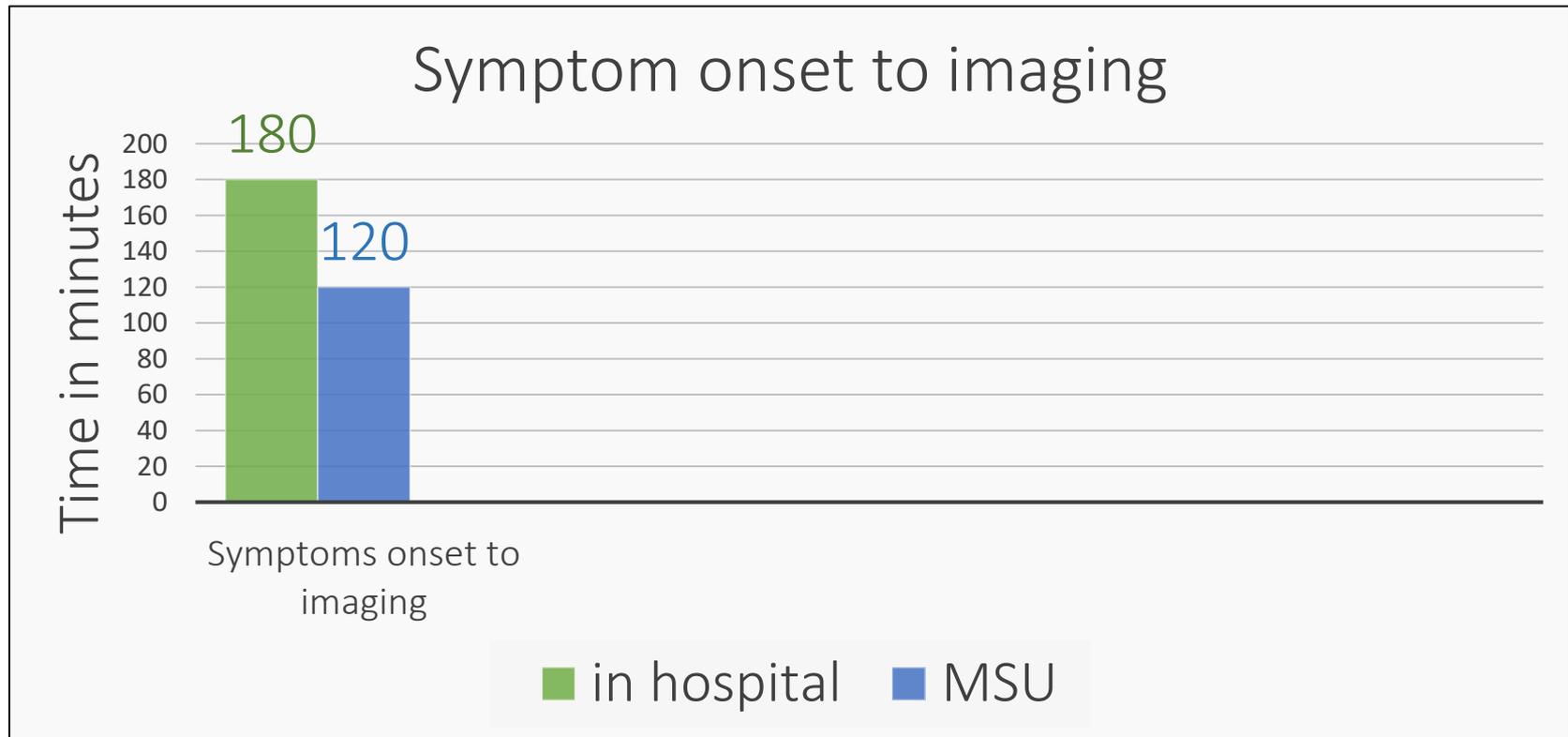


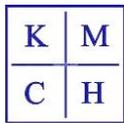
Symptom onset to management





Symptoms onset to Imaging : Comparison of data in subgroup of KMCH





Time metrics comparison with best available data

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Interventional
Neurology

Intervent Neurol 2018;7:347–358

DOI: 10.1159/000487334

Published online: May 31, 2018

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www.karger.com/ine

Review

Review of the Mobile Stroke Unit Experience Worldwide

Victoria J. Calderon^a Brittany M. Kasturiarachi^b Eugene Lin^a
Vibhav Bansal^c Osama O. Zaidat^a

^aMercy Health-St. Vincent Medical Center, Toledo, OH, USA; ^bOhio University Heritage College of Osteopathic Medicine, Athens, OH, USA; ^cMercy Health-St. Rita Medical Center, Lima, OH, USA

Keywords

Emergency medical services · Mobile stroke unit · Prehospital stroke treatment · Stroke management · Thrombolysis

Abstract

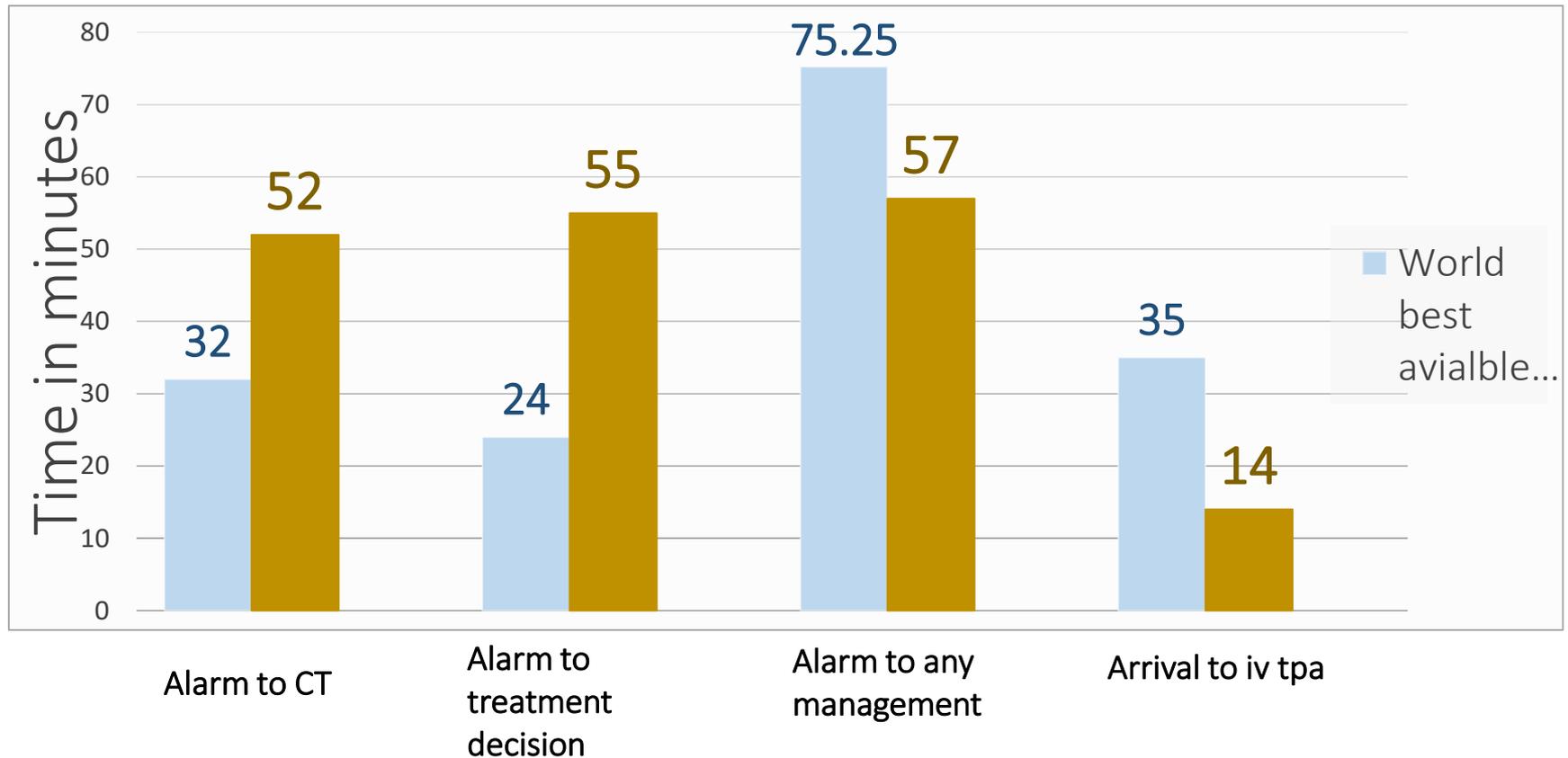
Background: The treatment of stroke is dependent on a narrow therapeutic time window that requires interventions to be emergently pursued. Despite recent “FAST” initiatives that have underscored “time is brain,” many patients still fail to present within the narrow time window to receive maximum treatment benefit from advanced stroke therapies, including recombinant tissue plasminogen activator (tPA) and mechanical thrombectomy. The convergence of emergency medical services, telemedicine, and mobile technology, including transportable computed tomography scanners, has presented a unique opportunity to advance patient stroke care in the prehospital field by shortening time to hyperacute stroke treatment with a mobile stroke unit (MSU). **Summary:** In this review, we provide a look at the evolution of the MSU into its current status as well as future directions. Our summary statement includes historical and implementation information, economic cost, and published clinical outcome and time metrics, including the utilization rate of thrombolysis. **Key Messages:** Initially hypothesized in 2003, the first MSUs were launched in Germany and adopted worldwide in acute, prehospital stroke management. These specialized ambulances have made the diagnosis and

V.J. Calderon and B.M. Kasturiarachi contributed equally to this work.

Osama O. Zaidat, MD, MS, FAAN, FAHA
Mercy Health-St. Vincent Medical Center, The Neuroscience Institute
Medical Office Building 2, Suite M200, 2222 Cherry Street
Toledo, OH 43608 (USA)

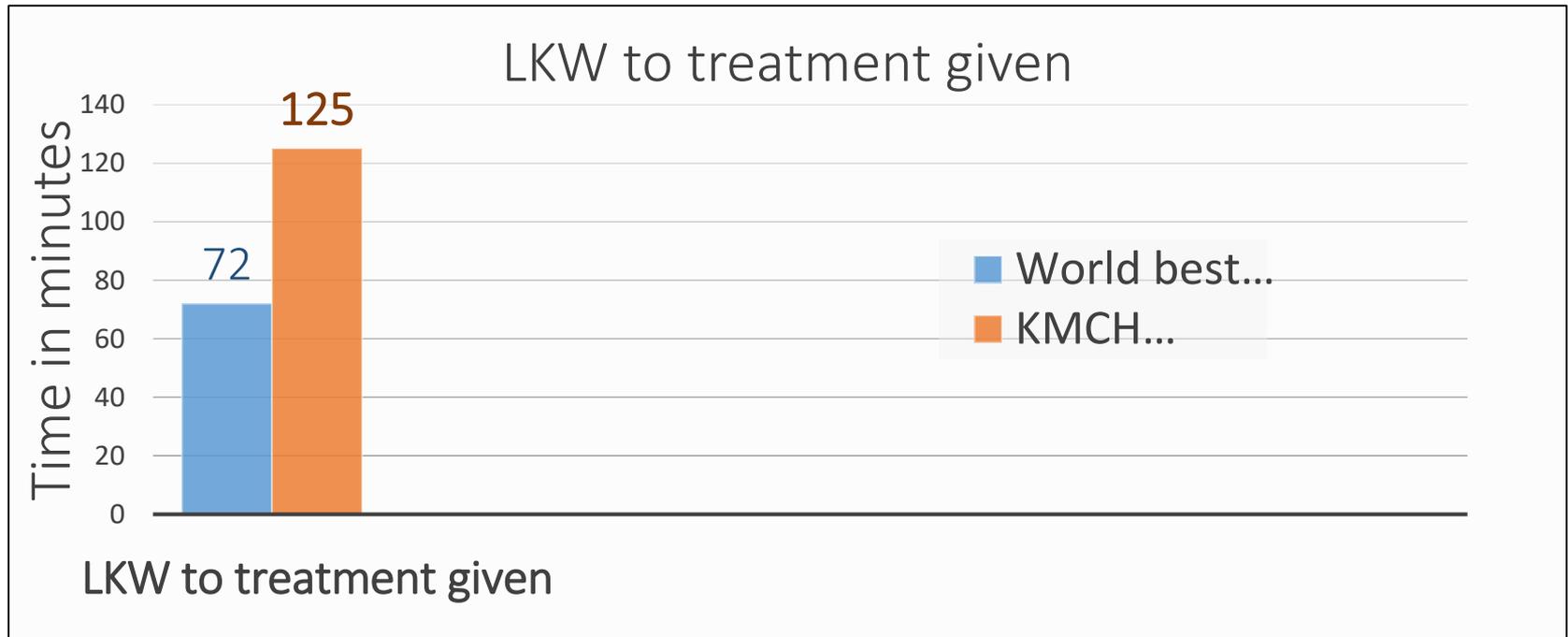


Time metrics: Comparison with best available data





Last known well to treatment given





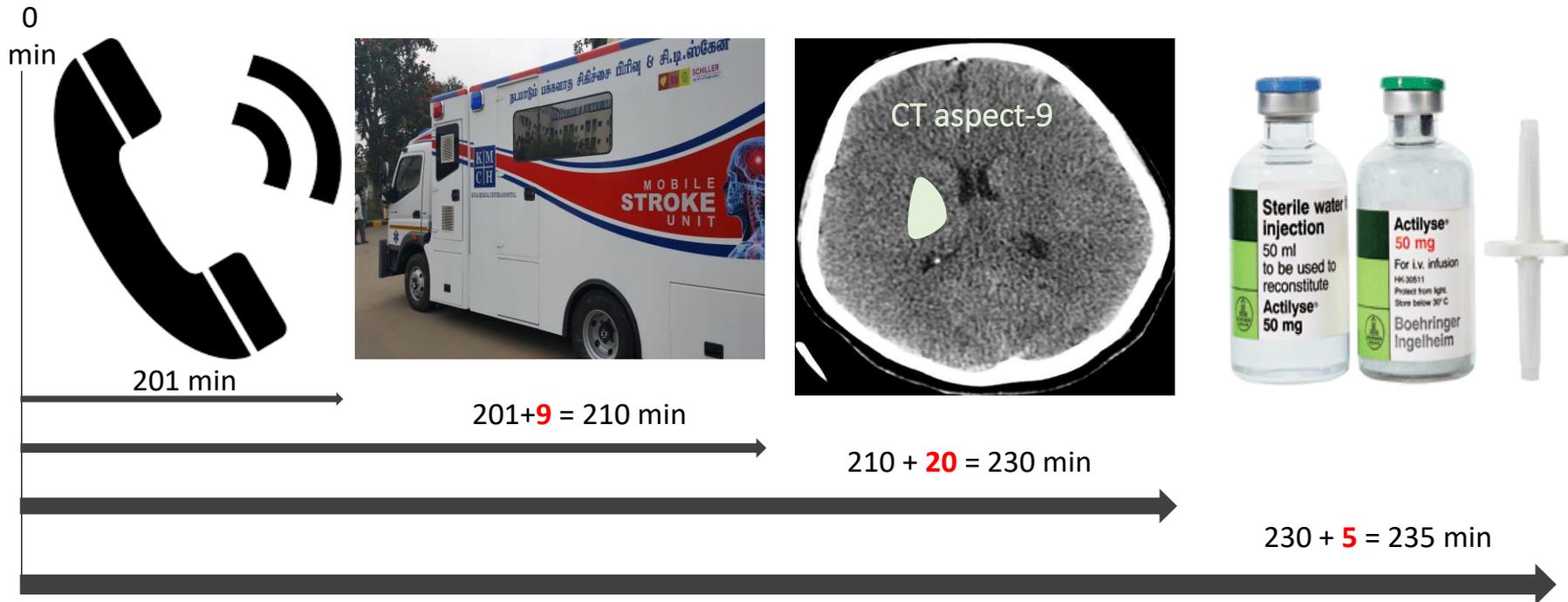
Case

- 29 year old
- Onset 3 hours before
- Left side hemiplegia
- Power 0/5
- Slurring of speech
- NIHSS score - 12





Imaging and treatment decision



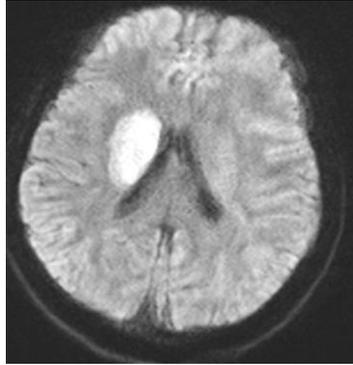


Further management

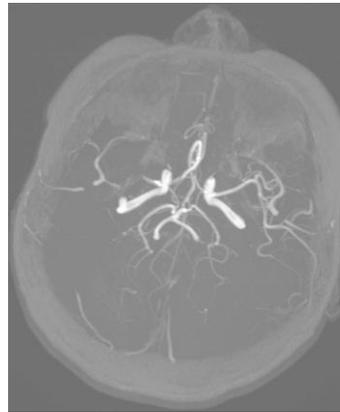
0
min



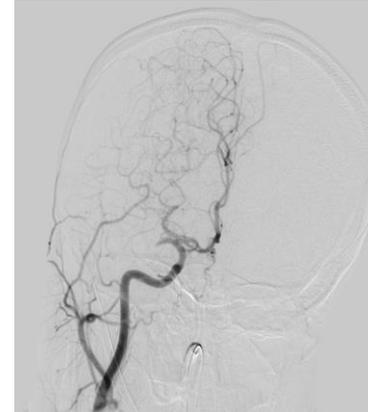
$$235 + 45 = 280 \text{ mins}$$



$$280 + 15 = 295 \text{ mins}$$



$$295 + 4 = 299 \text{ mins}$$



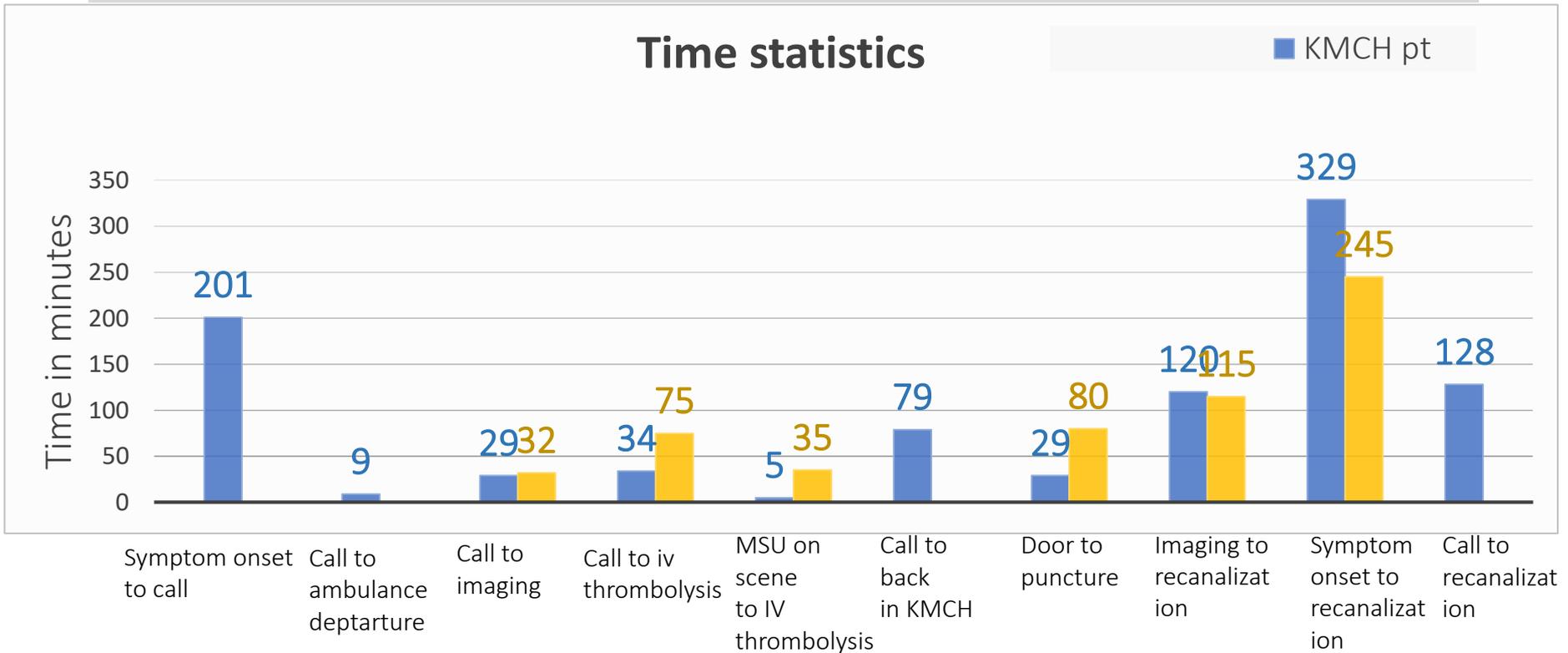
$$299 + 10 = 309 \text{ min}$$



$$309 + 20 = 329 \text{ min}$$



Time statistics for patient: Comparison with best available data



K	M
C	H

Ongoing hardware related issues with MSU



Obese pt with narrow CT table



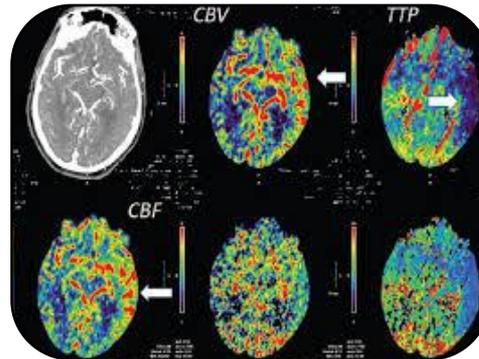
Hilly areas and bad roads



Unstable patient



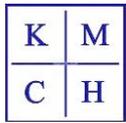
Long CT acquisition time



Poor quality CTA/No CT perfusion



Internet connectivity



Challenges and difficulties for MSU success

K	M
C	H



Lack of awareness of stroke among the public,
medical and paramedical staff

**MAY IS
STROKE
AWARENESS MONTH**

STOP Stroke • Act F.A.S.T. • Spread HOPE



Lack of easy to remember “3 digits” number

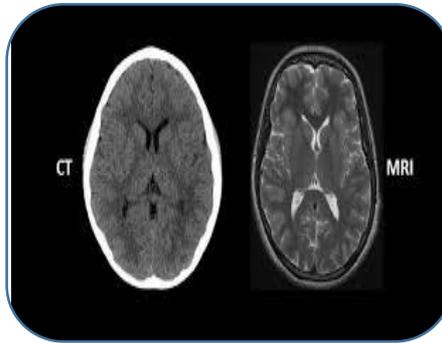




Affordability



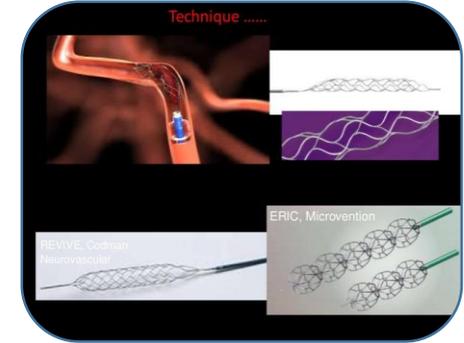
Ambulance cost: 5000/-



Imaging cost: 5000/-



IV thrombolysis: 30,000 to 50,000/-



Mechanical thrombectomy: 3-4 lakhs

K	M
C	H

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SUGGESTION

PEOPLE STRATEGY INFORMATION

BUSINESS

IDEA

BOX

COMMUNICATION

TEAM

SHA

VOTE

ADULT

TECHNOLOGY

PAPER

BALLOT

CONNECTION

SOLUTION

KNOWLEDGE

LEGAL

INSERTING

WORK

SUGGEST

ONLINE

VOTING

OPINION

PERSON

ADVICE

ADVISE

PLANNING

CONCEPT

OFFICE

HELP

WORD

CORPORATE

SERVICE



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National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke



Training Module for Medical Officers for Prevention, Control and Population Level Screening of Hypertension, Diabetes and Common Cancer (Oral, Breast & Cervical)



National Centre for Disease Control
Directorate General of Health Services
Ministry of Health and Family Welfare, GOI
22 - Sham Nath Marg, New Delhi-110054, India

2017

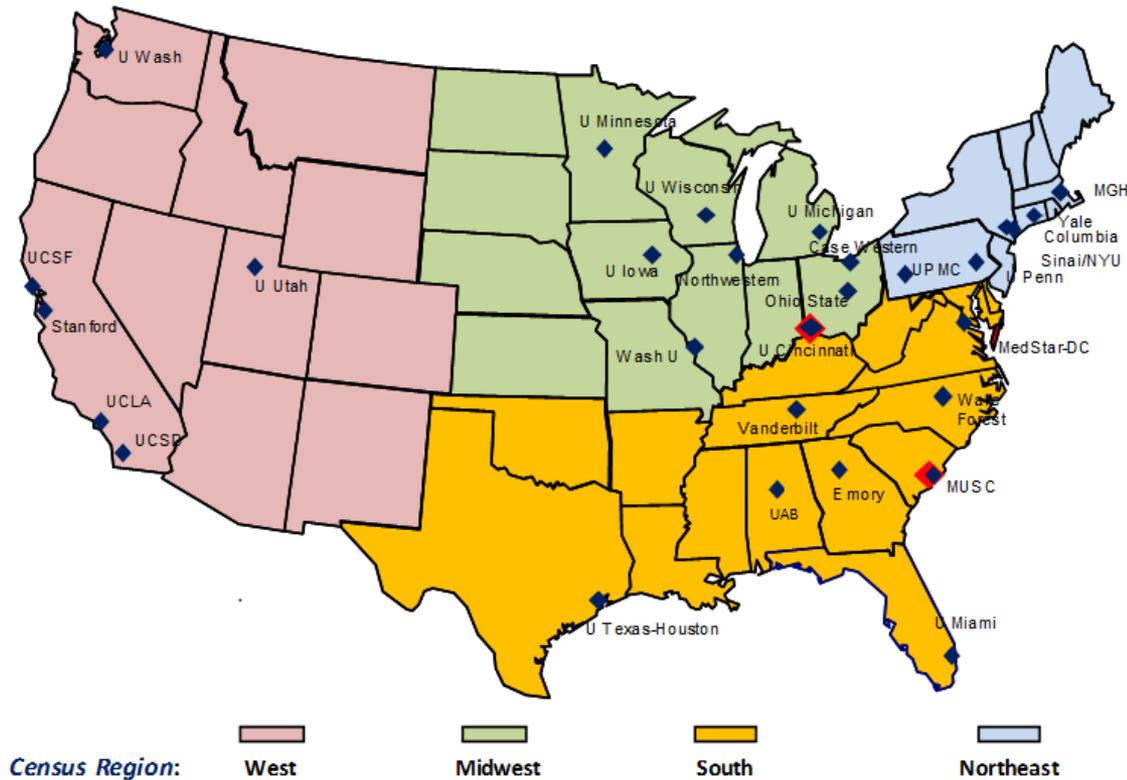
National stroke
programme



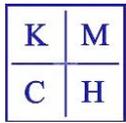
Implementation of India's national health insurance scheme



National and Regional Coordinating Centers



Regional stroke center in every 100-150 km radius with stroke ambulance and trained staff



Conclusion

- MSU can bring down the time to treatment
- We need it to be a part of the National EMS with a common 3 digit number.
- Need a national insurance policy.
- Need several regional stroke centers with trained man power and facilities that are available 24x7