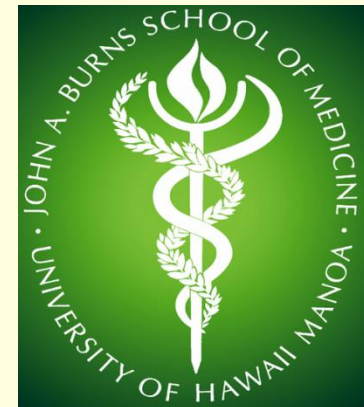# Expansion of Telestroke Services and Best Practices

Matthew Koenig, MD, FNCS
Medical Director of Telemedicine
The Queen's Healthcare Systems

Associate Professor of Medicine
The John A. Burns School of Medicine

Presenter Disclosure Information

Matthew Koenig, MD

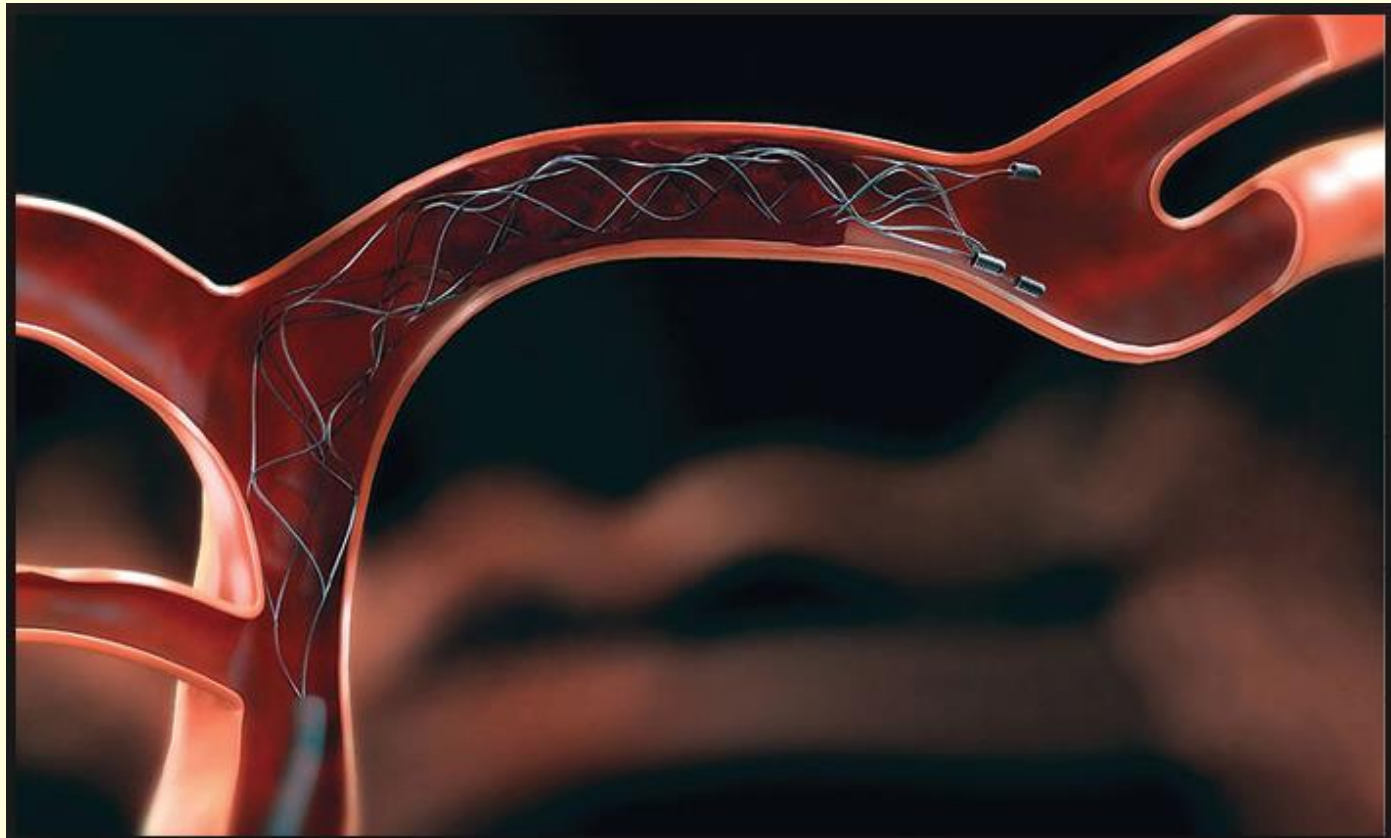Expansion of Telestroke Services and Best Practices

FINANCIAL DISCLOSURE:
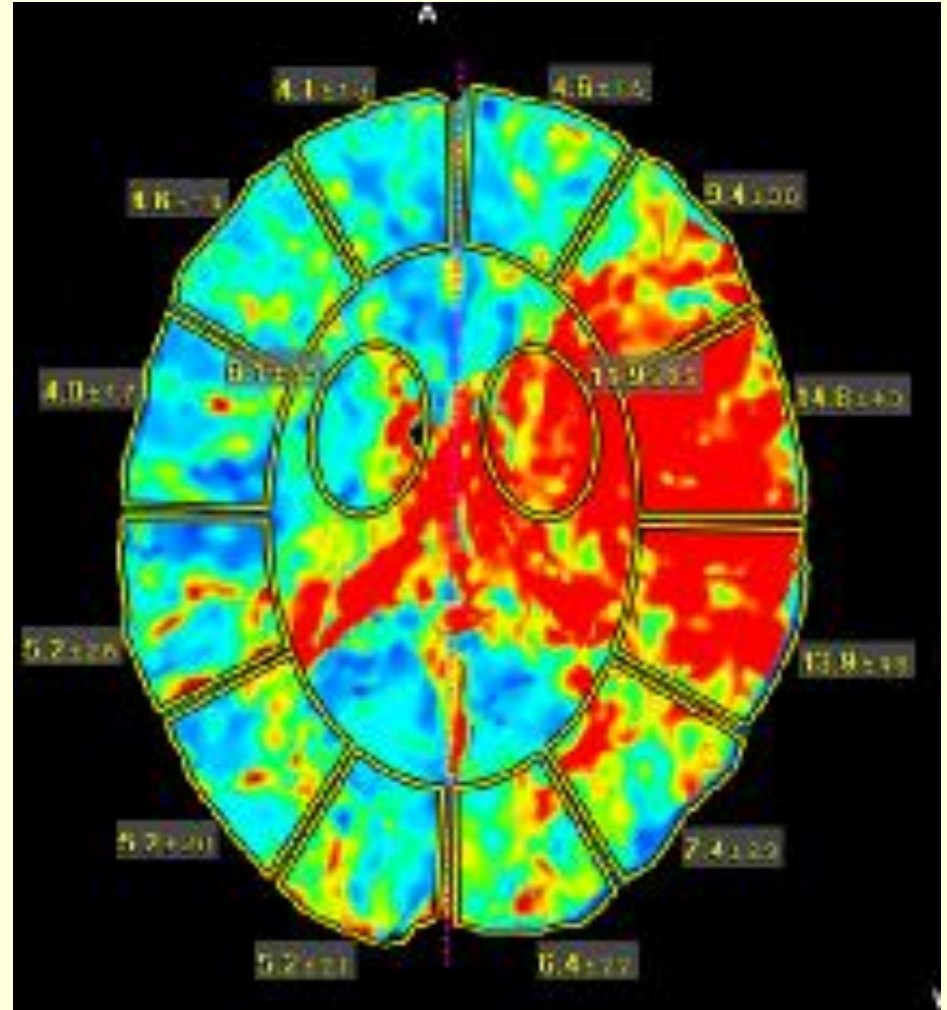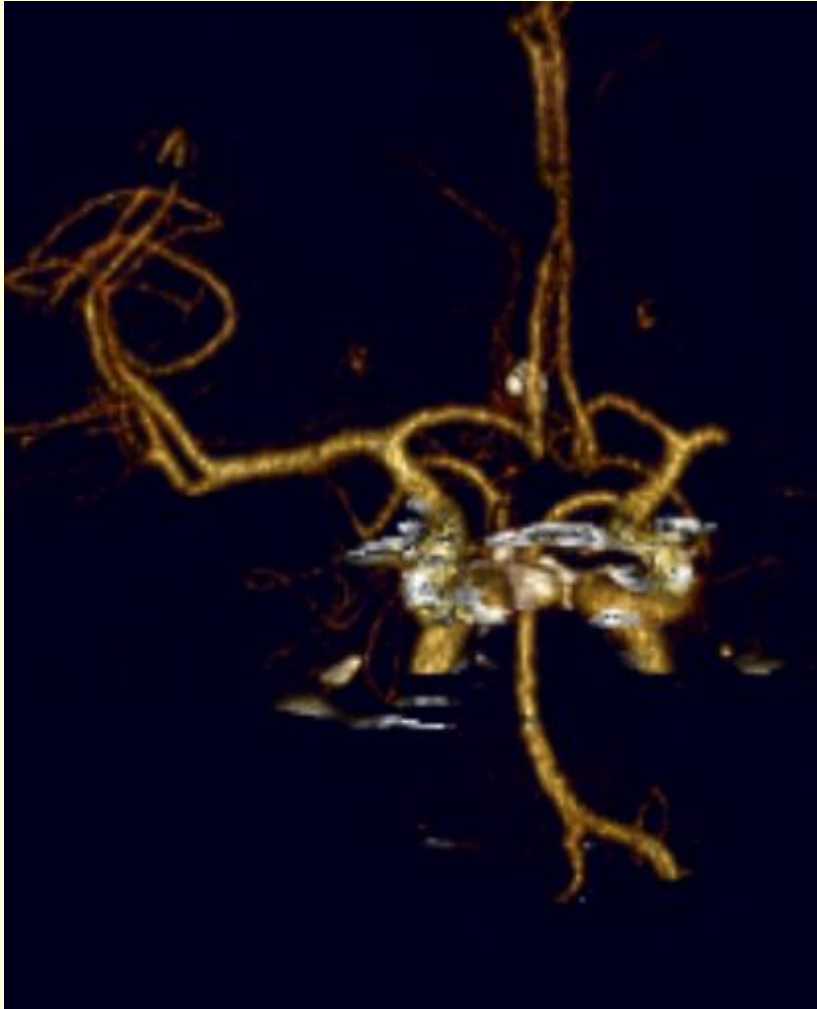**No relevant financial relationship exists**

UNLABELED/UNAPPROVED USES DISCLOSURE:
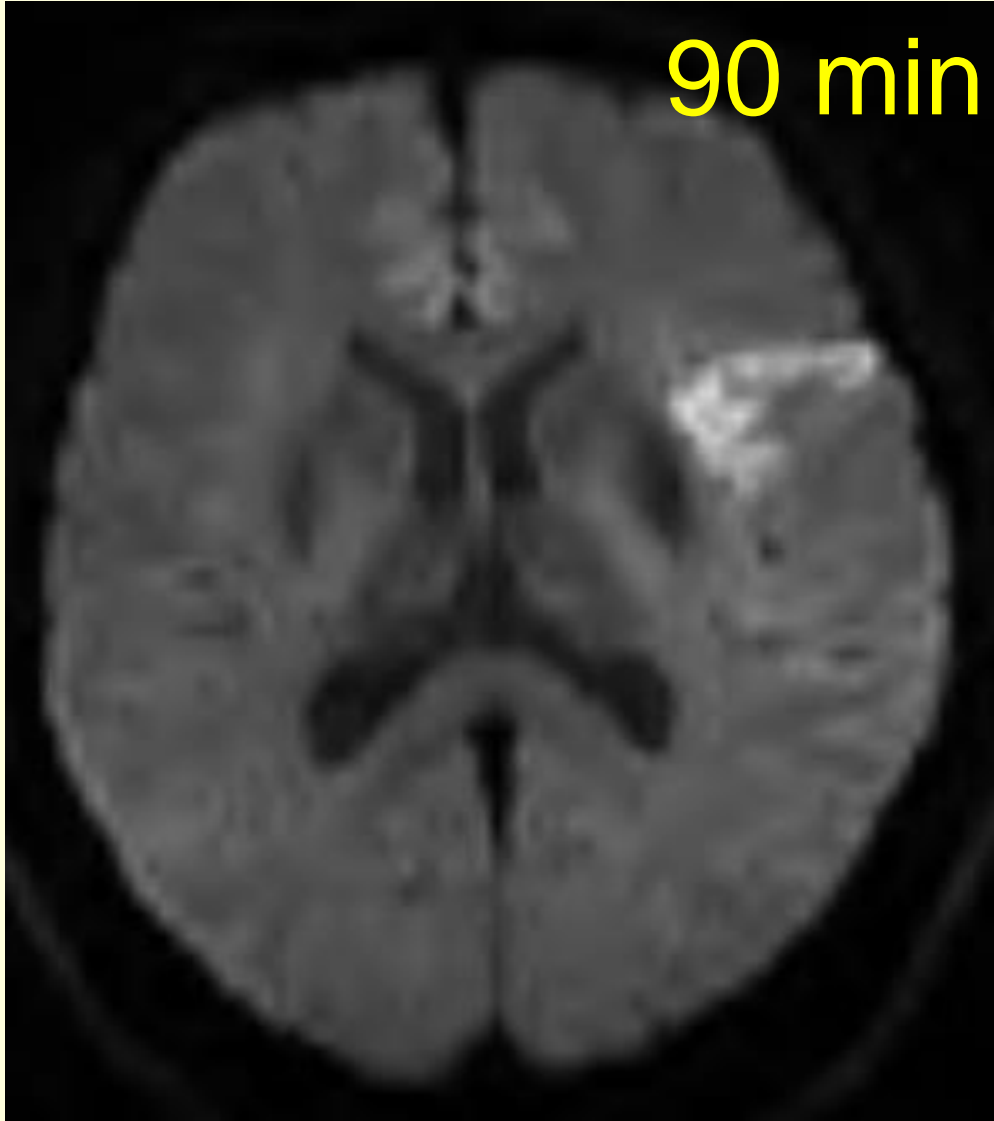**Use of alteplase beyond 3 hours**

Stroke Treatments

Stroke: Time is Brain

After occlusion, neuronal death begins at a rate of 1.9 neurons/min

90 min
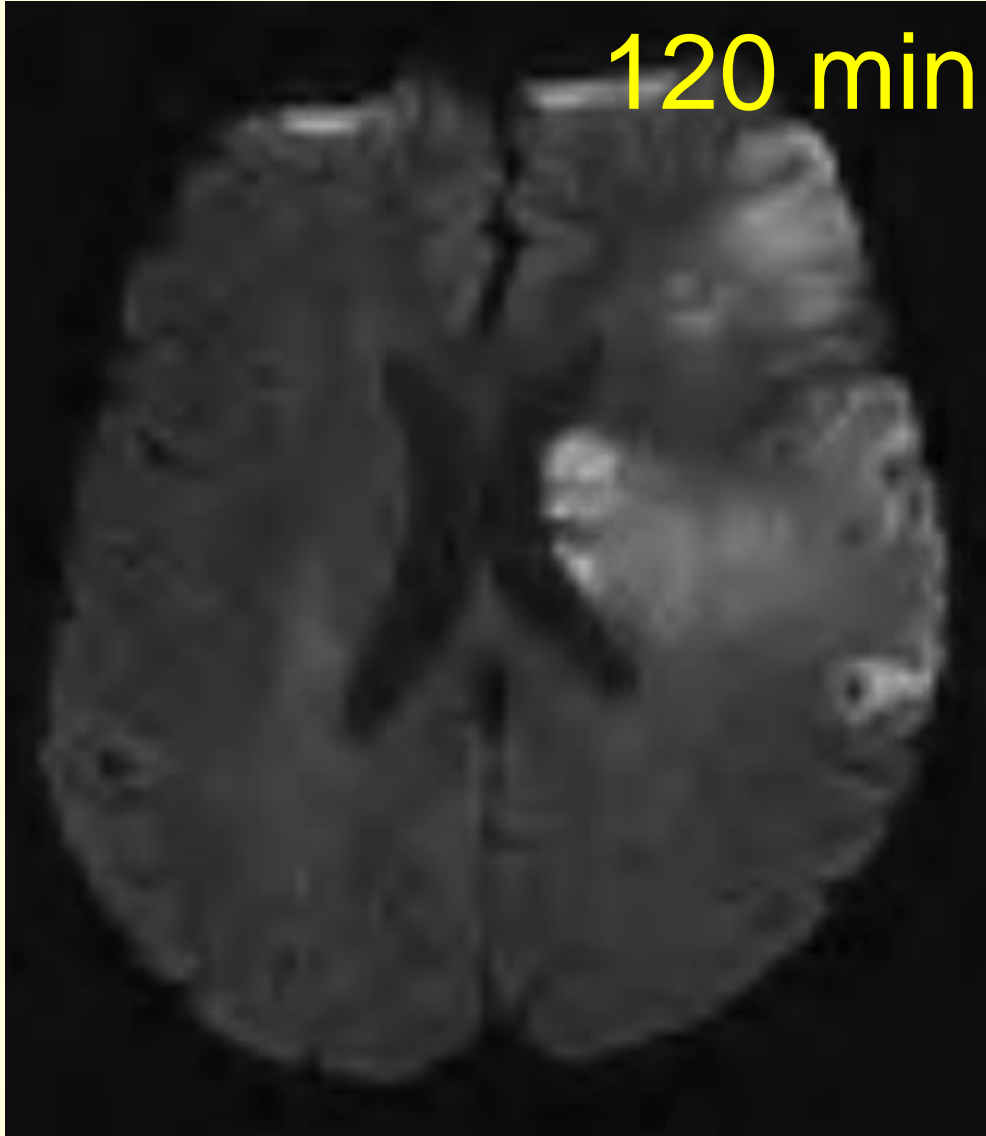
120 min
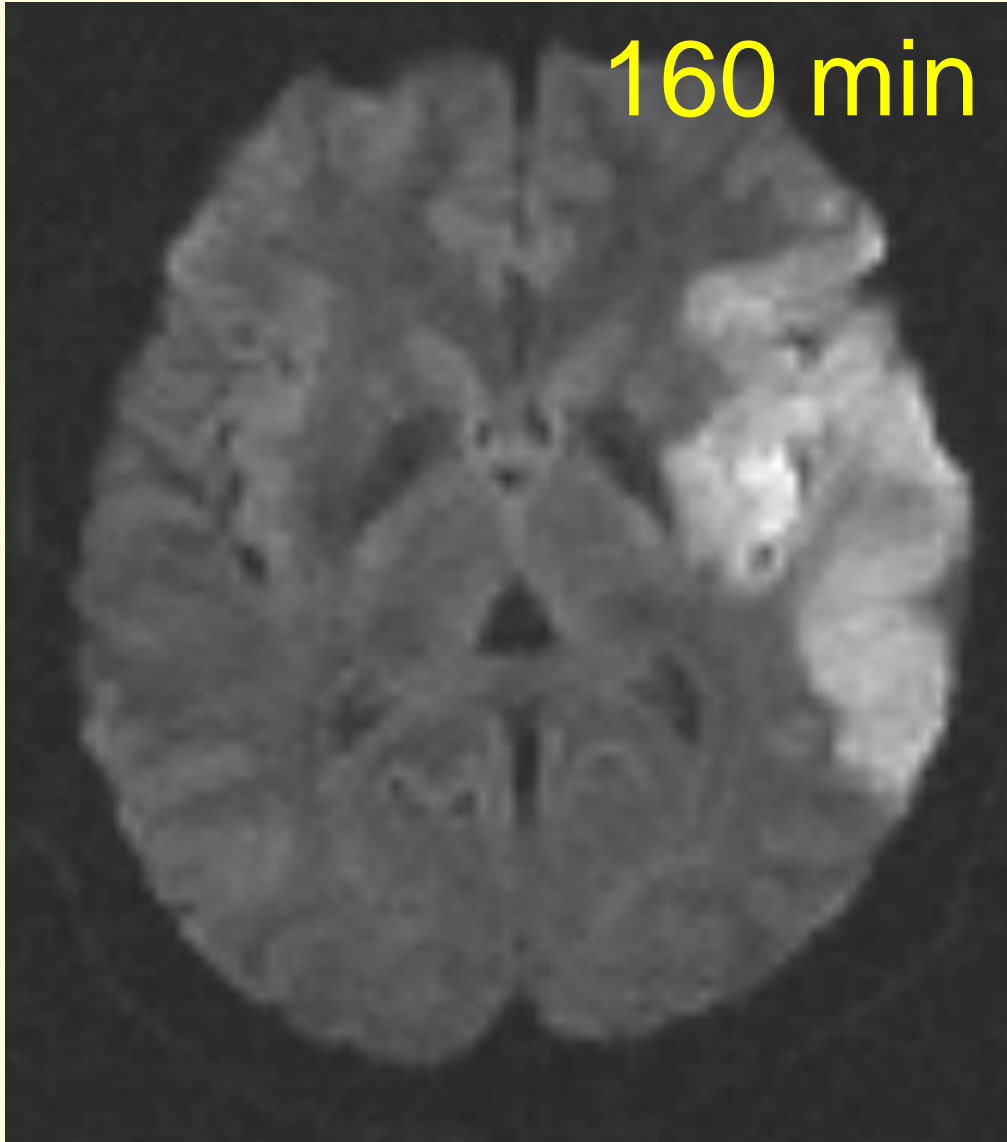
230 min
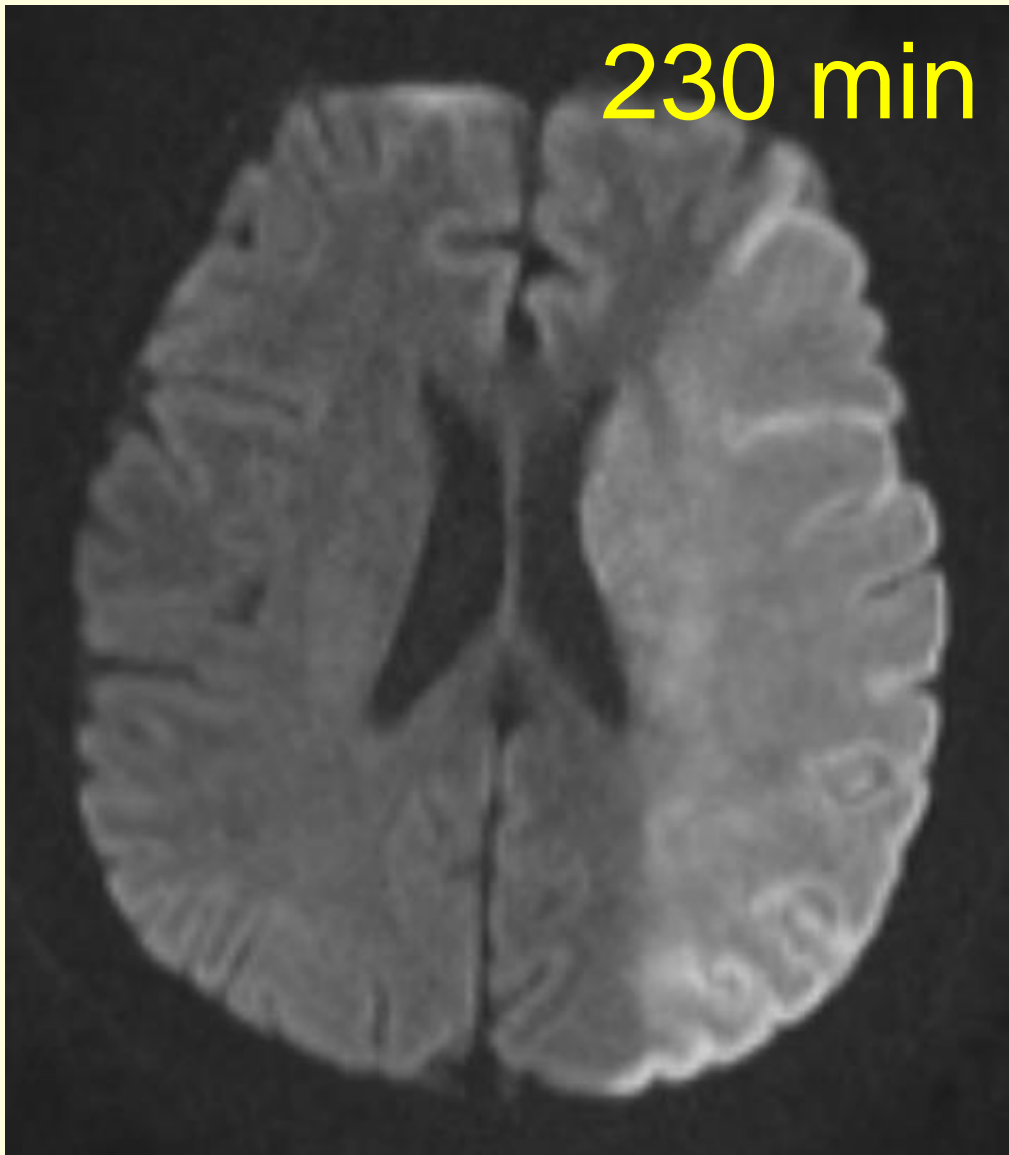
Kona Left MCA Occlusion

- Last known normal 11:30 AM
- Telestroke activation 1:00 PM
- tPA bolus 1:30 PM
- Arrival at QMC 6:30 PM

- Transit time: 5:00
- Total ischemia time prior to arrival: 7:00
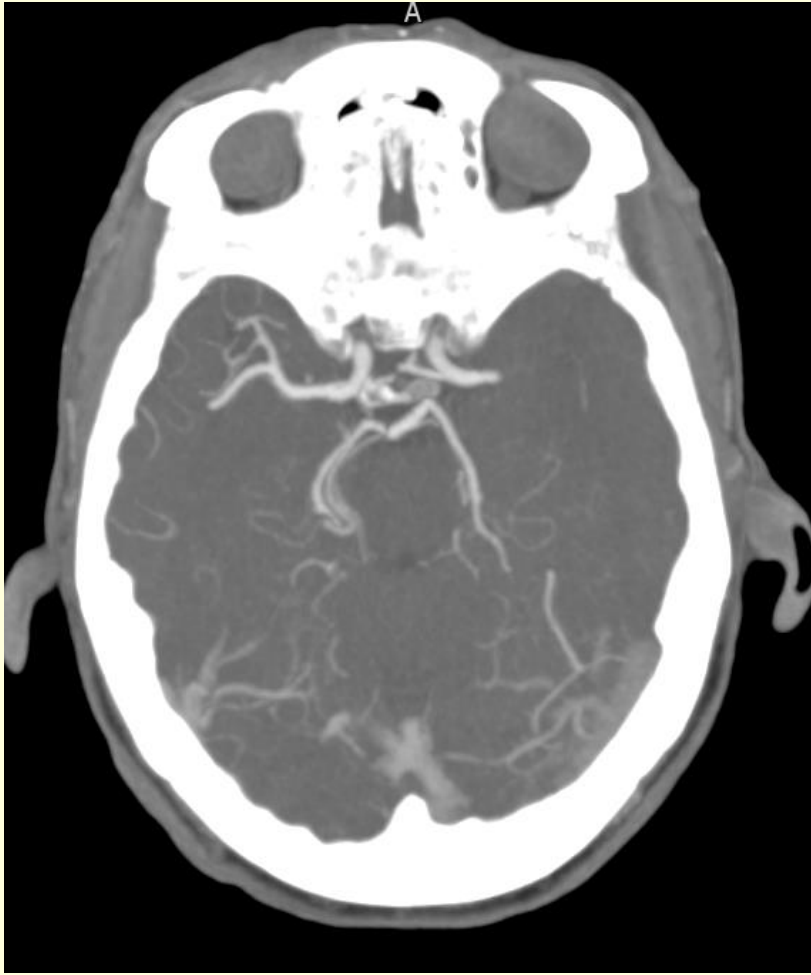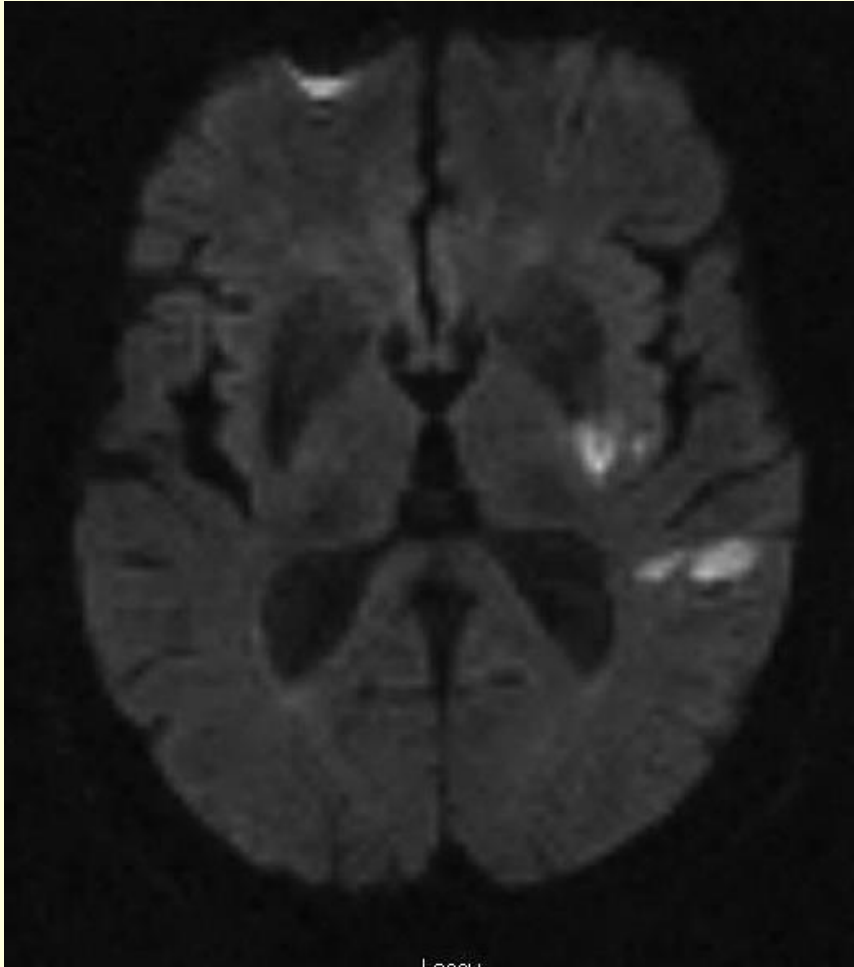
North Hawaii Left MCA Occlusion

- 41 year old woman
- Witnessed onset 8:30 AM
- Telestroke activation 11:15 AM
- tPA bolus 11:30 AM
- QMC arrival 2:45 PM
- Angio start 3:10 PM
- Recanalization 3:25 PM

- Transit time: 3:15
- Total ischemia time: 6:55

MAYO CLINIC

The Evidence

Efficacy of site-independent telemedicine in the STRokE DOC trial: a randomised, blinded, prospective study

Brett C Meyer, Rema Raman, Thomas Hemmen, Richard Obler, Justin A Zivin, Ramesh Rao, Ronald G Thomas, Patrick D Lyden

Summary

Background To increase the effective use of thrombolytics for acute stroke, the expertise of vascular neurologists must be disseminated more widely. We prospectively assessed whether telemedicine (real-time, two-way audio and vid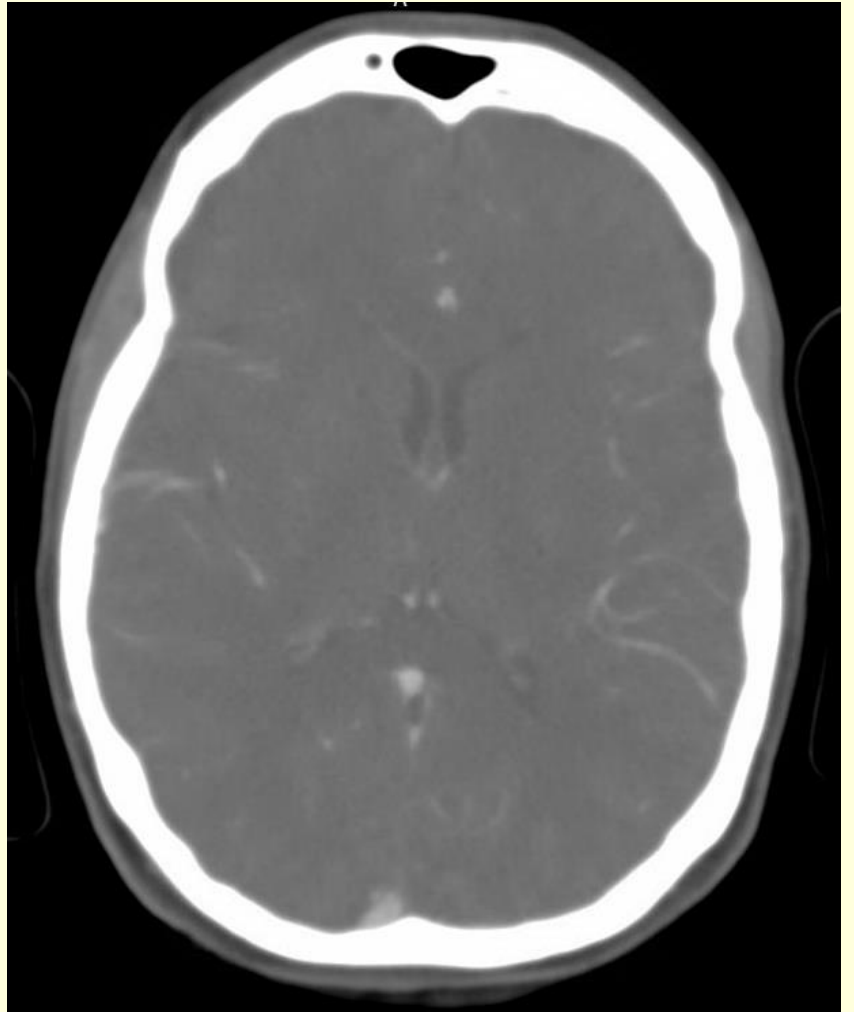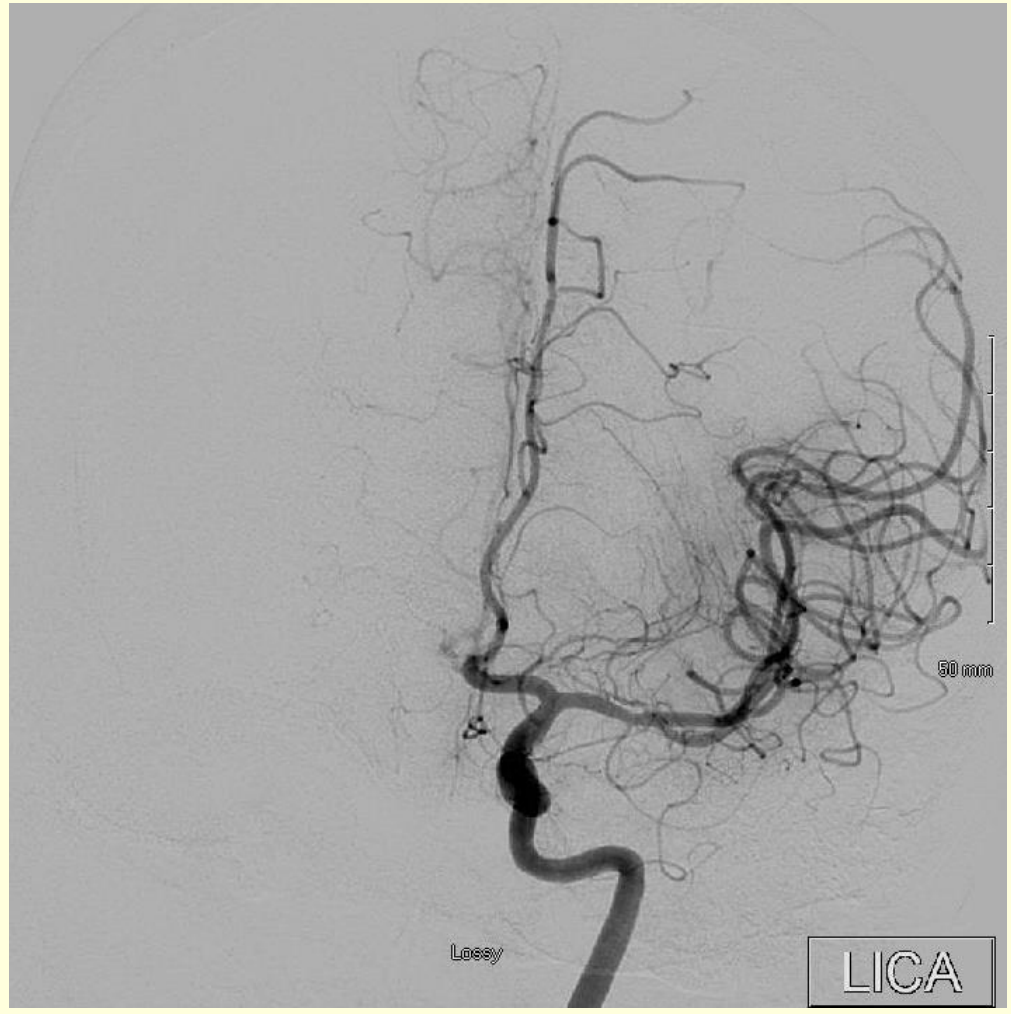eo, and digital imaging and communications in medicine [DICOM] interpretation) or telephone was superior for decision making in acute telemedicine consultations.

Methods From January, 2004, to August, 2007, patients older than 18 years who presented with acute stroke symptoms at one of four remote spoke sites were randomly assigned, through a web-based, permuted blocks system, to telemedicine or telephone consultation to assess their suitability for treatment with thrombolytics, on the basis of standard criteria. The primary outcome measure was whether the decision to give thrombolytic treatment was correct, as determined by central adjudication. Secondary outcomes were the rate of thrombolytic use, 90-day functional outcomes (Barthel index [BI] and modified Rankin scale [mRS]), the incidence of intracerebral haemorrhages, and technical observations. Analysis was by intention to treat. This trial is registered with ClinicalTrials.gov, number NCT00283868.

Findings 234 patients were assessed prospectively. 111 patients were randomised to telemedicine, and 111 patients were randomised to telephone consultation; 207 completed the study. Mean National Institutes of Health stroke scale score at presentation was 9·5 (SD 8·1) points (11·4 [8·7] points in the telemedicine group versus 7·7 [7·0] points in the telephone group; p=0·002). One telemedicine consultation was aborted for technical reasons, although it was included in the analyses. Correct treatment decisions were made more often in the telemedicine group than in the telephone group (108 [98%] vs 91 [82%], odds ratio [OR] 10·9, 95% CI 2·7–44·6; p=0·0009). Intravenous thrombolytics were used at an overall rate of 25% (31 [28%] telemedicine vs 25 [23%] telephone, 1·3, 0·7–2·5; p=0·43). 90-day functional outcomes were not different for BI (95–100) (0·6, 0·4–1·1; p=0·13) or for mRS score (0·6, 0·3–1·1; p=0·09). There was no difference in mortality (1·6, 0·8–3·4; p=0·27) or rates of intracerebral haemorrhage after treatment with thrombolytics (2 [7%] telemedicine vs 2 [8%] telephone, 0·8, 0·1–6·3; p=1·0). However, there were more incomplete data in the telephone group than in the telemedicine group (12% vs 3%, 0·2, 0·1–0·3; p=0·0001).

Interpretation The authors of this trial report that stroke telemedicine consultations result in more accurate decision making compared with telephone consultations and can serve as a model for the effectiveness of telemedicine in other medical specialties. The more appropriate decisions, high rates of thrombolysis use, improved data collection, low rate of intracerebral haemorrhage, low technical complications, and favourable time requirements all support the efficacy of telemedicine for making treatment decisions, and might enable more practitioners to use this medium in daily stroke care.

MAYO CLINIC

tPA or no tPA

Did the Hub consultant make the correct decision?

Results – determining tPA eligibility

	Telemedicine n = 110	Telephone n = 111	O.R.	p
Overall correct decision Level 2b (SDAC)	108 (98%)	91 (82%)	10.9 (2.7-44.6)	0.0009 (0.0001)

Correct treatment decisions made more often in telemedicine group than telephone-only group

AHA/ASA Scientific Statement

A Review of the Evidence for the Use of Telemedicine Within Stroke Systems of Care

A Scientific Statement From the American Heart Association/American Stroke Association

The American Academy of Neurology (AAN) affirms the value of this paper as an educational tool for neurologists.

Lee H. Schwamm, MD, FAHA, Co-Chair; Robert G. Holloway, MD, MPH, Co-Chair; Pierre Amarenco, MD, FAHA; Heinrich J. Audebert, MD; Tamilyn Bakas, RN, DNS, FAHA, FAAN; Neale R. Chumbler, PhD; Rene Handschu, MD; Edward C. Jauch, MD, MS, FAHA; William A. Knight IV, MD; Steven R. Levine, MD, FAHA; Marc Mayberg, MD, FAHA; Brett C. Meyer, MD; Philip M. Meyers, MD, FAHA; Elaine Skalabrin, MD; Lawrence R. Wechsler, MD, FAHA; on behalf of the American Heart Association Stroke Council and the Interdisciplinary Council on Peripheral Vascular Disease

Abstract—The aim of this new statement is to provide a comprehensive and evidence-based review of the scientific data evaluating the use of telemedicine for stroke care delivery and to provide consensus recommendations based on the available evidence. The evidence is organized and presented within the context of the American Heart Association's Stroke Systems of Care framework and is classified according to the joint American Heart Association/American College of Cardiology Foundation and supplementary American Heart Association Stroke Council methods of classifying the level of certainty and the class of evidence. Evidence-based recommendations are included for the use of telemedicine in general neurological assessment and primary prevention of stroke; notification and response of

AHA/ASA Scientific Statement

A Review of the Evidence for the Use of Telemedicine Within Stroke Systems of Care

Class I Recommendation

1. It is recommended that a stroke specialist using HQ-VTC provide a medical opinion in favor of or against the use of intravenous tPA in patients with suspected acute ischemic stroke when on-site stroke expertise is not immediately available (*Class I, Level of Evidence B*).

2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Reviewed for evidence-based integrity and endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons

Endorsed by the Society for Academic Emergency Medicine

William J. Powers, MD, FAHA, Chair; Alejandro A. Rabinstein, MD, FAHA, Vice Chair;
Teri Ackerson, BSN, RN; Opeolu M. Adeoye, MD, MS, FAHA;
Nicholas C. Bambakidis, MD, FAHA; Kyra Becker, MD, FAHA; José Biller, MD, FAHA;
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Andrew M. Southerland, MD, MSc; Deborah V. Summers, MSN, RN, FAHA;
David L. Tirschwell, MD, MSc, FAHA; on behalf of the American Heart Association Stroke Council

4. Telestroke/teleradiology evaluations of AIS patients can be effective for correct IV alteplase eligibility decision making.	IIa	B-R	New recommendation.
The STRokEDOC (Stroke Team Remote Evaluation Using a Digital Observation Camera) pooled analysis supported the hypothesis that telemedicine consultations, which included teleradiology, compared with telephone-only resulted in statistically significantly more accurate IV alteplase eligibility decision making for patients exhibiting symptoms and signs of an acute stroke syndrome in EDs.[46]			See Table XI in online Data Supplement 1.
5. Administration of IV alteplase guided by telestroke consultation for patients with AIS may be as safe and as beneficial as that of stroke centers.	IIb	B-NR	New recommendation.
A systematic review and meta-analysis was performed to evaluate the safety and efficacy of IV alteplase delivered through telestroke networks in patients with AIS. Symptomatic intracerebral hemorrhage (sICH) rates were similar between patients subjected to telemedicine-guided IV alteplase and those receiving IV alteplase at stroke centers. There was no difference in mortality or in functional independence at 3 months between telestroke-guided and stroke center–managed patients. The findings indicate that IV alteplase delivery through telestroke networks is safe and effective in the 3-hour time window.[47]			See Table XII in online Data Supplement 1.

6. Providing alteplase decision-making support via telephone consultation to community physicians is feasible and safe and may be considered when a hospital has access to neither an in-person stroke team nor a telestroke system.	IIb	C-LD	New recommendation.
The advantages of telephone consultations for patients with acute stroke syndromes are feasibility, history of use, simplicity, availability, portability, short consultation time, and facile implementation.[48]			See Table XIII in online Data Supplement 1.

7. Telestroke networks may be reasonable for triaging patients with AIS who may be eligible for interfacility transfer in order to be considered for acute mechanical thrombectomy.	IIb	B-NR	New recommendation.
An observational study compared clinical outcomes of endovascular treatment (EVT) between patients with anterior circulation stroke transferred after teleconsultation and those directly admitted to a tertiary stroke center. The study evaluated 151 patients who underwent emergency EVT for anterior circulation stroke. Of these, 48 patients (31.8%) were transferred after teleconsultation, and 103 (68.2%) were admitted primarily through an ED. Transferred patients were younger, received IV alteplase more frequently, had prolonged time from stroke onset to EVT initiation, and tended to have lower rates of symptomatic intracranial hemorrhage and mortality than directly admitted patients. Similar rates of reperfusion and favorable functional outcomes were observed in patients treated by telestroke and those who were directly admitted. Telestroke networks may enable the triage and the delivery of EVT to selected ischemic stroke patients transferred from remote hospitals.[49]			See Table XII in online Data Supplement 1.

Telestroke Program

- 3,000 strokes per year in Hawaii
- #3 cause of death, leading cause of adult disability
- Low tPA utilization in Hawaii at start of the project in 2011
- High variability in tPA utilization among Hawaii hospitals due to poor neurology coverage
- Long delays in treatment time due to poor systems of care
- Telestroke project funded by Hawaii DOH in 2011
- Hub and spoke model with 8 Hawaii hospitals

Neurologist Distribution

tPA Utilization (%) 2009-2012 by Hawaii Hospitals
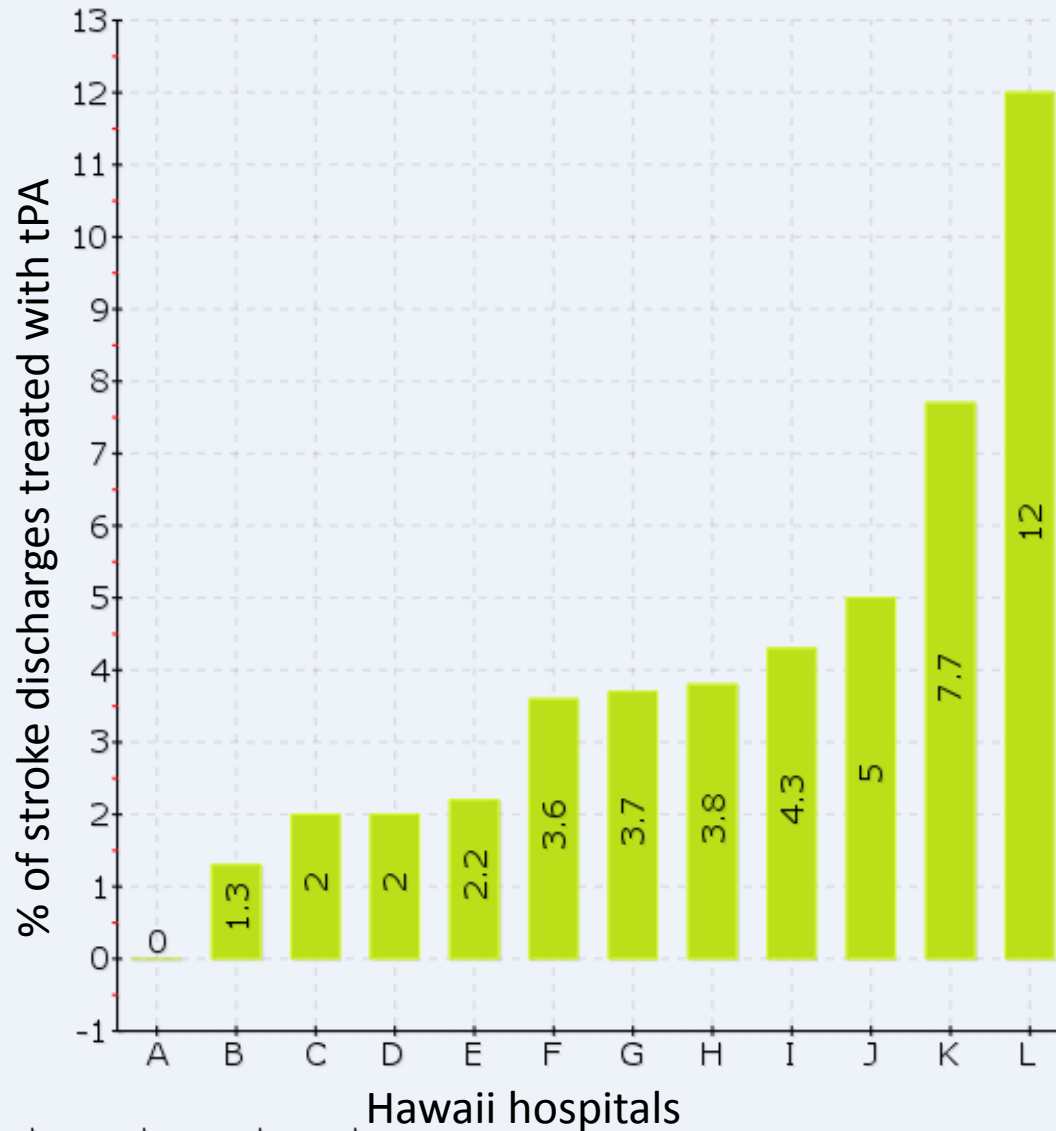
*NEUROTRAUMA HOME

OUR MISSION

To develop, implement, and monitor a comprehensive system of statewide supports to address the needs of people with neurotrauma injury and their families.

We provide leadership through community partnerships to promote neurotrauma injury prevention programs, education and public awareness.

LIVING WITH NEUROTRAUMA

In Hawaiʻi, neurotrauma injury is seen as a severe and chronic disability of a person that is attributable to an injury to the central nervous system, such as traumatic brain injury (TBI), spinal cord injury or stroke, and is likely to continue indefinitely.

RESOURCES

We are **Neurotrauma Supports** of the State of Hawaiʻi Department of Health's Developmental Disabilities Division.

📄 Spinal Cord Injury – Hospital Discharge Packet 15MB pdf

📄 Neurotrauma Supports Strategic Plan 2018-2020

📄 What is Traumatic Brain Injury?

Hub and Spoke Network
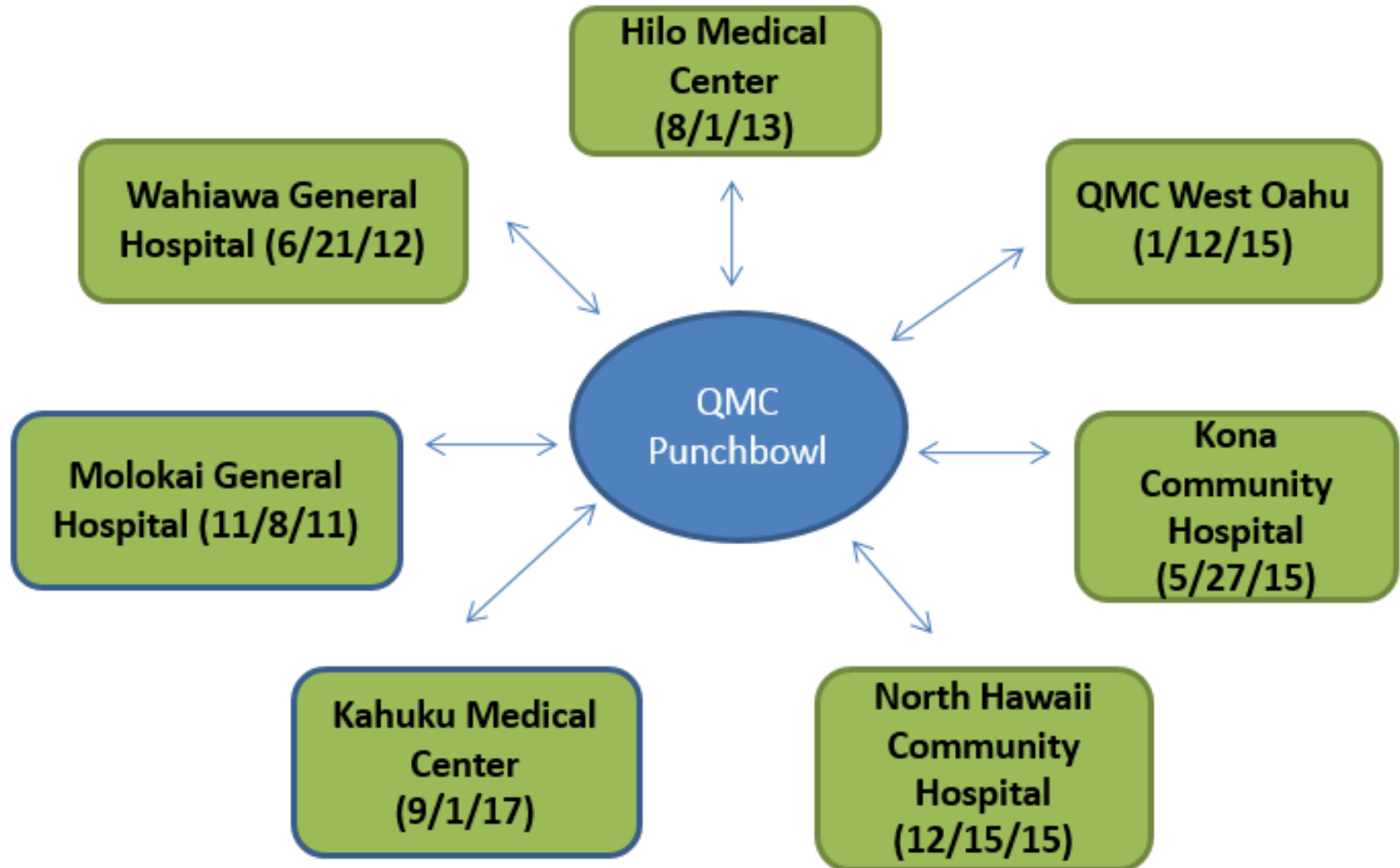
Staffing Model

- Queen's-employed neurologists on-call
- 24/7/365 teleconsultation for acute stroke
  - Remotely review the CT scan through BEAM
  - Examine the patient via telemedicine cart
  - Identify contraindications/indications and discuss risk/benefit of IV tPA
  - Recommend for or against IV tPA and thrombectomy
  - Triage whether patient needs transfer or can remain at originating site

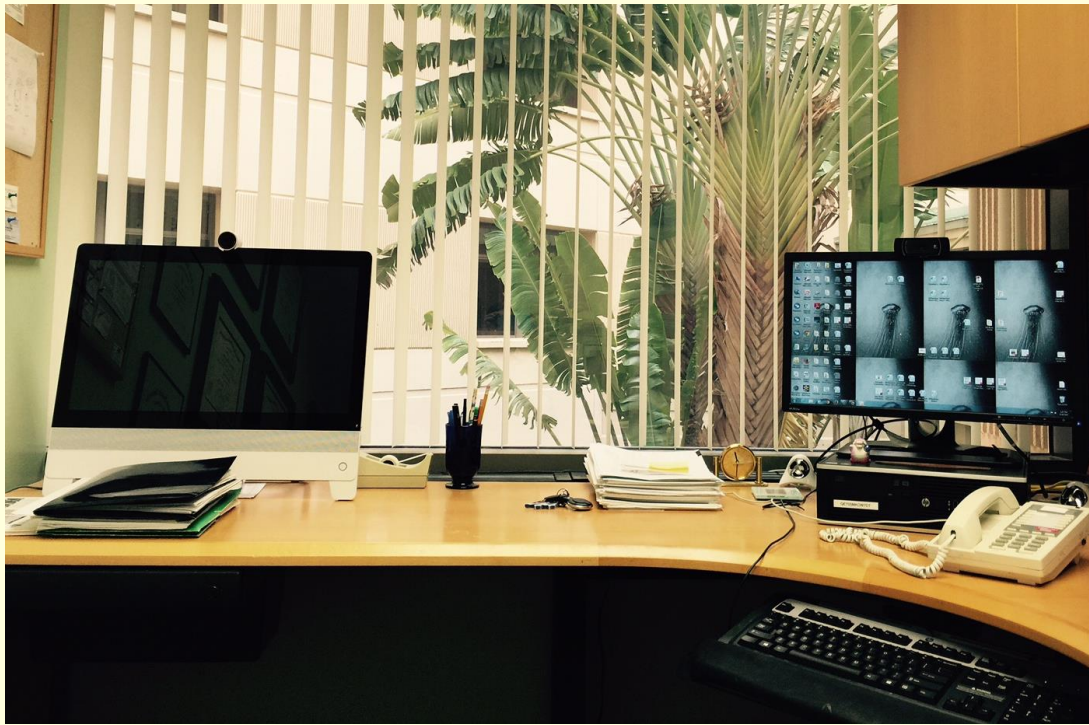# Documentation

- Calls recorded by Transfer Call Center
- Transfer Call Center generates a Queen's MRN for patients if they do not already have one
- Stroke physician writes a brief note in Queen's Carelink (Epic) using SmartText template
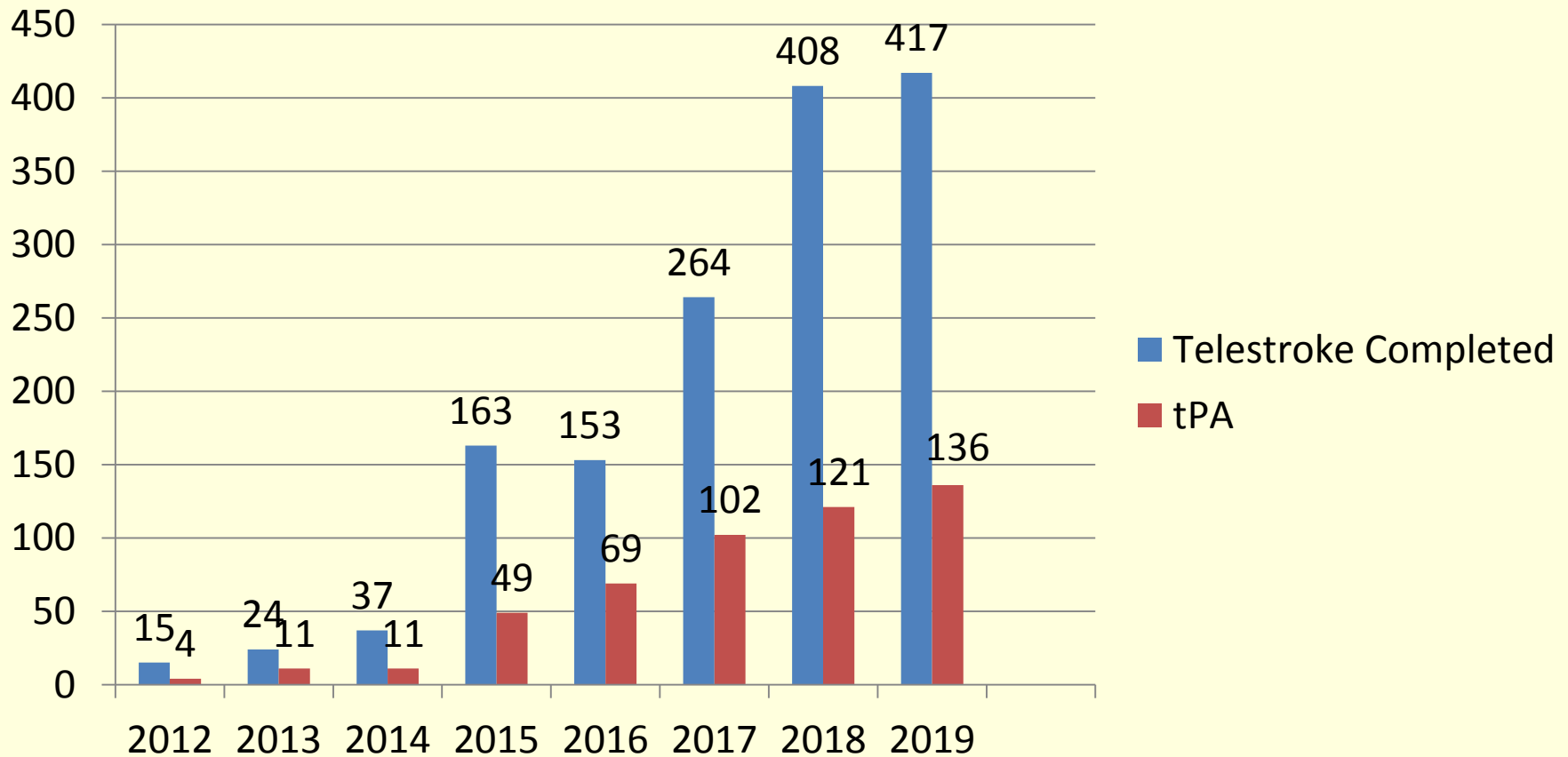- Note is now auto-faxed to referring hospital ED and Medical Records

Cisco Jabber

Annual Telestroke Rates 2012-2019

- Total telestroke consults 1,637 with 556 patients treated with IV tPA
- $45,000 direct medical cost savings per tPA-treated patient = $25 million to date
- Only 1/3 of patients required transfer to QMC and 2/3 remained in their community

Telestroke Visits to Date

Completed Calls	1637	Molokai General Hospital (MGH)	49
		Wahiawa General Hospital (WGH)	137
		Hilo Medical Center (HMC)	247
		The Queen's Medical Center West (QMC-W)	767
		Kona Community Hospital (KCH)	154
		Maui Memorial Medical Center (MMMC)	28
		North Hawaii Community Hospital (NHCH)	102
		The Queen's Medical Center Punchbowl	142
		Kahuku Medical Center	11
# IV tPA Administrations	556	# Transferred to QMC Punchbowl	327

- In 2019, we gave more tPA by telemedicine (136 cases) than we did in-person at QMC Punchbowl (116 cases)

- In 2019, 1/3 of the tPA treatments in the state of Hawaii were done by us using telemedicine

- The telestroke project was initially funded by a total of $930K in grant support from the DOH Neurotrauma Special Fund

- Converted to a self-sustaining, subscription based business model after grant support ended in June

Hawaii Stroke Coalition

Hawaii Stroke Coalition

- Multi-organization community stakeholder group consisting of voting members from all 17 acute care hospitals in Hawaii and Hawaii EMS.

- Meet every other month to review stroke quality data, share best practices, collaborate on public education efforts, and improve processes between EMS and hospitals.

- Started in 2012 as Hawaii Stroke Taskforce

Hawaii Stroke Coalition Activities

- Passed Hawaii state legislation Act 211
- Trained EMS personnel on pre-hospital stroke recognition using LAPSS and C-STAT
- Launched pre-hospital stroke code activation program
- Sponsored public education campaigns
- Created state guidelines for recognition of "Hawaii designated stroke hospitals"
- Mandated reporting of quality data using Get With the Guidelines-Stroke as our statewide stroke registry
- EMS bypass rules for large vessel occlusion strokes

Approved by the Governor

on _____ JUL 2 2015

ORIGINAL

HOUSE OF REPRESENTATIVES
TWENTY-EIGHTH LEGISLATURE, 2015
STATE OF HAWAII

ACT 2 1 1

H.B. NO. 589
H.D. 1
S.D. 1

A BILL FOR AN ACT

RELATING TO STROKE CARE.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF HAWAII:

1   SECTION 1. The legislature finds that the rapid

2   identification, diagnosis, and treatment of strokes can save the

3   lives of stroke patients and, in some cases, can reverse

4   neurological damage such as speech and language impairments or

5   paralysis, leaving stroke patients with few or no neurological

6   deficits. Despite significant advances in diagnosis, treatment

7   and prevention, stroke is a leading cause of death nationally

8   and in Hawaii. An estimated 795,000 new and recurrent strokes

9   occur each year in this country. With the aging of the

10 population, the number of persons who have strokes is projected
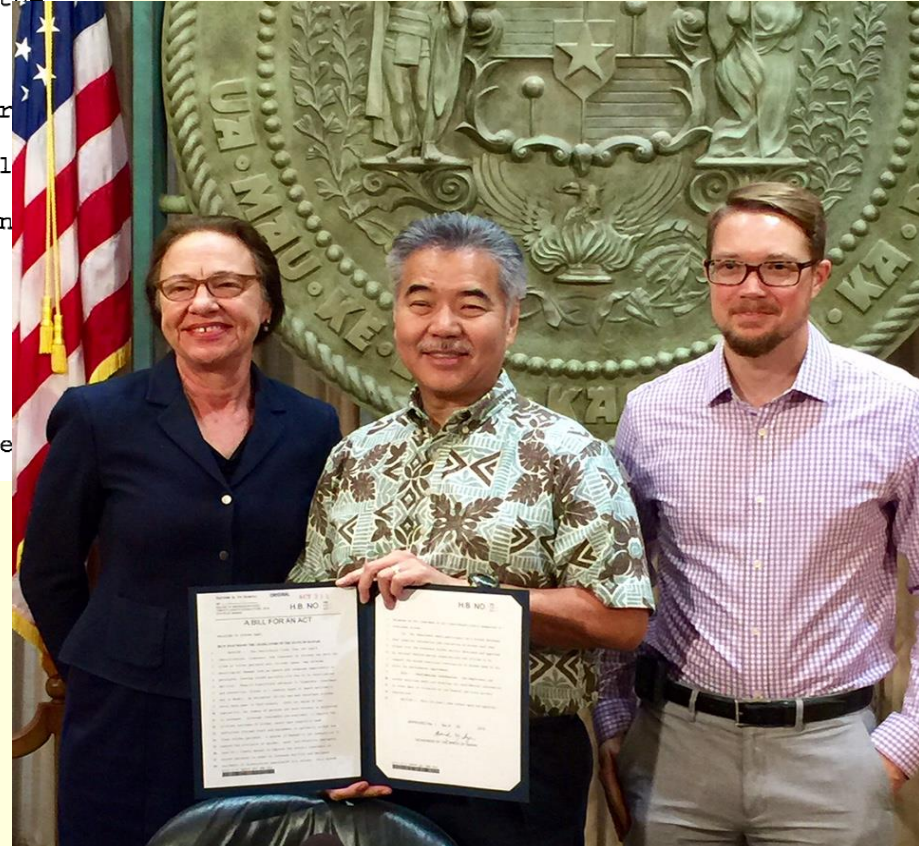
Act 211

- Recognizes Hawaii Stroke Coalition as a community stakeholder organization composed of representatives from all participating hospitals, EMS, and DOH

- Requires all participating hospitals to report quality data through GWTG-Stroke

- Grants Hawaii Stroke Coalition an advisory role in determining prehospital stroke recognition tools, activation, and triage

# Statewide Improvements in Stroke Treatment Due to Telestroke Project and Hawaii Stroke Coalition

Thrombolytic Therapies

Note: Time periods/Categories at the end of the graph and data table have been omitted because there were no patient records during that time.

Benchmark Group	Time Period	IV alteplase initiated at this hospital for ED patients	IV alteplase initiated at this hospital for Inpatients	IV alteplase initiated at outside hospital and not initiated at this hospital	IA catheter-based reperfusion at this hospital for ED patients	IA catheter-based reperfusion at this hospital for Inpatients	IA catheter-based reperfusion at outside hospital	Any thrombolytic therapy	Total
All HI Hospitals	2011	105 (5.9%)	3 (0.2%)	18 (1%)	15 (0.8%)	0 (0%)	0 (0%)	131 (7.4%)	1781
	2012	136 (8.1%)	6 (0.4%)	10 (0.6%)	17 (1%)	1 (0.1%)	2 (0.1%)	157 (9.3%)	1686
	2013	118 (7.5%)	4 (0.3%)	23 (1.5%)	12 (0.8%)	1 (0.1%)	1 (0.1%)	155 (9.9%)	1572
	2014	154 (8%)	12 (0.6%)	32 (1.7%)	11 (0.6%)	2 (0.1%)	1 (0.1%)	201 (10.4%)	1927
	2015	180 (8.7%)	11 (0.5%)	59 (2.9%)	49 (2.4%)	5 (0.2%)	1 (0%)	270 (13.1%)	2060
	2016	227 (10.9%)	16 (0.8%)	63 (3%)	52 (2.5%)	3 (0.1%)	1 (0%)	324 (15.5%)	2086
	2017	248 (10.8%)	11 (0.5%)	77 (3.3%)	45 (2%)	4 (0.2%)	2 (0.1%)	352 (15.3%)	2299
	2018	285 (10.9%)	9 (0.3%)	104 (4%)	91 (3.5%)	1 (0%)	10 (0.4%)	449 (17.1%)	2620
	2019	304 (11.7%)	18 (0.7%)	94 (3.6%)	90 (3.5%)	6 (0.2%)	11 (0.4%)	464 (17.8%)	2604

# Time to Intravenous Thrombolytic Therapy - 45 min

Percent of acute ischemic stroke patients receiving intravenous tissue plasminogen activator (alteplase) therapy during the hospital stay who have a time from hospital arrival to initiation of thrombolytic therapy administration (door-to-needle time) of 45 minutes or less.
Time Period: 01/2011 - 12/2019; **Site:** Queen's Medical Center (14542)

All HI Hospitals
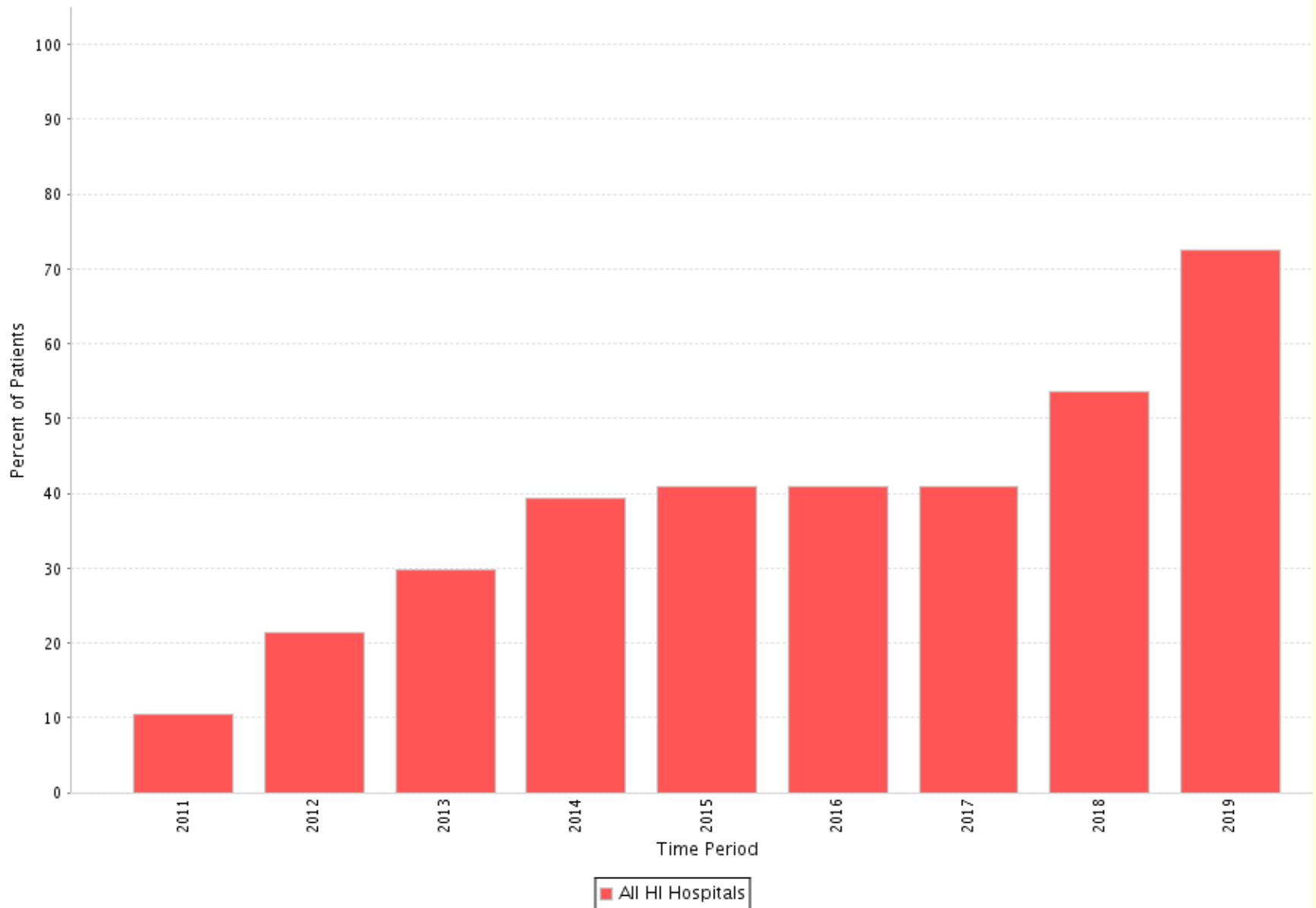
Ongoing Developments

- Bypass rules for mechanical thrombectomy in large vessel occlusion stroke

- Pre-hospital telemedicine

- Shared imaging with RAPID CT perfusion
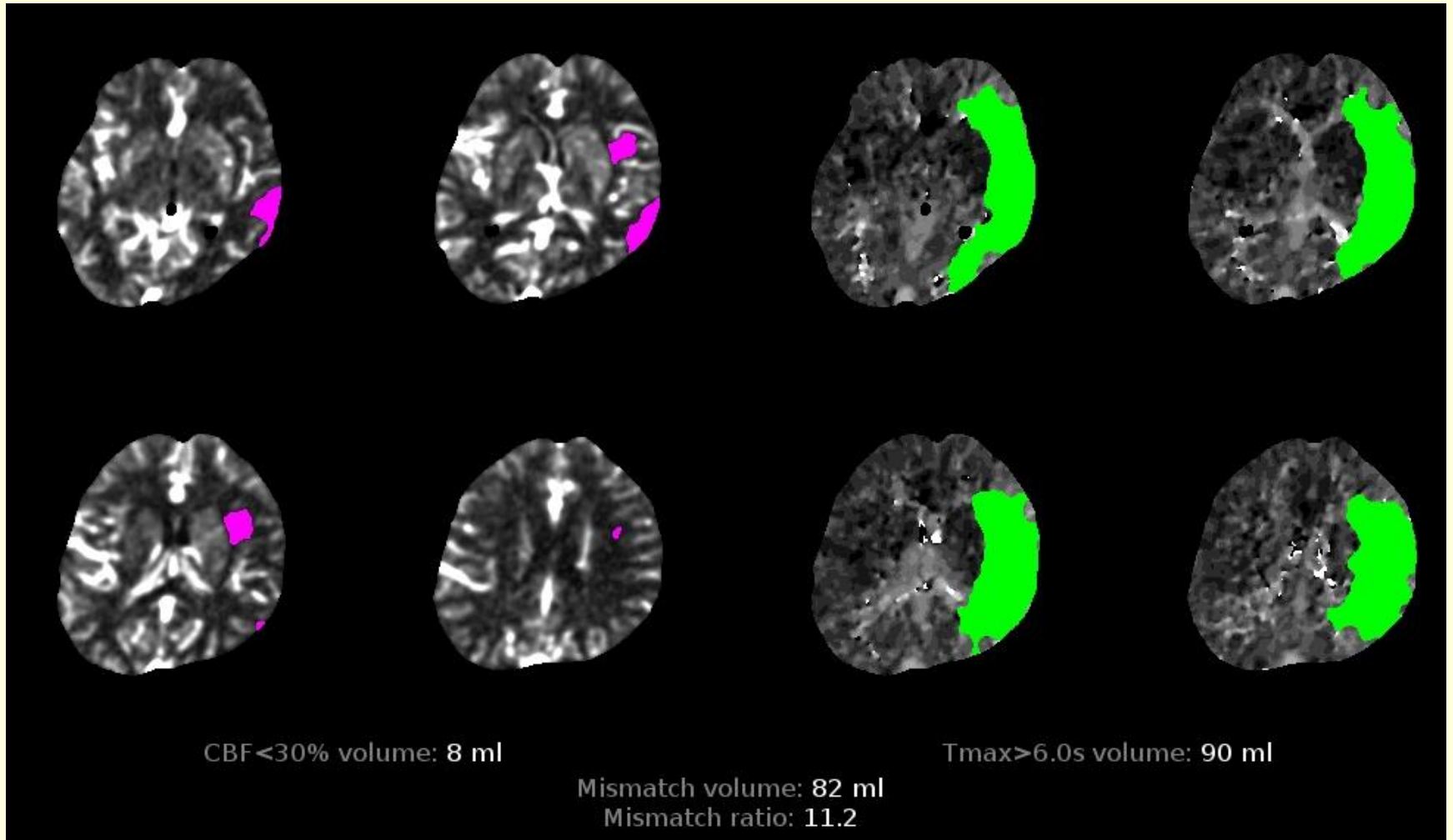
EMS Bypass Rules
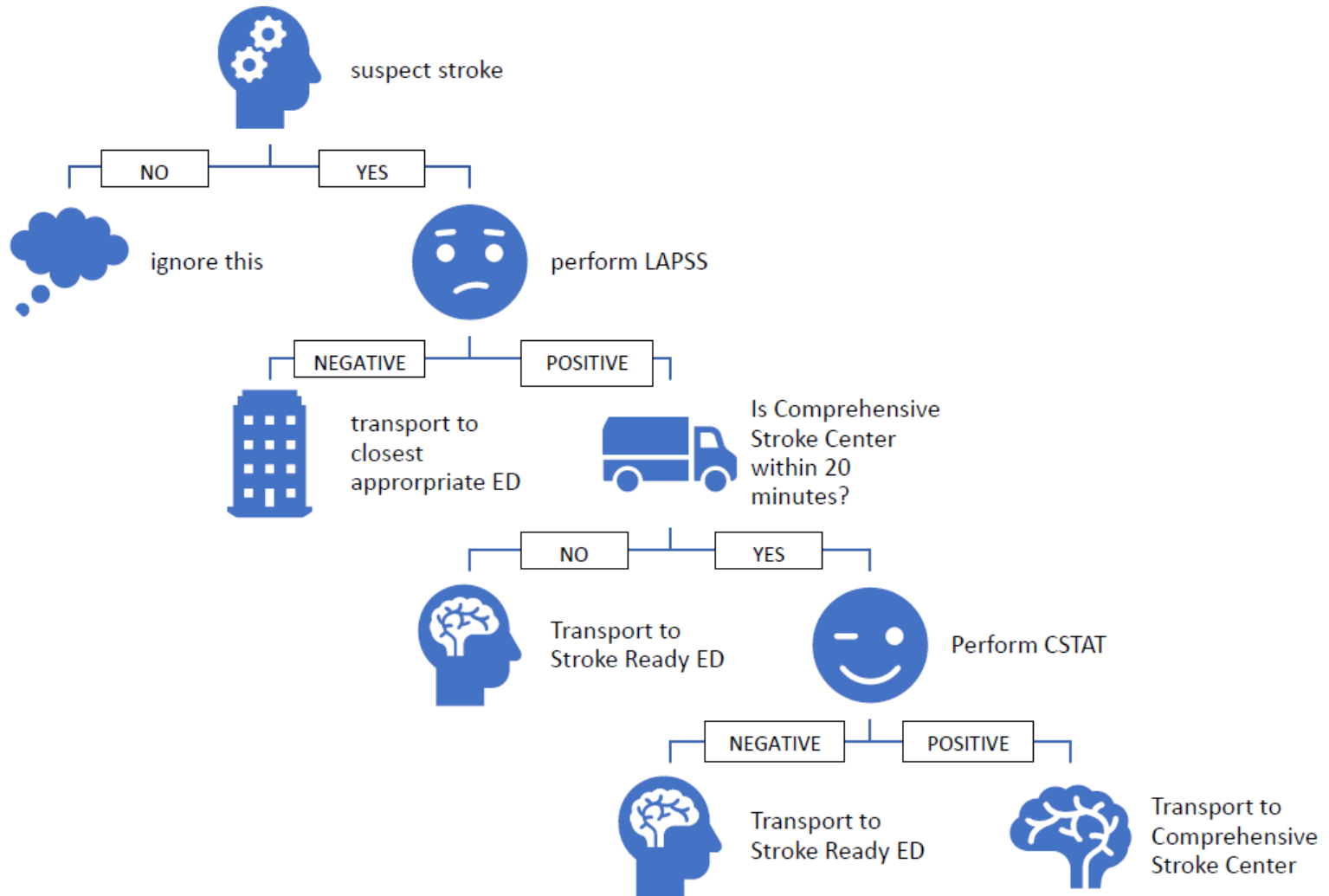
A low-cost, tablet-based option for prehospital neurologic assessment
The iTREAT Study

The neurologist is communicating directly with a simulated patient to perform the NIH Stroke Scale while a local emergency medical services provider assists as tele-presenter. iTREAT = Improving Treatment with Rapid Evaluation of Acute Stroke via Mobile Telemedicine.
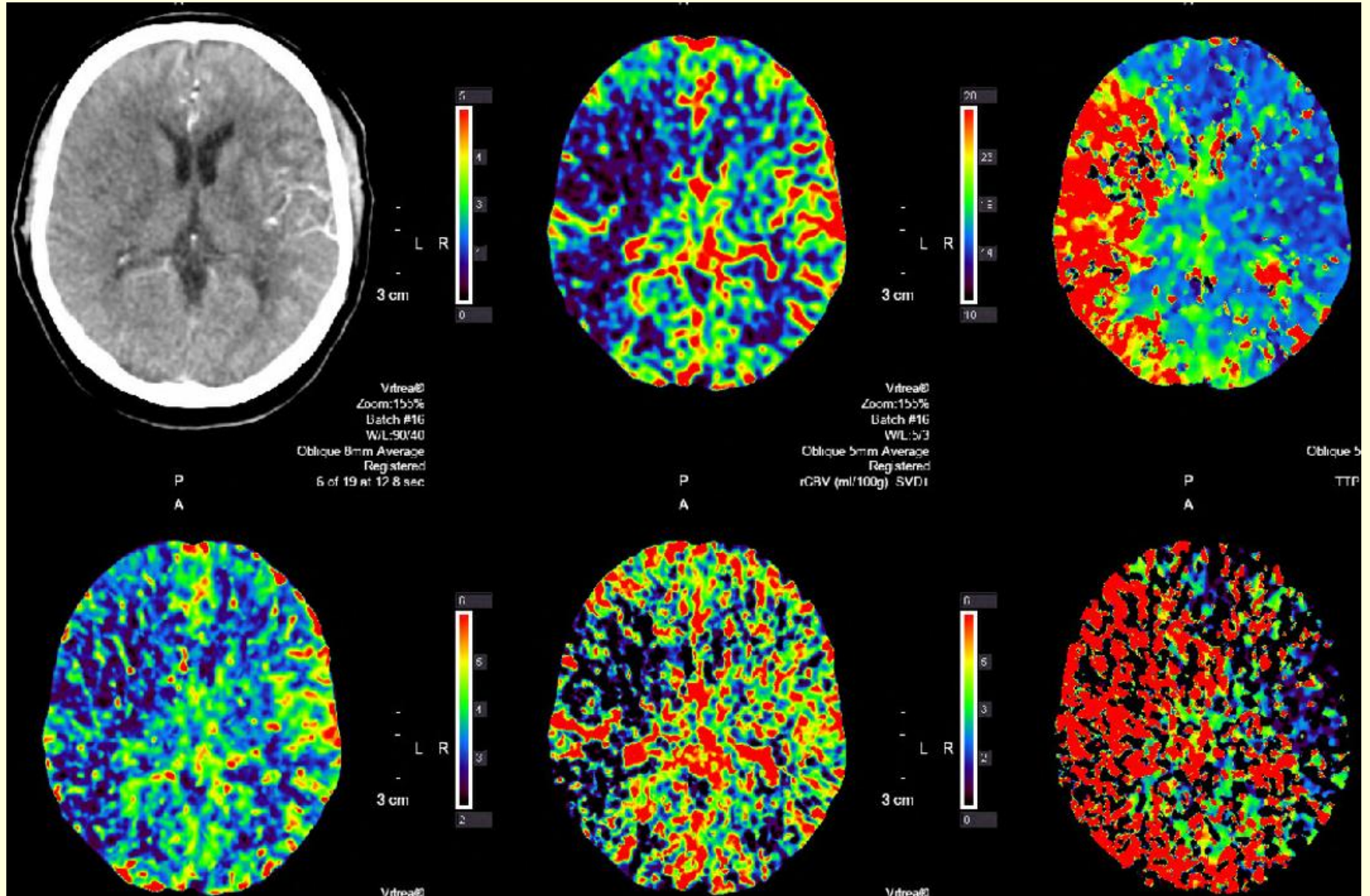
RAPID Perfusion

CBF<30% volume: 8 ml

Tmax>6.0s volume: 90 ml

Mismatch volume: 82 ml
Mismatch ratio: 11.2

Tele-Neuro ICU

Patient Story

Population per sq. mile

- <1
- 1...10
- 10...25
- 25...50
- 50...100
- 100...250
- 250...500
- 500...1000
- 1000...2500
- 2500...5000
- >5000
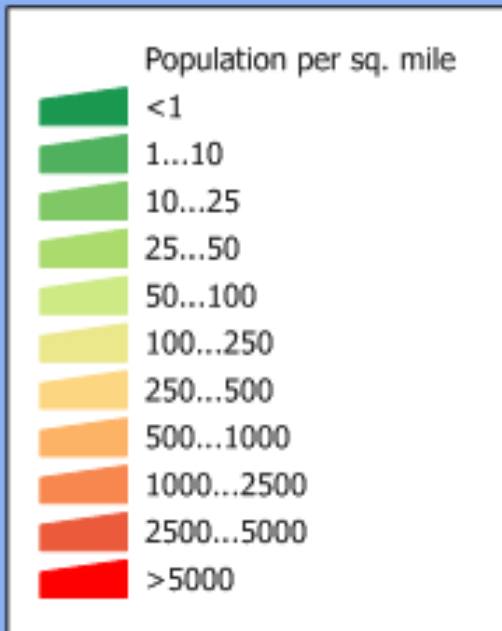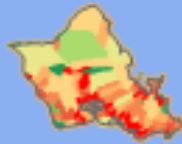
Source: U.S. Census Bureau
Census 2010 Summary File 1
population by census tract

NORTH HAWAI'I
COMMUNITY HOSPITAL
AN AFFILIATE OF THE QUEEN'S HEALTH SYSTEMS

North Hawaii
Community Hospital

A Healthier Way to Care

September 7, 2015   newswires

ORDER PRINTS   SHARE

Charges for medevac flights soar

Honolulu Star-Advertiser (HI)

Sept. 07--Toby Sidlo, a tour boat captain on Kauai, was going out for a pass during a beach football game when he fell into a bonfire and severely burned 30 percent of his body.

The 35-year-old Kalaheo resident in July 2014 suffered critical, potentially life-threatening injuries that could not be appropriately treated on the island, so doctors decided to medevac him to Straub Clinic & Hospital's intensive care burn unit on Oahu.

Several months later Sidlo received a $36,000 bill for the air ambulance service from Hawaii Life Flight Inc., one of two emergency medical air transport providers operating in the state. The total bill was roughly $50,000, and his health insurance covered about $14,000.

Hawaii air ambulance company buying its competitor

September 4, 2017

Click to copy

RELATED TOPICS

Business

Hawaii

Honolulu

HONOLULU (AP) — A firm that controls one of two air ambulance companies in Hawaii is acquiring the other business.

Air Medical Group Holdings Inc., which owns Hawaii Life Flight, plans to buy competitor American Medical Response for $2.4 billion, the Honolulu Star-Advertiser reported (http://bit.ly/2gzjdqF) Monday.

The deal comes after Kaiser Foundation Health Plan sued Hawaii Life Flight last year, claiming the company charges exorbitant rates that are significantly higher than American Medical Response.

Post-thrombolytic monitoring

- Triage which patients are safe to remain at originating hospital
- Nurse-driven monitoring of the neurological examination
- Pro-active versus reactive monitoring of stroke patients
- EMR access at originating hospital
- Availability of nurses and allied health professionals from the Comprehensive Stroke Center
- Stroke etiology and work-up
- Prognosis and patient / family support

Tele-Neurocritical Care / Neurology

- Non-operative intracerebral hemorrhage

- Seizures and status epilepticus

- Remote review of continuous EEG monitoring

- Treatment of intracranial hypertension in non-operative TBI

- Management of Guillain-Barre and other causes of diagnosed neuromuscular weakness

- Encephalopathy and pain-agitation-delirium

- Assistance with brain death determination

Choosing Models of Tele-ICU

A. Centralized tele-ICU: A physician in tele-ICU center
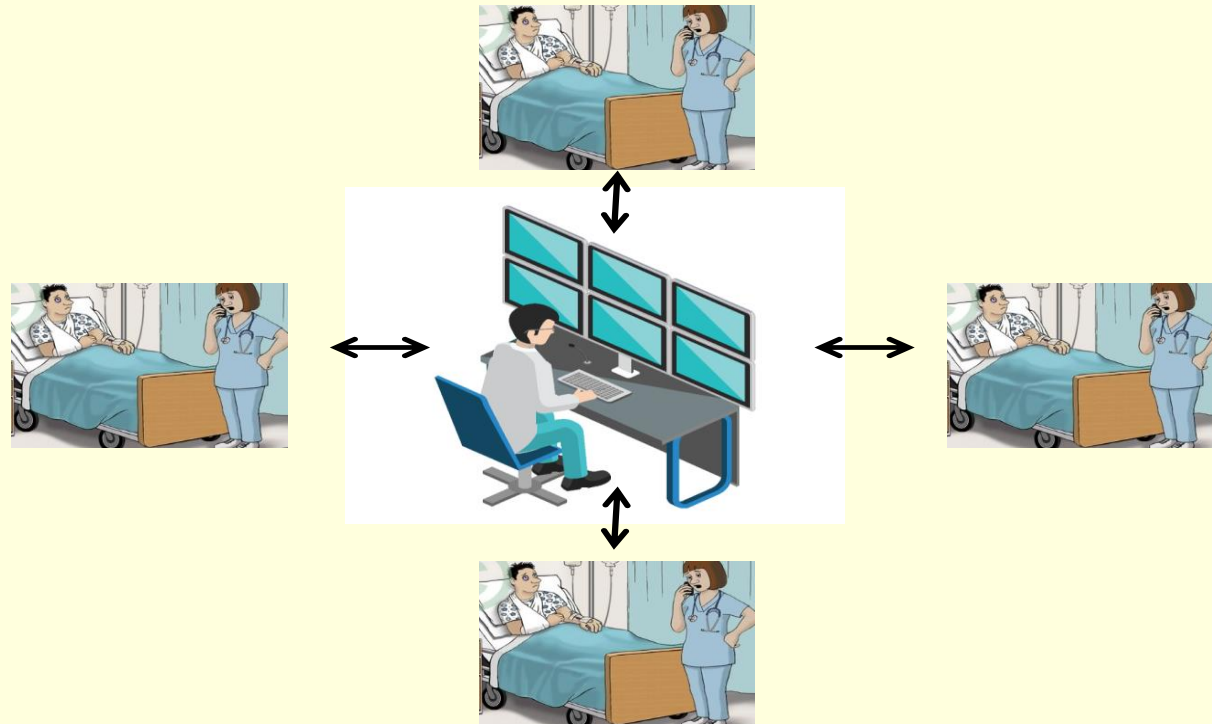
B. Decentralized tele-ICU: A physician in office or home
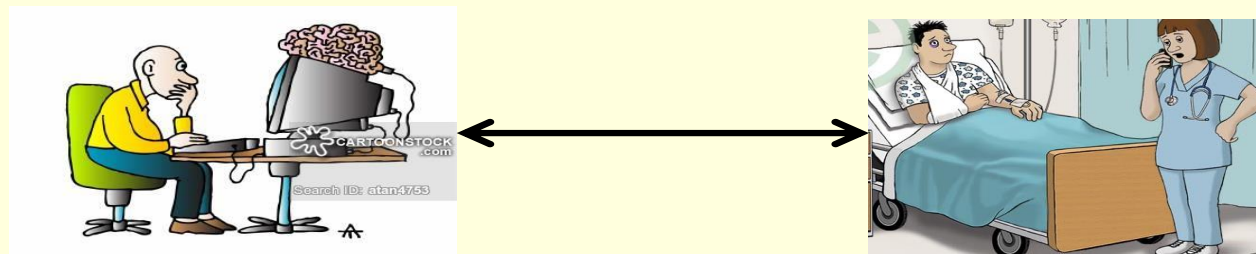
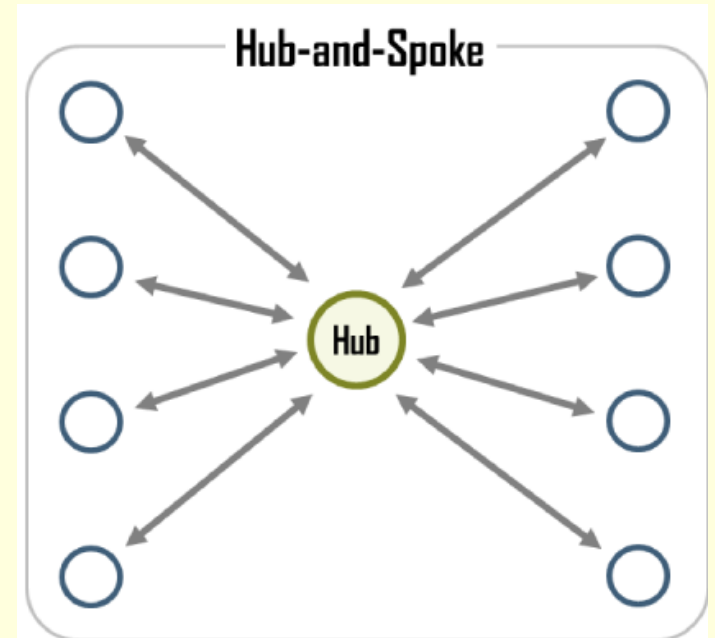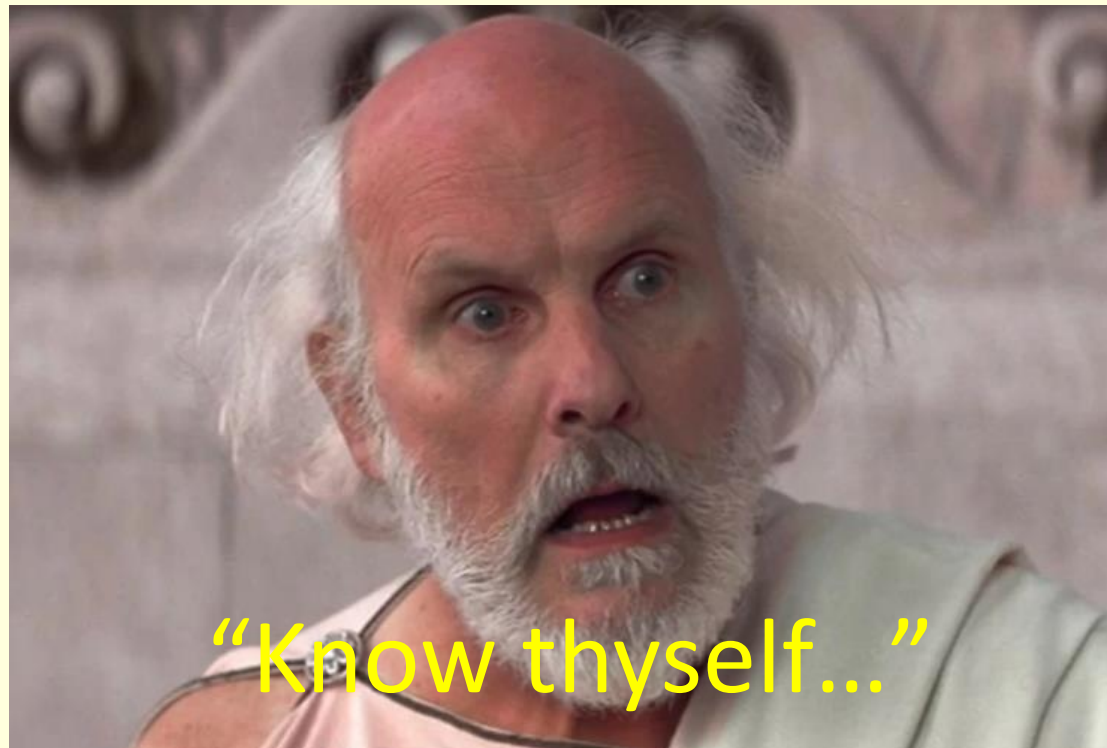# Telestroke Best Practices

Telestroke definitions

- Originating site: where the patient is
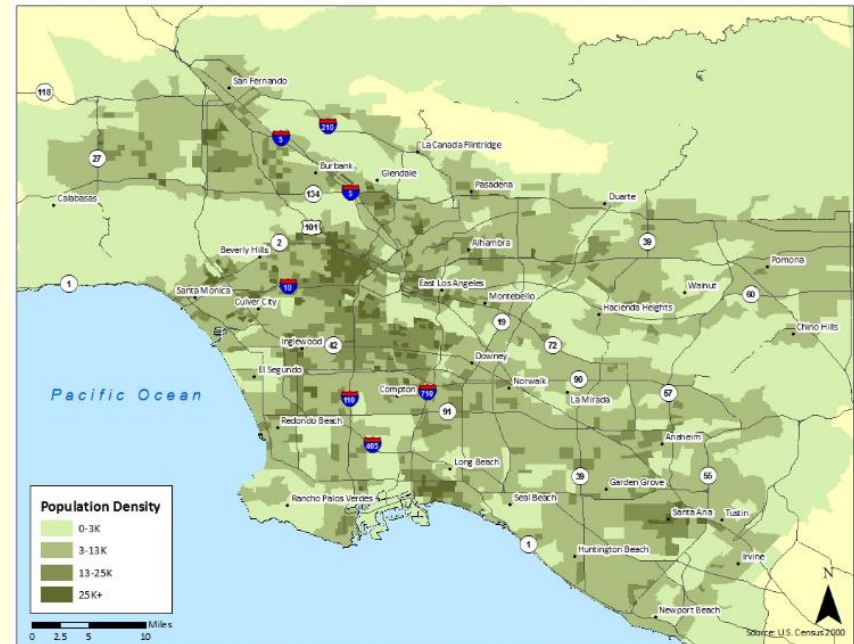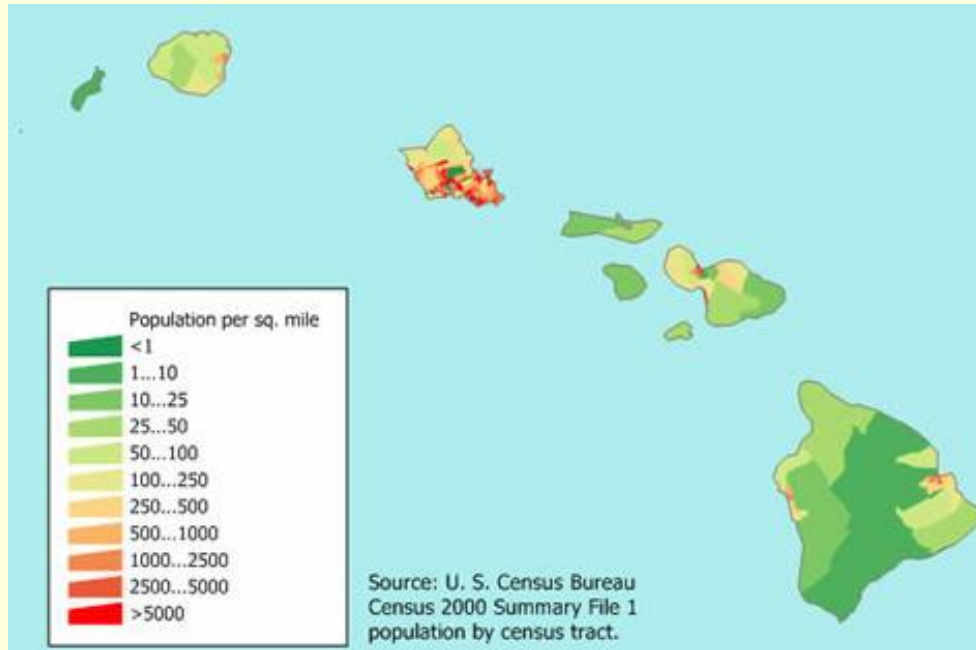
- Distant site: where the provider is

- Hub-and-spoke: one distant site provider group covers multiple originating sites simultaneously

Hub-and-Spoke

Define the use case / model: is your organization the telestroke provider, recipient, or both?

"Know thyself..."

What is the goal of your telestroke program: increase transfers or keep patients in their communities?

Is telestroke right for your organization or should you be doing it in-person?

Completed Calls	1637	Molokai General Hospital (MGH)	49
		Wahiawa General Hospital (WGH)	137
		Hilo Medical Center (HMC)	247
		The Queen's Medical Center West (QMC-W)	767
		Kona Community Hospital (KCH)	154
		Maui Memorial Medical Center (MMMC)	28
		North Hawaii Community Hospital (NHCH)	102
		The Queen's Medical Center Punchbowl	142
		Kahuku Medical Center	11
# IV tPA Administrations	556	# Transferred to QMC Punchbowl	327

Is telestroke supplemental coverage or your only coverage?

Neurologist Distribution

Identify local clinical champions

Work together with provider group and originating site to create a workflow specific to each hospital

Algorithm for ACUTE STROKE
Wahiawa General Hospital

Criteria for Activating Tele-Stroke Code
- Acute onset of new, focal neurological deficit within 4.5 hours
  - Vision loss or blurry vision
  - Difficulty speaking/understanding or slurred speech
  - Weakness or numbness on one side of the body
  - New onset clumsiness or difficulty walking
- Able to establish a witnessed onset time OR time patient was last known to be normal
- Tele-Stroke Code should *not* be activated for routine neurology consults

---

Brief history and exam
Note time patient was <u>last known to be normal</u>
(Note: this may be different from time deficits were first discovered)

↓

Call QMC Transfer Hotline 808-691-5112
Use password: **Tele-Stroke Code** to be connected to on-call stroke neurologist

↓

Establish IV access (prefer 18 gauge antecubital for CTA)

↓

Draw STAT labs (PT, PTT, CBC, Chem 7) and **finger stick glucose**

↓

Obtain STAT dry head CT and CTA (unless CTA contraindicated or stroke neurologist/ED physician do not believe CTA is needed), have technician BEAM images

↓

Bring telestroke camera to bedside and push "on" button

↓

Gather available witnesses and/or family to bedside so history can be obtained
Review WGH records and call PCP for additional history (if needed)

↓

Bring tPA (alteplase/Activase) to bedside and review instructions and dosing calculations

↓

tPA decision (yes/no) made by stroke neurologist and ED physician

Define standard activation criteria for telestroke

Algorithm for ACUTE STROKE
Wahiawa General Hospital

Criteria for Activating Tele-Stroke Code
- Acute onset of new, focal neurological deficit within 4.5 hours
    - Vision loss or blurry vision
    - Difficulty speaking/understanding or slurred speech
    - Weakness or numbness on one side of the body
    - New onset clumsiness or difficulty walking
- Able to establish a witnessed onset time OR time patient was last known to be normal
- Tele-Stroke Code should *not* be activated for routine neurology consults

How does telestroke activation fit in with prehospital activation and direct-to-CT protocols?
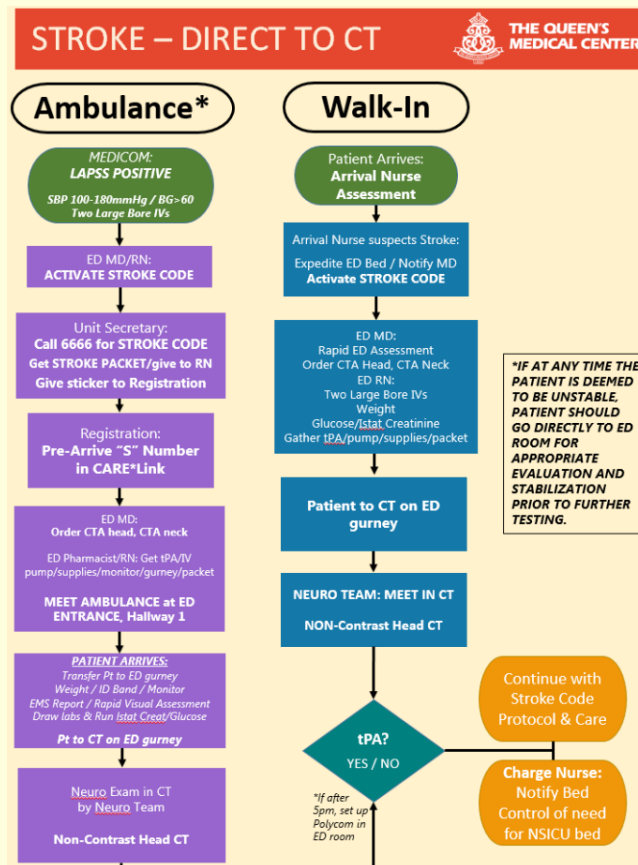
How does the remote provider interact with in-person providers at the originating site?

- Who is writing orders?
- Who is discussing risks and benefits of treatment?
- Who gets the final say about treatment decisions?

Is it a provider-to-provider consult or direct-to-patient (or somewhere in between)?

# Delineate responsibilities at the originating site

- Taking the history
- Assistance with or performance of the NIH stroke scale
- Discussion of risks and benefits
- Mixing tPA
- Treatment of blood pressure

Figure out how to modify the exam for telemedicine

You know how.

Down to earth.

I got home from work.

Near the table in the dining room.

They heard him speak on the radio last night.

MAMA

TIP – TOP

FIFTY – FIFTY

THANKS

HUCKLEBERRY

BASEBALL PLAYER

A

A¹
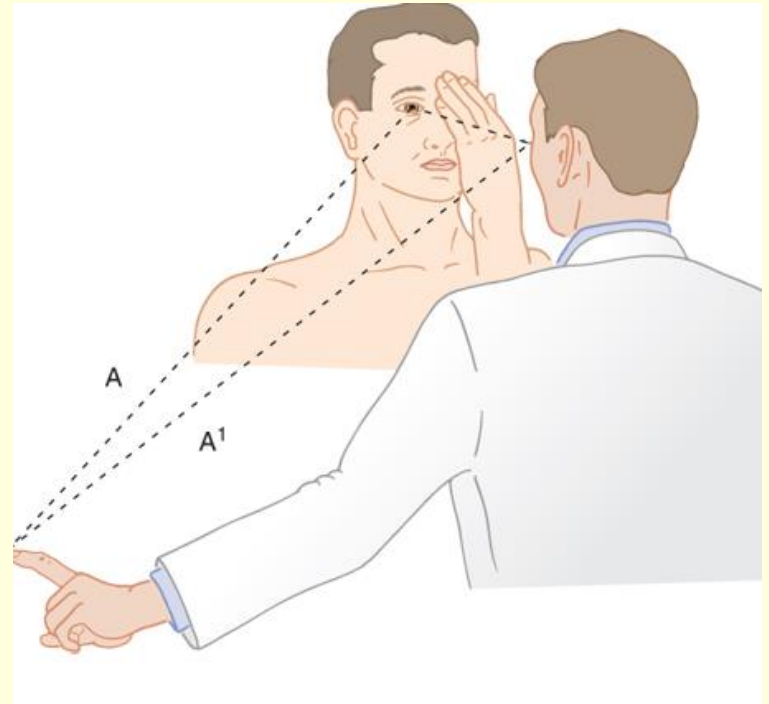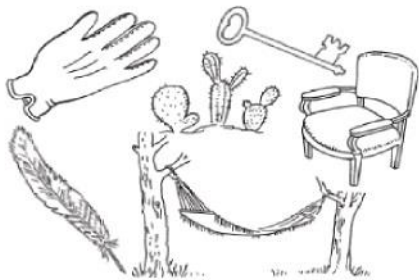
The TeleStroke Mimic (TM)-Score: A Prediction Rule for Identifying Stroke Mimics Evaluated in a Telestroke Network

Syed F. Ali, MD; Anand Viswanathan, MD; Aneesh B. Singhal, MD; Natalia S. Rost, MD; Pamela G. Forducey, PhD; Lawrence W. Davis, MD; Joseph Schindler, MD; William Likosky, MD; Sherene Schlegel, BSN; Nina Solenski, MD; Lee H. Schwamm, MD; on Behalf of Partners Telestroke Network

Background—Up to 30% of acute stroke evaluations are deemed stroke mimics (SM). As telestroke consultation expands across the world, increasing numbers of SM patients are likely being evaluated via Telestroke. We developed a model to prospectively identify ischemic SMs during Telestroke evaluation.

Methods and Results—We analyzed 829 consecutive patients from January 2004 to April 2013 in our internal New England–based Partners TeleStroke Network for a derivation cohort, and 332 cases for internal validation. External validation was performed on 226 cases from January 2008 to August 2012 in the Partners National TeleStroke Network. A predictive score was developed using stepwise logistic regression, and its performance was assessed using receiver-operating characteristic (ROC) curve analysis. There were 23% SM in the derivation, 24% in the internal, and 22% in external validation cohorts based on final clinical diagnosis. Compared to those with ischemic cerebrovascular disease (iCVD), SM had lower mean age, fewer vascular risk factors, more frequent prior seizure, and a different profile of presenting symptoms. The TeleStroke Mimic Score (TM-Score) was based on factors independently associated with SM status including age, medical history (atrial fibrillation, hypertension, seizures), facial weakness, and National Institutes of Health Stroke Scale >14. The TM-Score performed well on ROC curve analysis (derivation cohort AUC=0.75, internal validation AUC=0.71, external validation AUC=0.77).

Conclusions—SMs differ substantially from their iCVD counterparts in their vascular risk profiles and other characteristics. Decision-support tools based on predictive models, such as our TM Score, may help clinicians consider alternate diagnosis and potentially detect SMs during complex, time-critical telestroke evaluations. (***J Am Heart Assoc***. 2014;3:e000838 doi: 10.1161/JAHA.114.000838)

Make sure there is a good fit between provider group and originating site: consider alternate providers (if possible)

Visit the sites in-person prior to launch and at regular intervals after launch

Establish relationships with originating site providers by whatever means necessary

Make sure the providers understand the local resources at the originating site

What happens after tPA: drip-and-ship, drip-and-keep, or a little of both?

Total Calls	748		
Incomplete Calls	122	Triage calls, not telestroke	75
		Technical difficulties	47
Completed Calls	626	Molokai General Hospital (MGH)	29
		Wahiawa General Hospital (WGH)	66
		Hilo Medical Center (HMC)	87
		The Queen's Medical Center West (QMC-W)	289
		Kona Community Hospital (KCH)	62
		Maui Memorial Medical Center (MMMC)	27
		North Hawaii Community Hospital (NHCH)	35
		The Queen's Medical Center Punchbowl	30
		Kahuku Medical Center	1
# IV tPA Administrations	246	# Transferred to QMC Punchbowl	167
		# Not transferred-remained at site or transferred to another institution	79
Total Transfers to QMC Punchbowl	229	Non tPA Transfers	62

30 tPA
29/30 transfer

40 tPA
2/40 transfer

25 tPA
10/25 transfer

"One and done" or ongoing care: what happens after the ER consult?

Choose technologies in service of the clinical workflow not vice versa
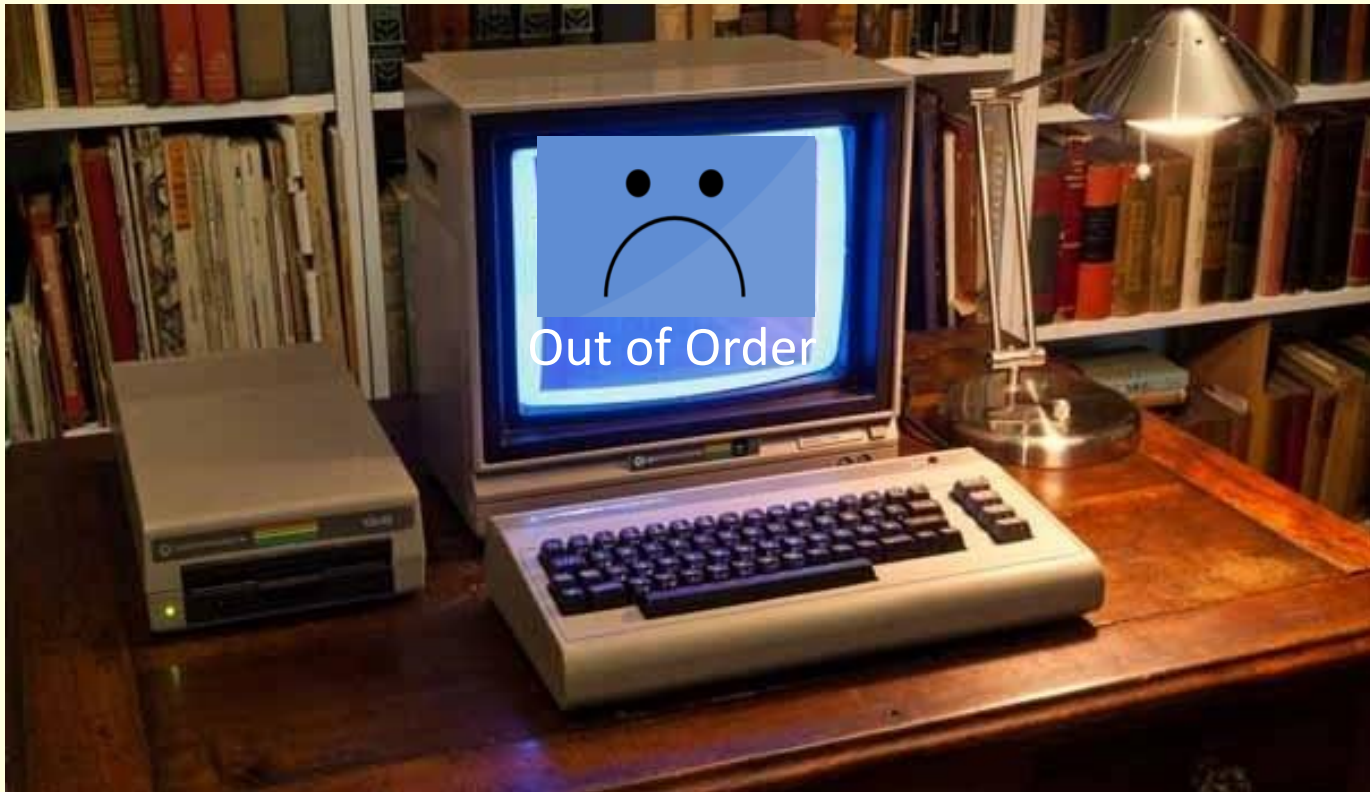
Integrate review of imaging into the clinical workflow and technology

Test the technologies and clinical workflows prior to program launch?

Make sure the technology works when needed

- Proactive monitoring
- IT delegation of responsibilities
- Help desk support
- Vendor support
- Regular hands-on equipment tests
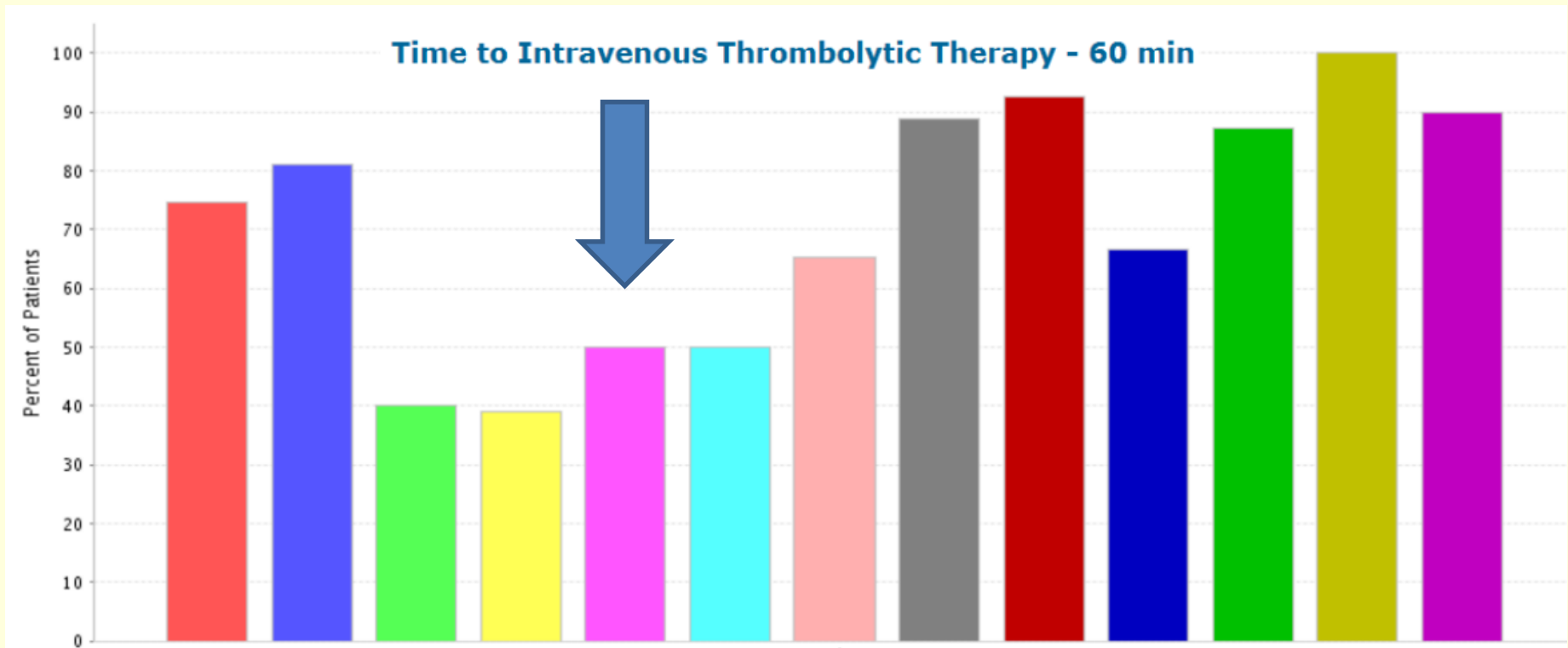- Mock telestroke code

What is the back-up plan if the technology fails?

Figure out how to document clinical decision making in the medical record

- Shared EMR

- Originating site EMR access

- Health information exchange (HIE)

- Fax

- Secure email

Sharing data and outcomes between hub and spoke sites: real time feedback

Grant support is a great way to start but...

- Don't give it away for free

- Start planning the business model for the end of grant support

- Keep it affordable

Payment models for telestroke

- Subscription
- Volume-based prorated subscription
- Per-click
- Hybrid
- Fee-for-service
- RVU

Bill for your services

- Provider professional fees

- Facility originating site fees

BILLING AND PAYMENT FOR THE ORIGINATING SITE FACILITY FEE

Originating sites are paid an originating site facility fee for telehealth services as described by HCPCS code Q3014. Bill the MAC for the originating site facility fee, which is a separately billable Part B payment.

Note: When a CMHC serves as an originating site, the originating site facility fee does not count toward the number of services used to determine payment for partial hospitalization services.

CY 2018 Medicare Telehealth Services

Service	HCPCS/CPT Code
Telehealth consultations, emergency department or initial inpatient	HCPCS codes G0425–G0427
Follow-up inpatient telehealth consultations furnished to beneficiaries in hospitals or SNFs	HCPCS codes G0406–G0408
Office or other outpatient visits	CPT codes 99201–99215
Subsequent hospital care services, with the limitation of 1 telehealth visit every 3 days	CPT codes 99231–99233

ORIGINATING SITES

An originating site is the location of an eligible Medicare beneficiary at the time the service furnished via a telecommunications system occurs. Medicare beneficiaries are eligible for telehealth services only if they are presented from an originating site located in:

- A county outside of a Metropolitan Statistical Area (MSA) or

- A rural Health Professional Shortage Area (HPSA) located in a rural census tract

The Health Resources and Services Administration (HRSA) determines HPSAs, and the Census Bureau determines MSAs. You can access HRSA's Medicare Telehealth Payment Eligibility Analyzer to determine a potential originating site's eligibility for Medicare telehealth payment.

Entities that participate in a Federal telemedicine demonstration project approved by (or receiving funding from) the Secretary of the U.S. Department of Health & Human Services as of December 31, 2000, qualify as originating sites regardless of geographic location.

Each CY, the geographic eligibility of an originating site is established based on the status of the area as of December 31st of the prior CY. Such eligibility continues for the full CY.

Telestroke etiquette

- Eye contact
- Professional appearance
- Proper lighting
- Non-verbal gestures
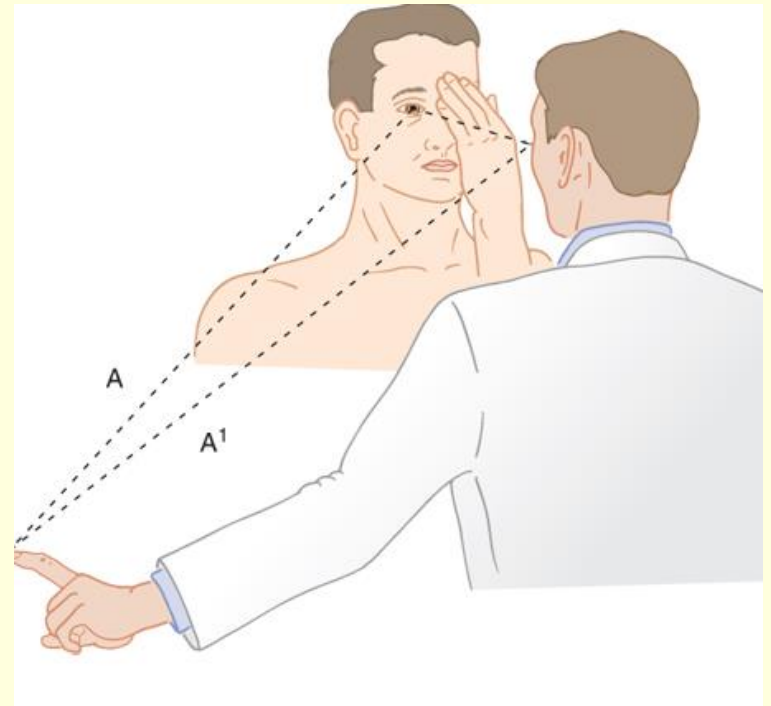- Lag / echo
- Specifying object of speech
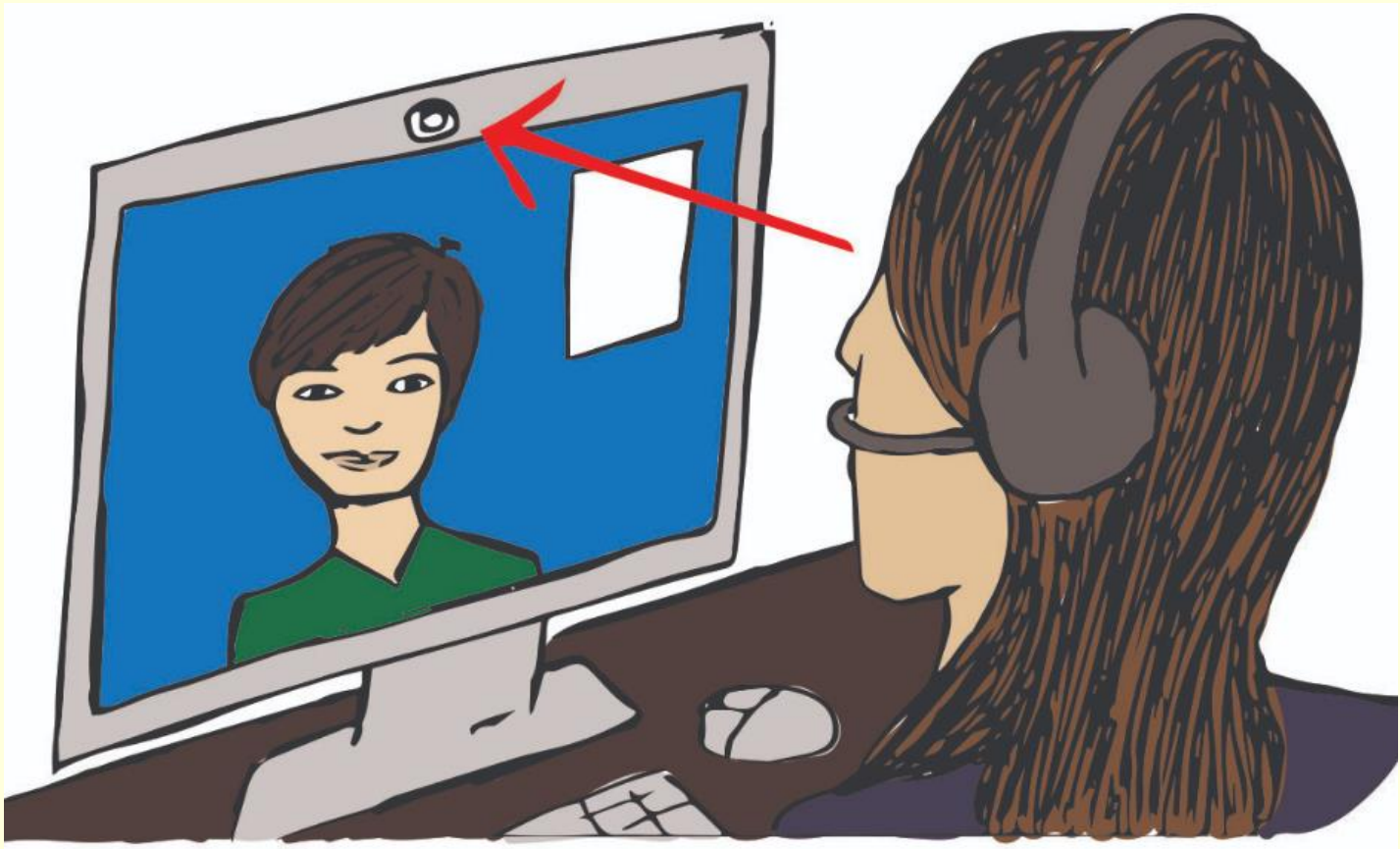
Don't discount the phone (especially for heads-up comments, provider-to-provider discussion)

# Teaching moments: using the opportunity to teach examination skills

"I have seen the specialist" - telemedicine is a two-way interaction

"You can't list your iPhone as your primary-care physician."

Stay on the line after the tPA decision

- Double check the dose, drug, and vial
- Look at the infusion pump
- Make sure blood pressure goals are met
- Minimize delays and distractions (EKG, Foley, etc)
- Make sure tPA is started in a timely manner
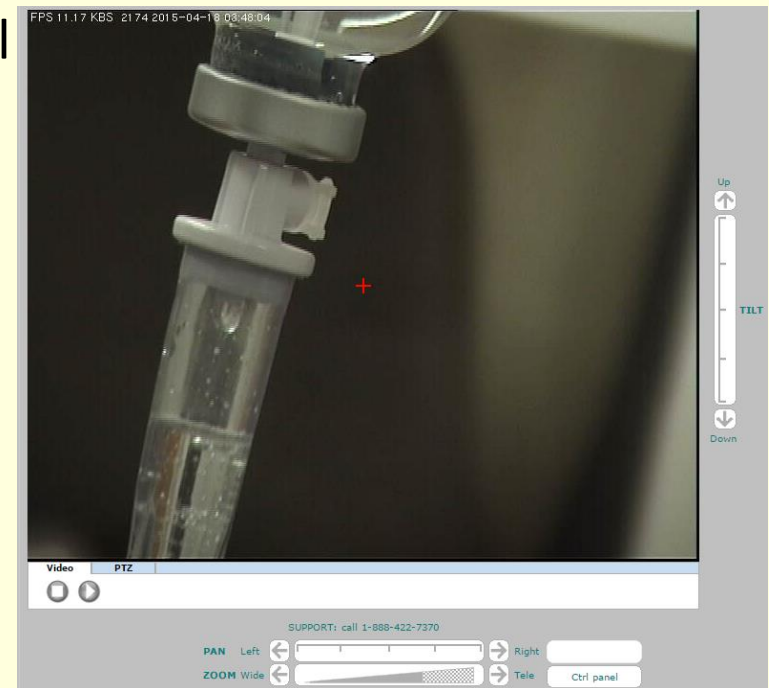
Avoid provider burnout

- Provider satisfaction is independent of pay
- Shared call schedule
- Nights and weekends
- Integration with in-perso
- Other professional respo
- "Invasiveness"