



Wyoming's TeleStroke System

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Patient case

KB



77 RHF USOH 14:45
witnessed sudden
onset LHP and
dysarthria



911 activated,
neurologist
contacted by EMS
and code stroke
activated



Met by stroke
team WMC ER
15:10



NIHSS 15:
dysarthria, forced
gaze R, LHH, L
facial droop, LHP, L
sensory loss, L
hemineglect



Head CT negative
for hemorrhage
but calcified R
MCA

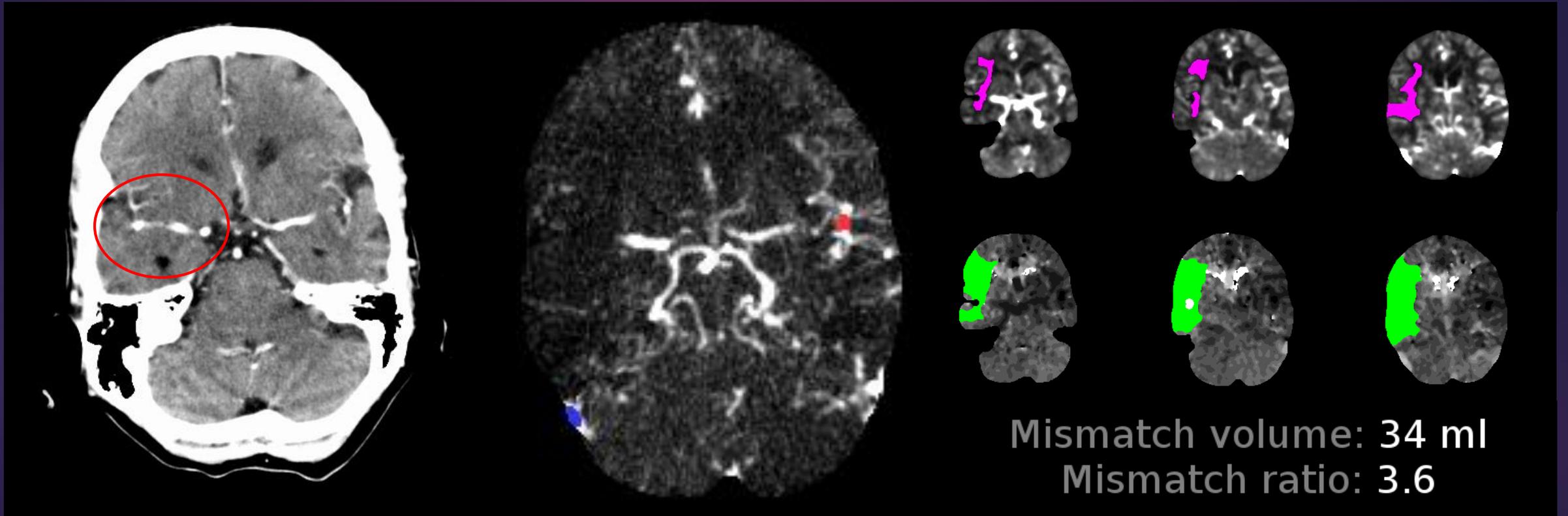


IV alteplase (tPA)
started at 15:29



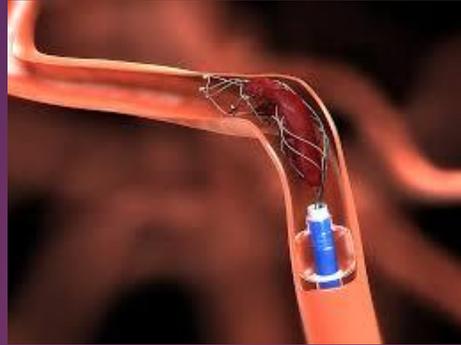
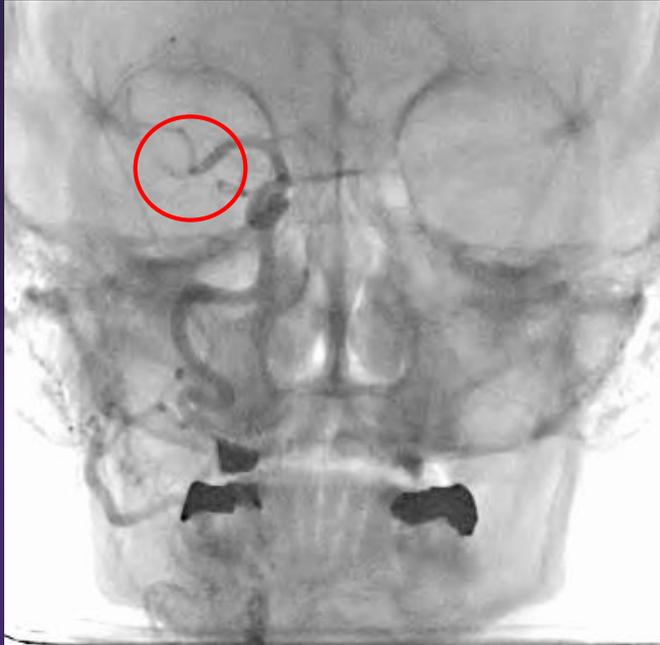
Patient case: KB stroke protocol CT

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Patient case: KB Thrombectomy

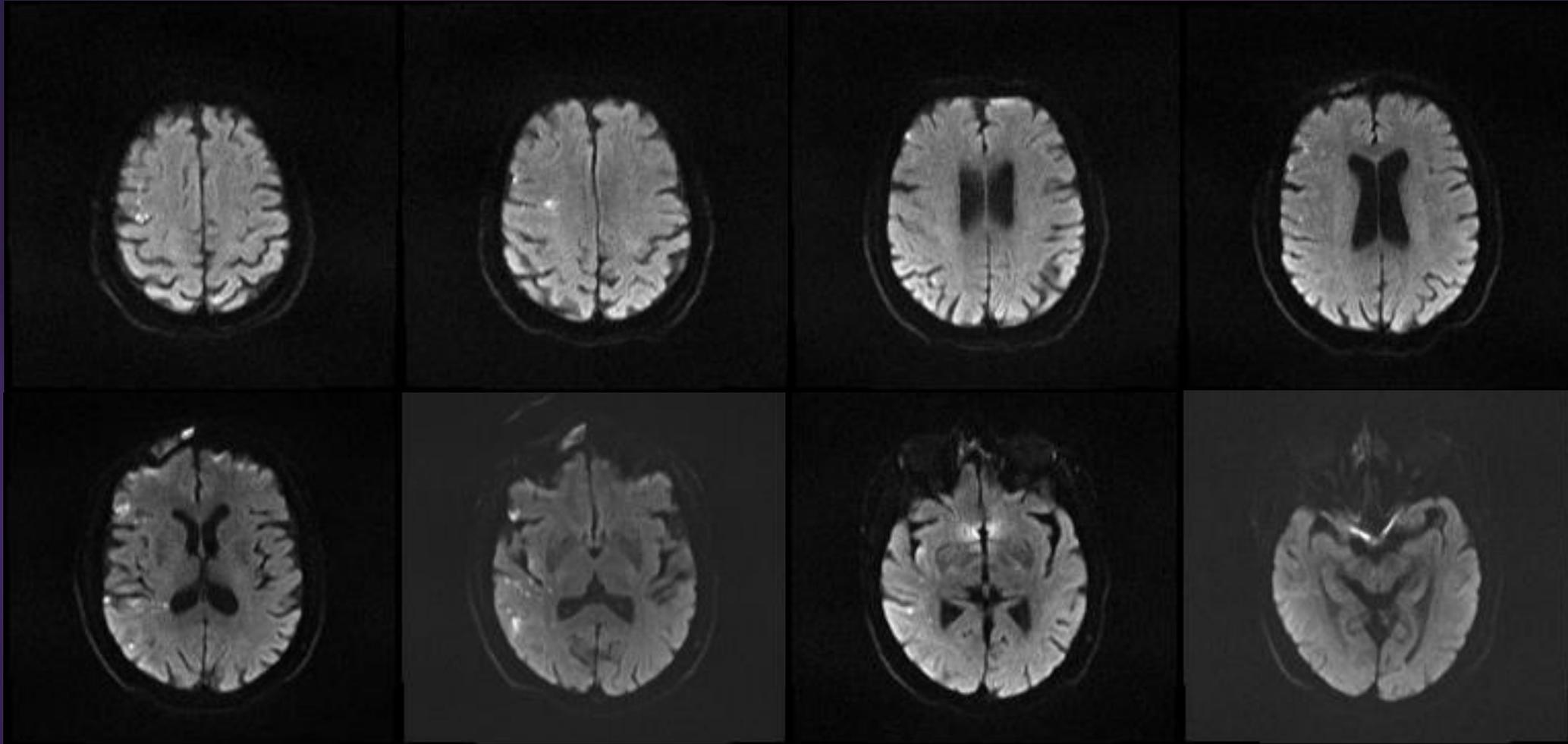
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After the device is withdrawn NIHSS 0 !!!

Patient case: KB follow-up MRI

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Patient case: KB clinical outcome

Found to have paroxysmal atrial fibrillation so started apixiban 5 mg BID

PT/OT/SLP identified mild generalized weakness needing rehab

Discharged to inpatient on Day 3 with slight left facial droop

Discharged home 8 days after stroke with outpatient SLP for subtle executive function

Stroke statistics

795,000 new or recurrent strokes per year in the US

- 610,000 are first attacks, and 185,000 are recurrent attacks
- On average a stroke occurs every 40 seconds on average.

Stroke is the 5th leading cause of death in the US

- 142,000 Americans die each year from stroke
- 1 of every 19 deaths (or 37.3 per 100,000)
- On average in 2016, someone died of stroke every 3 minutes 42 seconds.

Stroke is the leading cause of long term disability

- Approximately 3% of males and 2% of females reported that they were disabled because of stroke.

Time is brain - quantified

	Neurons Lost	Synapses Lost	Myelinated Fibers Lost	Accelerated Aging
Per Stroke	1.2 billion	8.3 trillion	4470 miles	36 years
Per Hour	120 million	830 billion	447 miles	3.6 years
Per Minute	1.9 million	14 billion	7.5 miles	3.1 weeks
Per Second	32,000	230 million	218 yards	8.7 hours

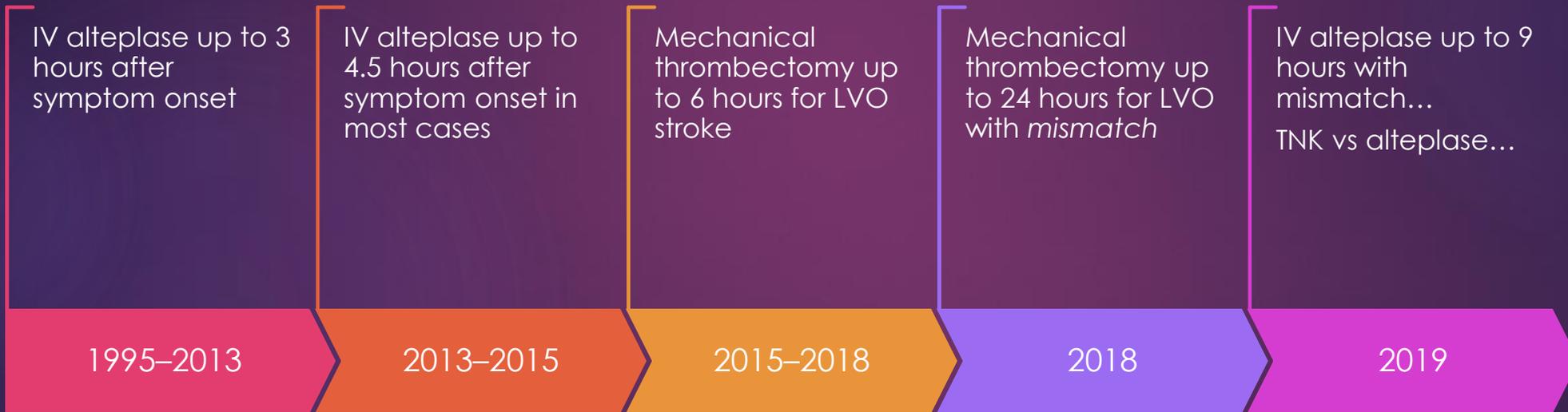
Saver, JL. Time Is Brain—Quantified. *Stroke*. 2006;**37**:263-266

Time is brain! But in Wyoming...

- ▶ 6 people per square mile
- ▶ ½ live > 1 hour from hospital
- ▶ Every 10 km from hospital increases mortality by 1%¹
- ▶ Our job is to build a system of care to overcome geographic barriers²

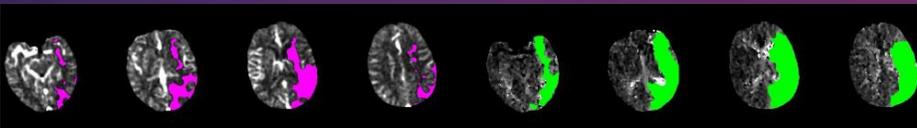
1. Nicholl J, West J, Goodacre S, Turner J. The relationship between distance to hospital and patient mortality in emergencies: an observational study. *Emerg Med J*. 2007;24(9):665-668. doi:10.1136/emj.2007.047654
2. Powers, WJ, Rabinstein, AA, Ackerson, T, et al. 2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke - A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. *Stroke*. 2018;49:e46-e99.

Evolution of the Window of Time

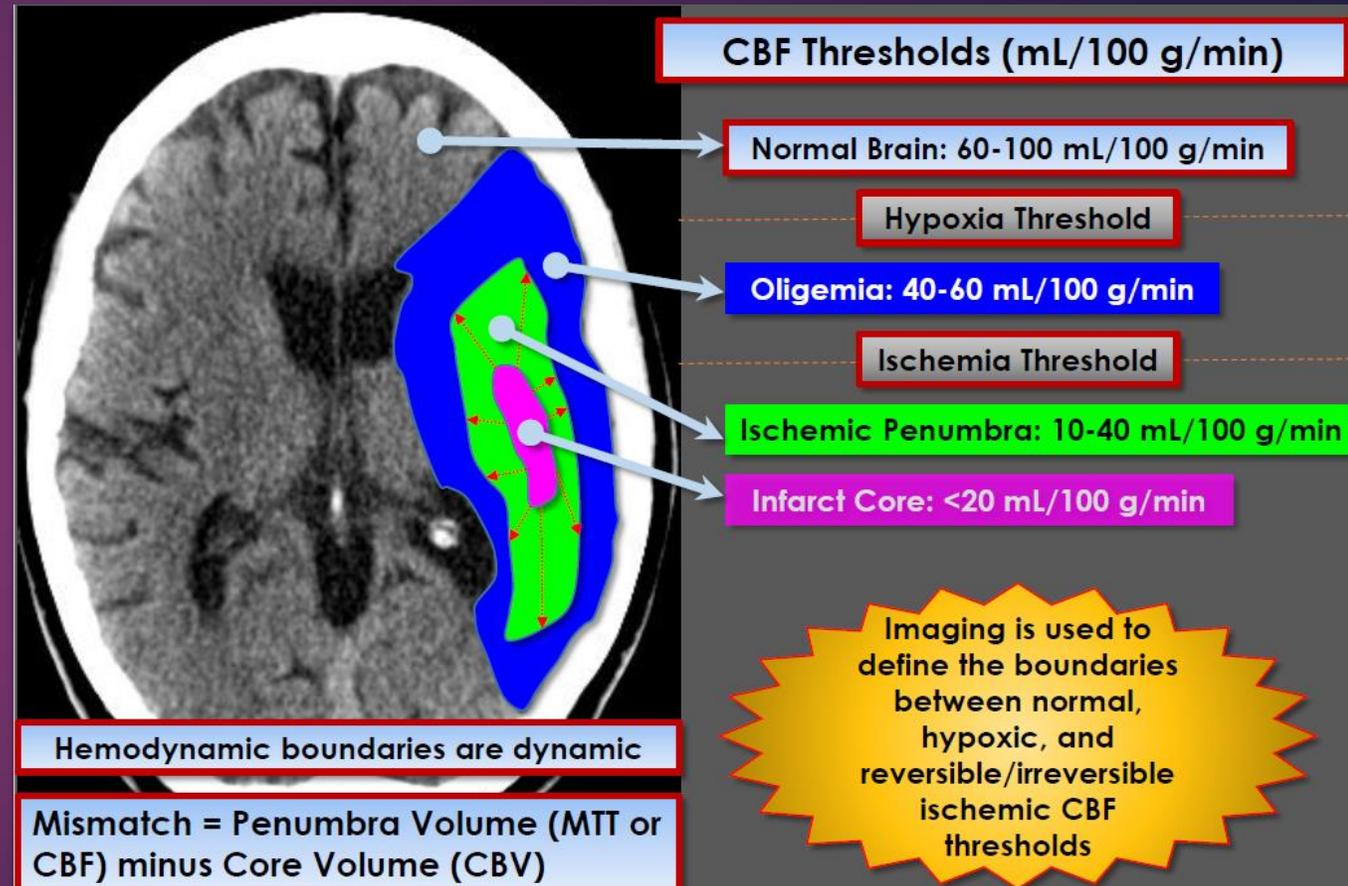


RAPID assessment of CT Perfusion

- ▶ All stroke protocol CTs include CT-, CTP (RAPID), CTA, CT+
- ▶ <4.5 hr alteplase if no bleed
- ▶ +LVO <6 hr thrombectomy
- ▶ +LVO 6-24 hr thrombectomy if RAPID mismatch



"Practical Approach to iSchemaView Rapid" JD Clemente, Dept Radiology, Carolinas Medical Center.



How to ensure every person in Wyoming who has a stroke can be treated effectively

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Public education regarding symptoms of stroke and importance of calling 911

EMS training for stroke recognition, severity assessment and management during transport

System wide triage plan to ensure rapid transport to the nearest appropriate facility

Public Education

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F.A.S.T. Campaign

Community Lectures

Public Service Announcements

Meals on Wheels Menu Ads

Billboards

Print Advertisement

Social Media Campaigns

SPOT A STROKE

FACE DROOPING | ARM WEAKNESS | SPEECH DIFFICULTY | TIME TO CALL 911

Stroke Warning Signs and Symptoms

SPOT A STROKE
FAST

Download the FREE APP and Be Ready

Available in Spanish

Download on the App Store | ANDROID APP ON Google play

THINK YOU ARE HAVING A STROKE? CALL 9-1-1 IMMEDIATELY!

F.A.S.T. is an easy way to remember the sudden signs of stroke. When you can spot the signs, you'll know that you need to **call 9-1-1 for help** right away. F.A.S.T. is:

F **Face Drooping** – Does one side of the face droop or is it numb? Ask the person to smile. Is the person's smile uneven?

A **Arm Weakness** – Is one arm weak or numb? Ask the person to raise both arms. Does one arm drift downward?

S **Speech Difficulty** – Is speech slurred? Is the person unable to speak or hard to understand? Ask the person to repeat a simple sentence, like "The sky is blue." Is the sentence repeated correctly?

T **Time to call 9-1-1** – If someone shows any of these symptoms, even if the symptoms go away, call 9-1-1 and get the person to the hospital immediately. Check the time so you'll know when the first symptoms appeared.

[Learn more stroke signs and symptoms >>>>](#)

Emergency Medical Services

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In person training programs



On-line lecture series



Department of Health Regulation



Real time feedback

EMS Stroke Assessment: Stroke?

Cincinnati Prehospital Stroke Severity Scale

- ▶ Facial Droop
 - ▶ Normal: both sides of face move equally
 - ▶ Abnormal: one side of face does not move
- ▶ Arm Drift
 - ▶ Normal: Both arms move equally or not at all
 - ▶ Abnormal: One arm drift or does not move compared to the other side
- ▶ Speech
 - ▶ Normal: patient uses correct words without slurring
 - ▶ Abnormal: Slurred or inappropriate words or mute

One abnormal finding associated with 72% probability of stroke

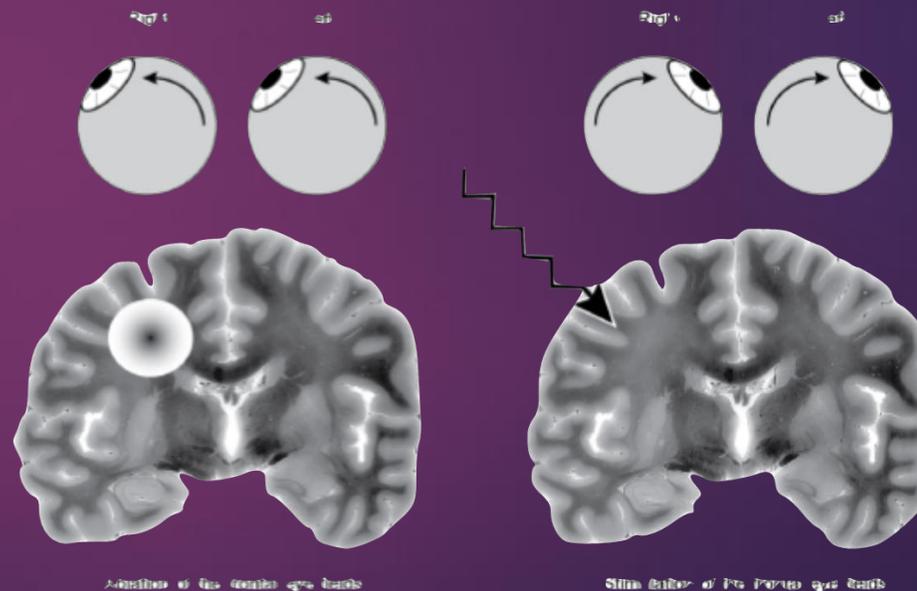


EMS Stroke Assessment: LVO?

Cincinnati Stroke Triage Assessment Tool (C-STAT)

- ▶ Arm weakness present = 1 point
- ▶ Decreased LOC = 1 point
 - ▶ Unable to state either age or current month and
 - ▶ unable to follow command to either open/close eyes or squeeze/release fist
- ▶ Gaze deviation present = 2 points

C-STAT ≥ 2 reliably identifies patient with Large Vessel Occlusion (LVO) Stroke



McMullan JT, Katz B, Broderick J, Schmit P, Sucharew H, Adeoye O. Prospective Prehospital Evaluation of the Cincinnati Stroke Triage Assessment Tool. Prehosp Emerg Care. 2017 Jul-Aug;21(4):481-488

Pre-hospital Notification by EMS

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Wyoming TeleStroke
7/3/2019



The stroke team should be activated by EMS ASAP



EMS or stroke team may consult directly with Neurologist by telephone or TeleStroke



Neurologist and/or Stroke Team triage to which facility patient should be taken

Code Stroke

18



EMS contacts Stroke Center and/or Stroke Doctor



EMS relays results of stroke assessment



EMS places 18g in AC checks FSBG and draws Rainbow



Code Stroke is activated



Page Alert: Stroke Doc, Stroke RN, Lab, CT, Admissions



Call for life flight or ACLS ambulance for expected transfer



Activate Telestroke System or call Neurologist

Upon arrival...

- ▶ Patient is registered
- ▶ Quick assessment by Stroke doc to ensure patient is stable
- ▶ Blood is taken to the lab
 - ▶ Required: INR, PLT, Cr
 - ▶ Optional: CBC, CMP, PT/PTT, trop, ESR, TSH
- ▶ Patient taken to CT
- ▶ Non-contrast head CT mandatory
- ▶ CTA head/neck if mandated by standard facility protocol



Consult Neurologist

- ▶ Early involvement with neurologist streamlines treatment¹
- ▶ Telephone consult with CT images pushed to WMC PACS
- ▶ TeleStroke allows direct patient assessment and immediate CT review
- ▶ Decide whether to give alteplase and whether patient needs to transfer



“Drip & Ship”



Give alteplase with goal door to needle (DTN) less than 30 minutes



If patient transfers goal door in-door out (DIDO) less than 60 minutes



Alteplase may continue *en route*

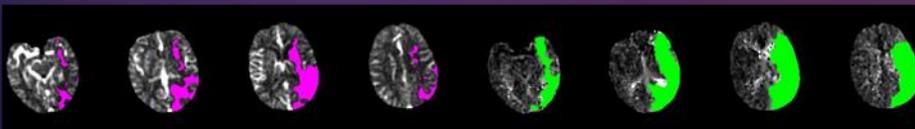
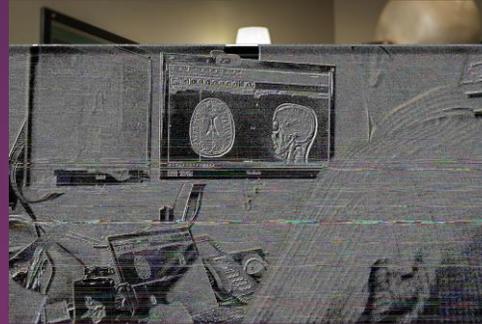
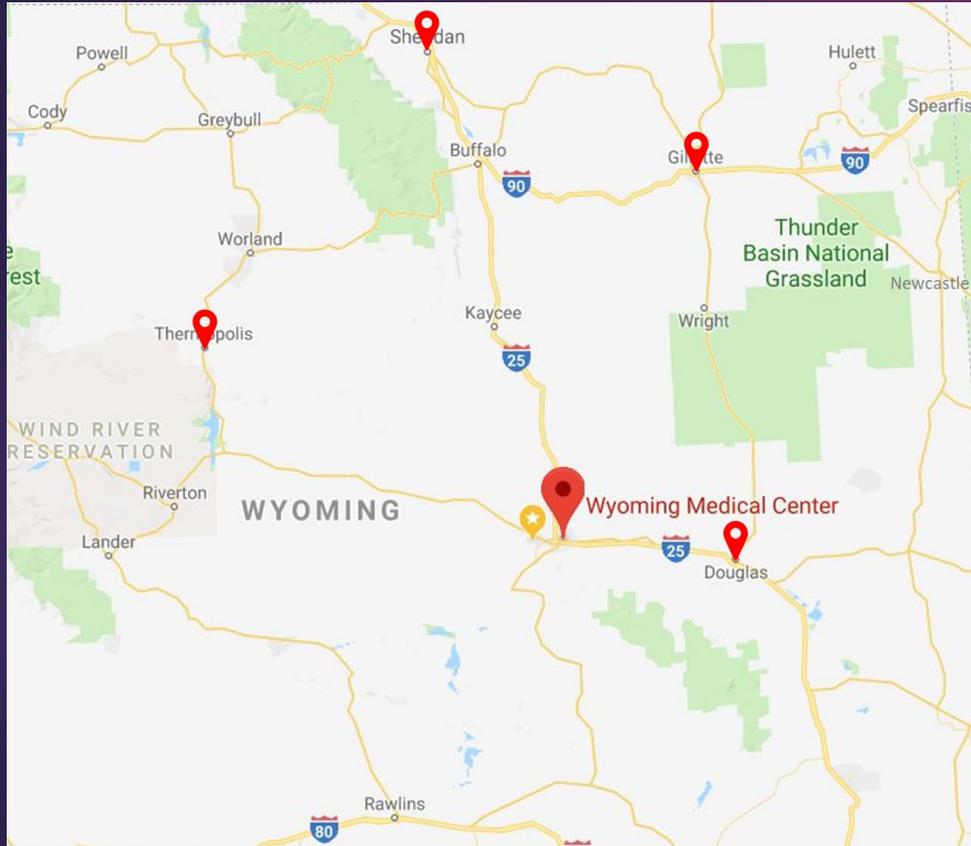


Blood pressure goal throughout <185/105 using 10-20 mg labetalol every 10 minutes prn as described in EMS Regulation

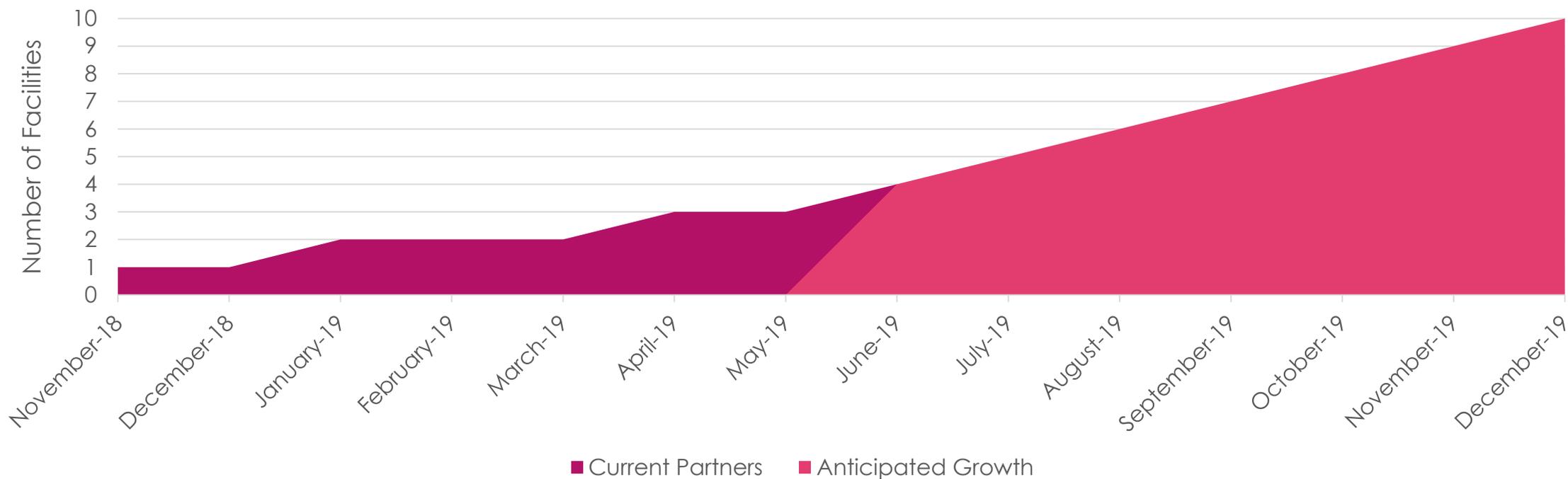
Wyoming TeleStroke

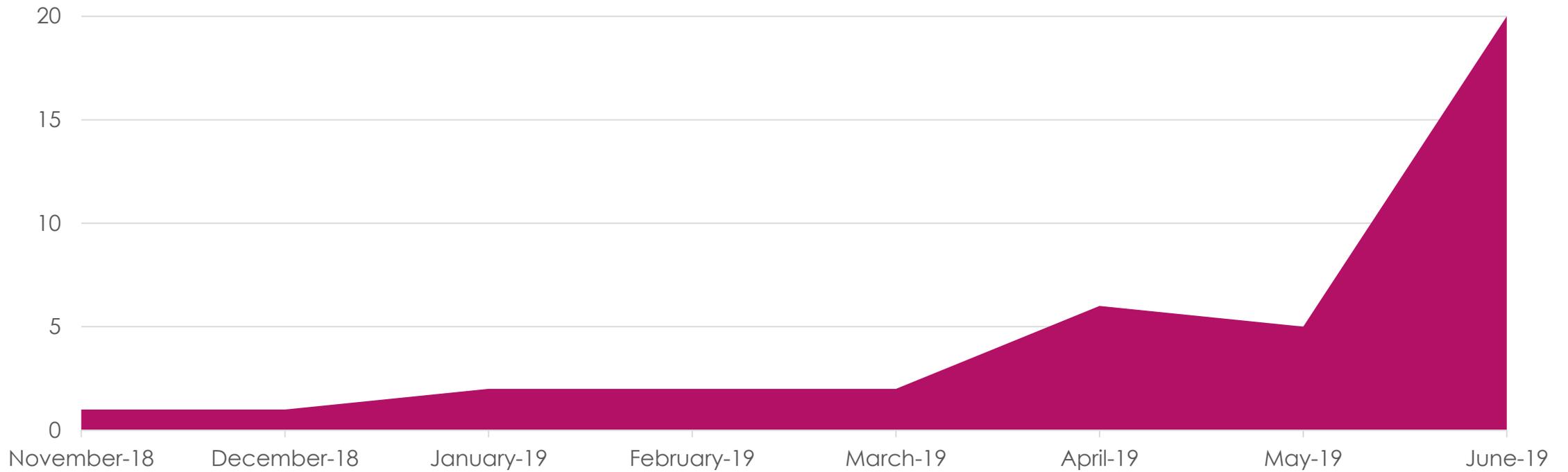
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Growth of the TeleStroke Network

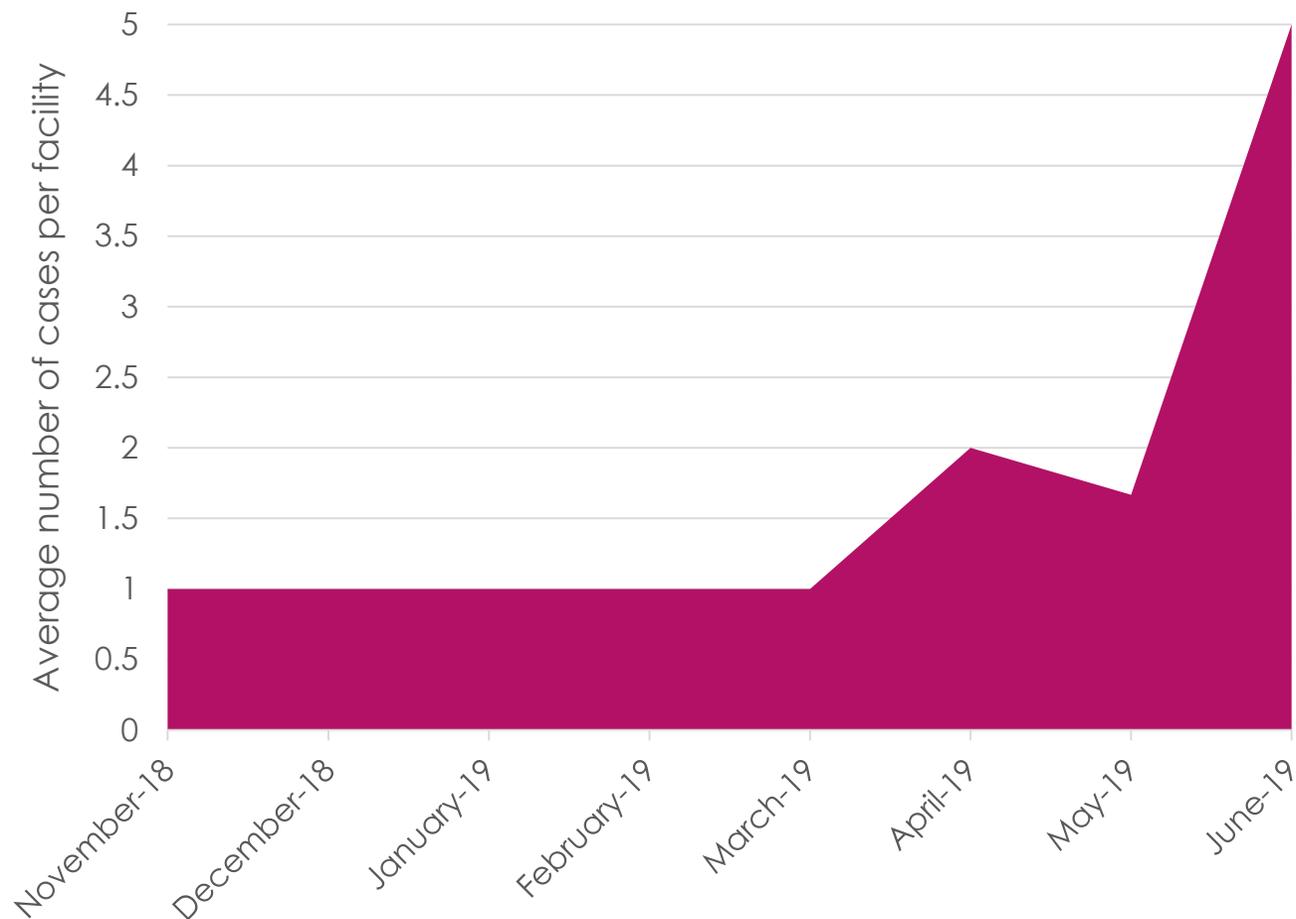




Number of Cases per Month

Acceleration of Utilization

25



WMC Primary Stroke Center



American Heart Association



2007 Bronze, 2008 Silver
2009-2010 Gold, 2011-2012 Gold +
2013-2014 Gold Plus and Target Stroke Honor Roll
2015- 2018 Gold Plus and Target Stroke Honor Roll Elite Plus

The Joint Commission



The Joint Commission Disease Specific Certification and Recertification: Primary Stroke Center in 2009-2018

Department of Health



First designated Primary Stroke Center by the Wyoming Department of Health in November 2015