Testimony of Dr. David Hess, M.D., Executive Vice President, Medical Affairs & Dean, Medical College of Georgia, Augusta University

Before the House Committee on Agriculture's Subcommittee on Commodity Exchanges, Energy, and Credit Hearing: Building Opportunity in Rural America through Affordable, Reliable and High-Speed Broadband

June 11, 2019

Good morning. First, I would like to thank the Chairman, the ranking member, and all the members of the subcommittee for the opportunity to testify today. I am Dr. David C. Hess, Dean of the Medical College of Georgia and Presidential Distinguished Chair of Neurology at the Medical College of Georgia at Augusta University. I am here to recount my experiences as a physician providing telestroke services, a form of telemedicine, to stroke patients presenting at hospitals in the rural Southeastern United States.

Georgia is situated in the "Stroke Belt", a region of high stroke incidence in the southeastern U.S. I work at the Medical College of Georgia, the only public medical school in the state of Georgia. We are the Joint Commission certified Advanced Comprehensive Stroke Center that serves patients in rural southeastern Georgia and South Carolina, areas that are in the "buckle of the Stroke Belt". In 1996, a drug called tissue plasminogen activator (TPA) was approved for the treatment of ischemic stroke by the Federal Drug Administration (FDA).

For background, there are two types of stroke –ischemic stroke is caused by a blockage of blood flow to the brain and hemorrhagic stroke caused by bleeding into the brain. TPA is effective for ischemic strokes but can be harmful if given for hemorrhagic strokes. The only way for a physician to tell the difference is to perform and review a CT scan of the brain. While TPA is very effective for ischemic stroke, in about 3% of patients it can cause bleeding into the brain which can be fatal. This complication caused many Emergency Medicine physicians to be reluctant to use TPA and they required stroke specialists (Neurologists) to assist them in making the decision.

After TPA was approved by the FDA, only about 2% of stroke patients were receiving TPA. Nationwide, 64% of US hospitals were not using TPA and most of them were small hospitals in the rural South. [1] There was a geographic penalty for stroke care-rural patients in small hospitals in the South that were not receiving TPA, the only drug that could reduce their chance of being disabled from a stroke.

One of the problems that led to low usage of TPA was the lack of neurologists and stroke specialists in the smaller hospitals to consult and help with the treatment decisions. Neurologists and stroke specialists tend to work in larger cities like Augusta and Atlanta and there were none in rural Georgia. Moreover, the time to treatment with TPA is a major determinant of how well the patient does; shorter time to treatment equates to better outcomes. Stroke is a "time sensitive disease" and it is estimated that during a stroke, 32,000 brain cells die per second so every second and minute delay matters when administering TPA. There is no time for the physician to get in their car and drive to a rural hospital. To make a decision to use TPA, the stroke specialist needs to see the patient and examine them and also review the CT scan of the brain. We would often get phone calls from our rural hospitals with questions about treating stroke patients with TPA. However, we could not see the patient or review their CT scan of the head, thus could not make safe decisions. The problem is that we had a very effective drug for stroke, but we did not have a healthcare system with the organization and tools to administer it.

To address this problem, back in 2002, we in the Department of Neurology at the Medical College of Georgia began to develop a web-based telestroke system to help treat stroke patients at rural hospitals in Georgia. There was no system available, so we developed our own. This involved 3 components – two-way video (we can see the patient and the patient can see us), ability to read the CT scan of the brain, and decision-support software that helped us make the

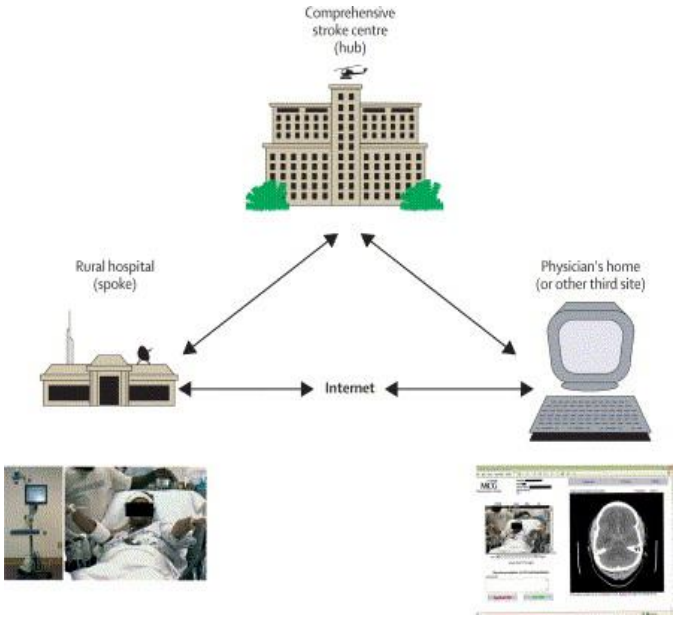


Fig 1 REACH telestroke system. Patient presents in rural hospital (lower left) Consultation done at home by Stroke specialist (lower right) and patient transferred to Comprehensive Stroke Center (top) after TPA given or if complex care needed

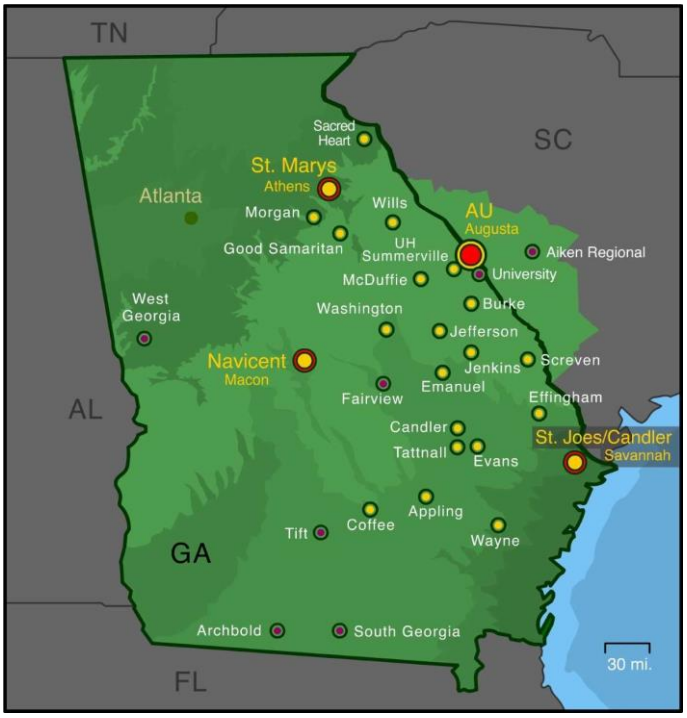


Fig 2 MCG-AU Health REACH Network: Red dot is AU Health, Comprehensive Stroke Center. Small yellow dots are small rural hospitals (<50 beds); purple dots are hospitals > 100 beds. Large yellow dots are larger hospitals >200 beds beds

correct treatment decision and allowed us to complete a note to provide a consultation to the physicians at the site. [2-4] (Fig 1) The other important feature was that the system was "site independent." We did not have to sit and wait for calls in a specific "wired" room in the hospital. We could be at home or anywhere that we had access to the internet. We called this program REACH (**R**emote **E**valuation of **A**cute is**CH**emic stroke). After building a prototype and testing it within our own hospital, we began a pilot program in 2003 with McDuffie Regional Hospital in Thomson, Georgia and Emanuel County Hospital in Swainsboro, Georgia. Both these hospitals had administrators, nurses, and physicians supportive of the telestroke program. Internet connectivity was poor on both ends –the hospital and on our end. For example, if I was coaching a Little League game, I would have to drive to the Taco Bell and "use" their hotspot as that was closer than my home.

We demonstrated that that we could accurately examine the patient and measure the severity of the stroke and that we could safely and effectively guide treatment with TPA. Once we demonstrated (in the medical literature and to our peers) that we could do this, we expanded our network to 9 rural hospitals over the next few years and now serve over 30 hospitals today throughout Georgia and one in South Carolina.[3,4] (Fig 2) We have performed over 13,000 acute stroke consultations and have treated more than 1800 stroke patients with TPA. Most of these patients would have never been treated with TPA without a telestroke system

Telestroke is now used almost everywhere in the nation and almost every large health system has a telestroke program. Telestroke has become the "standard of care" with position statements written by expert panels from the American Stroke Association endorsing its use. [5-8] Telestroke became a disruptive technology that changed how we manage stroke patients. Studies show that telestroke has expanded and improved stroke care in rural and "super-rural" areas. [9]

We have expanded the use of telestroke to include acute teleneurology (other neurological conditions beyond stroke) and to triage and select stroke patients for mechanical thrombectomy (MT). MT uses catheters and clot retrieval devices to mechanically remove blood clots from vessels in the brain and this is a life-saving treatment for patients with large strokes (blockage of large arteries such as the middle cerebral artery.) We currently use telestroke to triage patients from all over Georgia and fly them by helicopter to the few Comprehensive Stroke Centers (there are 4 in Georgia) where this procedure can be performed.

In 2006, a group of us licensed the REACH technology through our University and in 2006 we founded a company called REACH Health in Augusta Georgia. The company later moved to Alpharetta, Georgia, and it provided telestroke services to over 150 hospitals in the United States, including hospitals in South Carolina, New York, Pennsylvania, Louisiana, Massachusetts and Alaska. I was Chairman of the Board from 2006 to 2018

when the company was sold to InTouch. REACH health is now a division of InTouch Health, the leading developer of telestroke systems in the U.S. and around the world.

When we first started REACH back in 2003 to 2004, we had a lot of problems with internet connections to our rural hospitals. The video would often "freeze" and the consults would be delayed and occasionally dropped, and we would have to resort to using the telephone. Fortunately, this improved over the years. Access to bandwidth in rural Georgia is certainly much better than it was 10-15 years ago. There are also improved technologies that allow us to operate in a low bandwidth environment. This is stated in our Scientific Statement on "Telemedicine Quality and Outcomes in Stroke" from the American Stroke Association and endorsed by the American Telemedicine Association [7]"The Scalable Video Coding extension of the H.264/MPEG-4 Advanced Video Coding standard (H.264/AVC) is the latest development for this successful specification, enabling high-resolution performance at the relatively low-bandwidth environments often available at more rural hospital sites. New communication (Web Real-Time Communication) and compression and decompression standards (VP8) are also emerging that promote the use of a Web browser as the primary audio/video platform while maintaining equal or better quality at half the bandwidth cost. Accordingly, technological advances on the horizon coupled with increasing access to high-speed bandwidth continue to accelerate the implementation of telemedicine services. Depending on the technology used, bandwidth requirements can range from as little as 64 ×103 bits per second to in excess of 1.2×106 bits per second. However, bandwidth >512×103 bits per second or closer to 1.2×106 bits per second will usually be needed for seamless operation. The quality of the connection is affected by many factors, including bandwidth (connection capacity and speed), distance (which introduces latency), network throttling (introduced by network configuration), and congestion (hospital systems will be "saturated" at peak times, limiting the available bandwidth). The cell structure of mobile telecommunications may lead to low bandwidths during peak times of mobile Internet use. This becomes an issue in hospitals and busy emergency departments where competing for limited bandwidth leads to degradation of quality. Other variables affecting the conferencing experience include the number of participants in a videoconference, video resolution, and video size. Recently developed technologies, such as Scalable Video Coding1, provide better performance in low-bandwidth environments by making adjustments to frame rate, the area of the image to be refreshed, and video quality based on network environment. [7]

However, we do still experience problems with the video freezing and downloading imaging files. The problem is related to the people and resources necessary to adequately manage that bandwidth within the hospital. While most of these hospitals have access to broadband, they do not have the technology/IT budget to support much infrastructure inside the facility, much less support a full time IT person. The common example

is the hospital guest network being allowed to use the same internet connection (un-throttled) as the clinical applications. A better informed, professional IT manager can set-up restrictions on network use to prioritize clinical applications.

While internet connectivity is adequate for most of the rural hospitals, it is not adequate to provide telehealth consults to patients in homes and at small clinic sites in rural areas. Telehealth is able to reinvent "doctor house calls" and is moving to monitoring and consulting with the patient in their home. In addition to physicians, much of this monitoring will be done by nurses and advanced practice providers. Lack of access to physicians is a problem in many parts of rural Georgia. According to the Georgia Board for Physician Workforce (https://gbpw.georgia.gov/), there are 8 Georgia counties without any physicians, 11 counties without a Family Medicine Physician, 63 counties without a Pediatrician, 75 counties without an Obstetrician-Gynecologist and 78 counties without a general surgeon. Just as there are few stroke specialists in rural areas, there is a dearth of all types of medical specialists such as cardiologists, nephrologists, etc. This is likely to worsen as there is a looming shortage of physicians in the U.S. and major shortages in rural areas. One of the best ways to address these geographic disparities is through the use of telemedicine-to the patient's home and to health clinics.

There is also another need for stroke care where there is insufficient broadband-that is the poor connectivity to ambulances in rural areas. There is increasing interest in providing telestroke services in the ambulances transporting patients to the hospitals. This is presently not feasible in many rural areas.

Thank you again for the opportunity to testify before the Committee. I am available to answer any questions you may have.

References

1. Kleindorfer D, Xu Y, Moomaw CJ, Khatri P, Adeoye O, Hornung R. US geographic distribution of rt-PA utilization by hospital for acute ischemic stroke. Stroke 2009;40:3580-4.

2. Hess DC, Wang S, Gross H, Nichols FT, Hall CE, Adams RJ. Telestroke: extending stroke expertise into underserved areas. Lancet Neurol 2006;5:275-8.

3. Wang S, Gross H, Lee SB, et al. Remote evaluation of acute ischemic stroke in rural community hospitals in Georgia. Stroke 2004;35:1763-8.

4. Wang S, Lee SB, Pardue C, et al. Remote evaluation of acute ischemic stroke: reliability of National Institutes of Health Stroke Scale via telestroke. Stroke 2003;34:e188-91.

5. Schwamm LH, Audebert HJ, Amarenco P, et al. Recommendations for the implementation of telemedicine within stroke systems of care: a policy statement from the American Heart Association. Stroke 2009;40:2635-60.

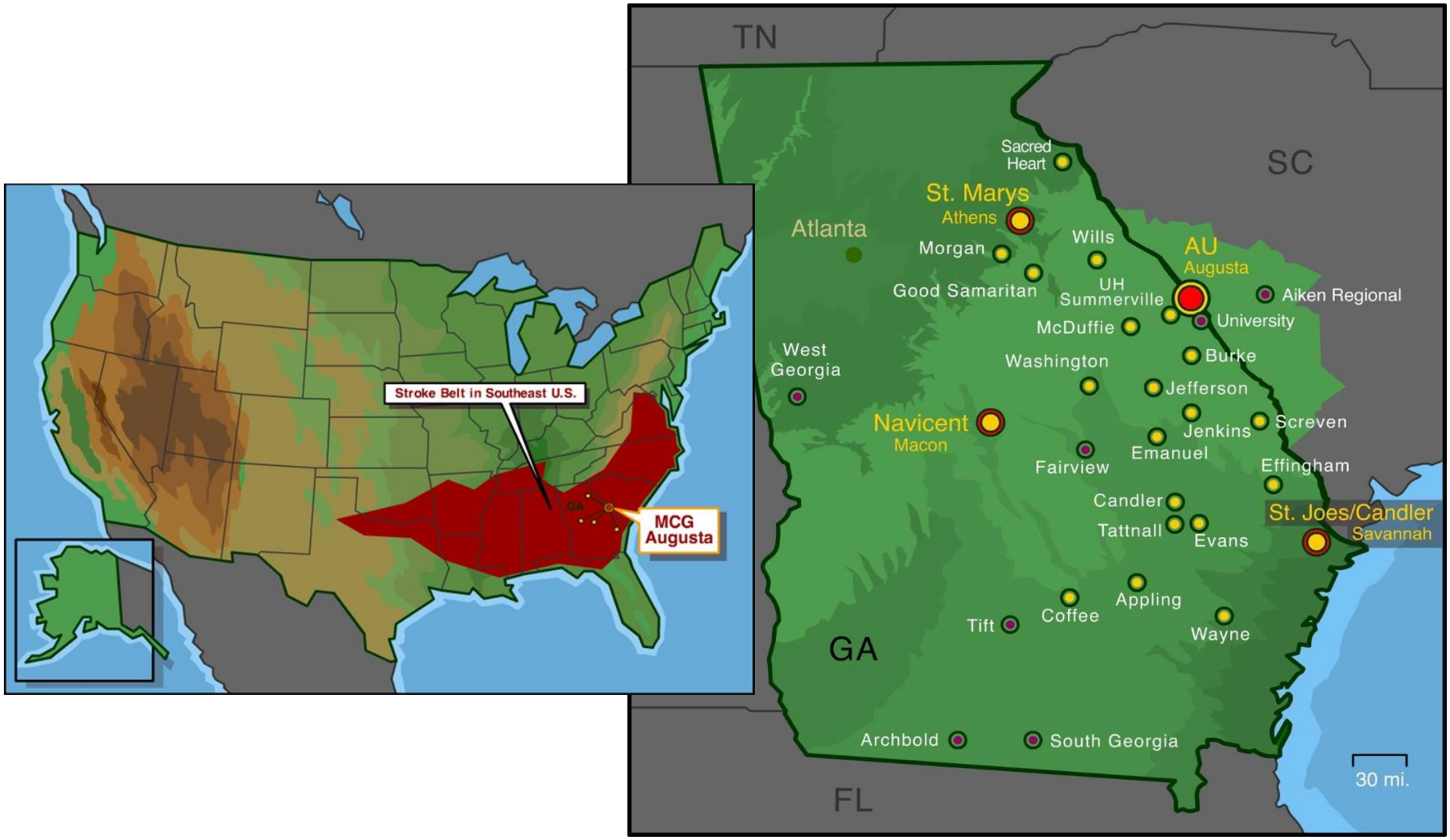
6. Schwamm LH, Holloway RG, Amarenco P, et al. A review of the evidence for the use of telemedicine within stroke systems of care: a scientific statement from the American Heart Association/American Stroke Association. Stroke 2009;40:2616-34.

7. Wechsler LR, Demaerschalk BM, Schwamm LH, et al. Telemedicine Quality and Outcomes in Stroke: A Scientific Statement for Healthcare Professionals From the American Heart Association/American Stroke Association. Stroke 2017;48:e3-e25.

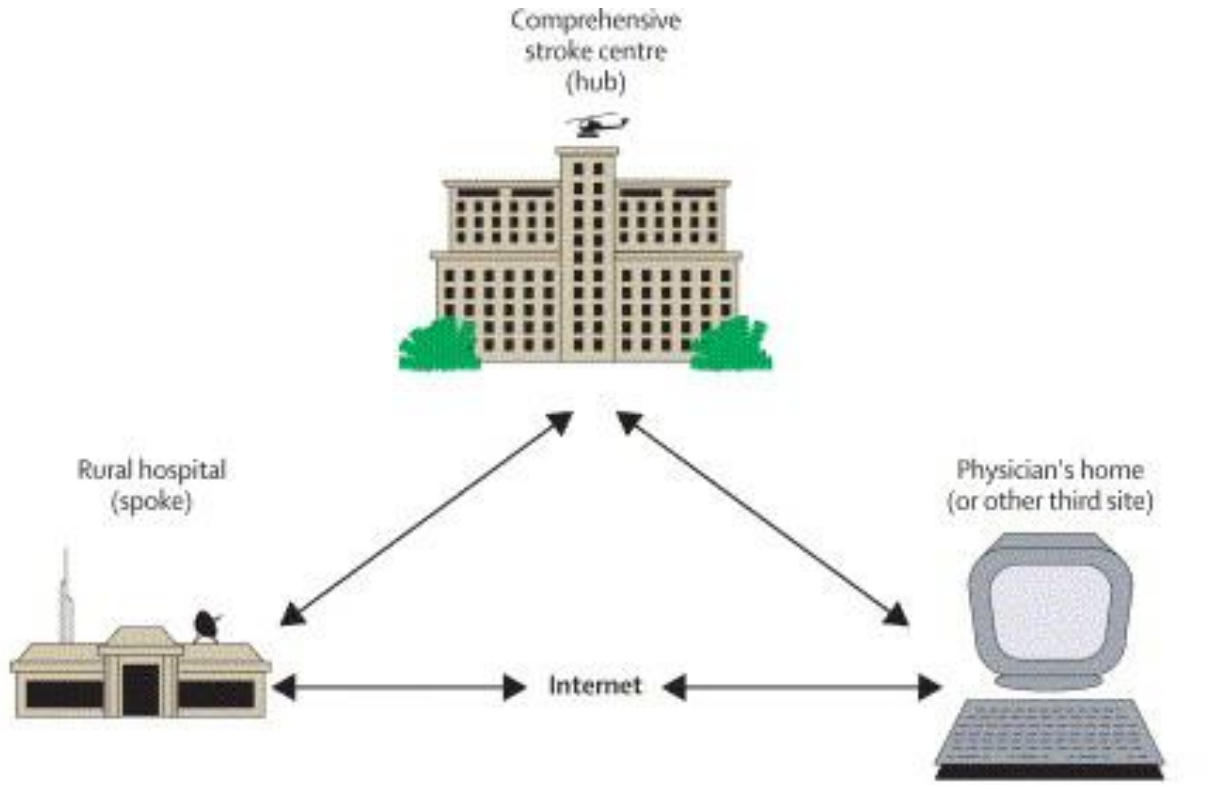
8. Wechsler LR, Tsao JW, Levine SR, et al. Teleneurology applications: Report of the Telemedicine Work Group of the American Academy of Neurology. Neurology 2013;80:670-6.

9. Zhang D, Wang G, Zhu W, et al. Expansion Of Telestroke Services Improves Quality Of Care Provided In Super Rural Areas. Health Aff (Millwood) 2018;37:2005-13.

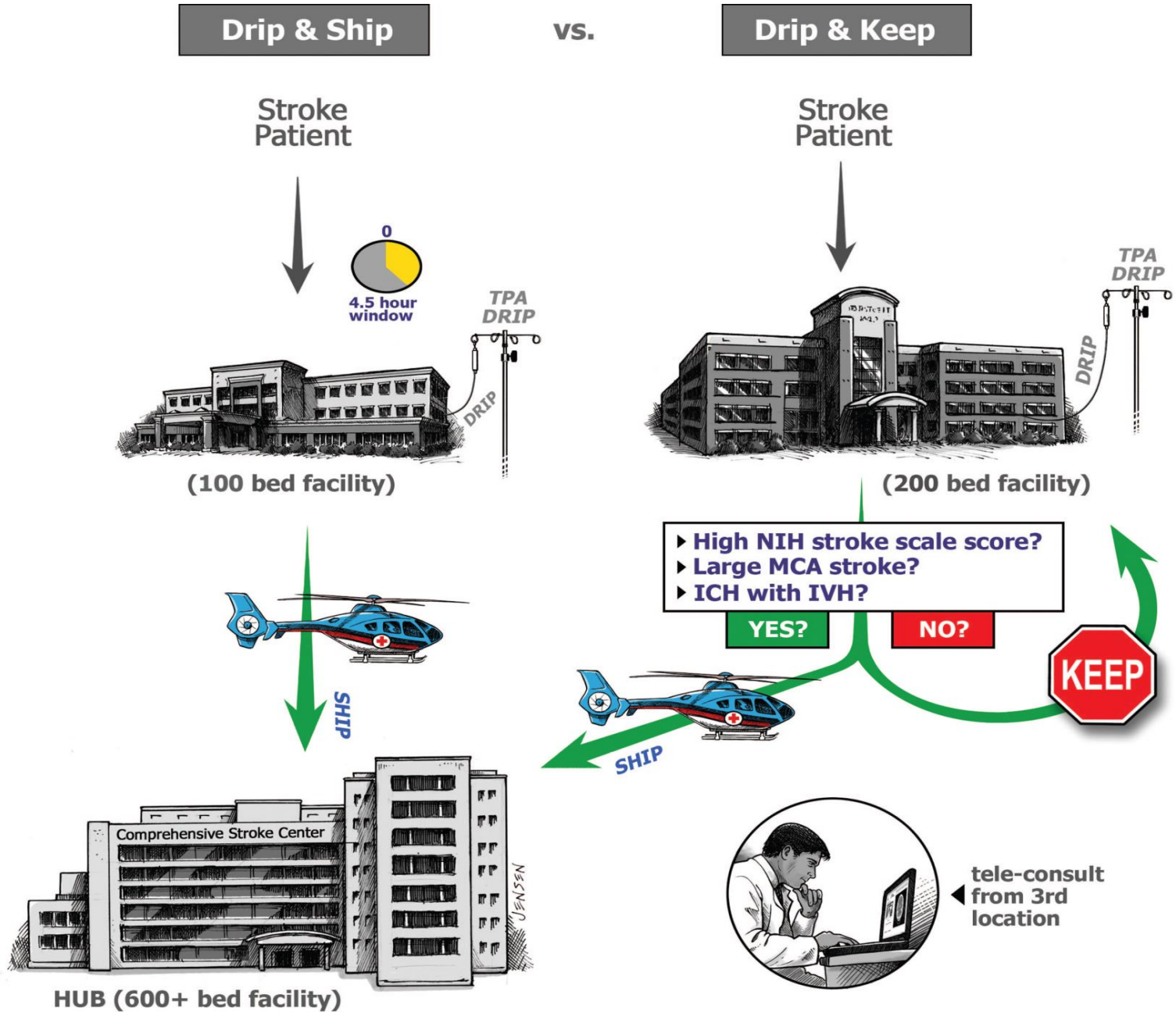
REACH Network



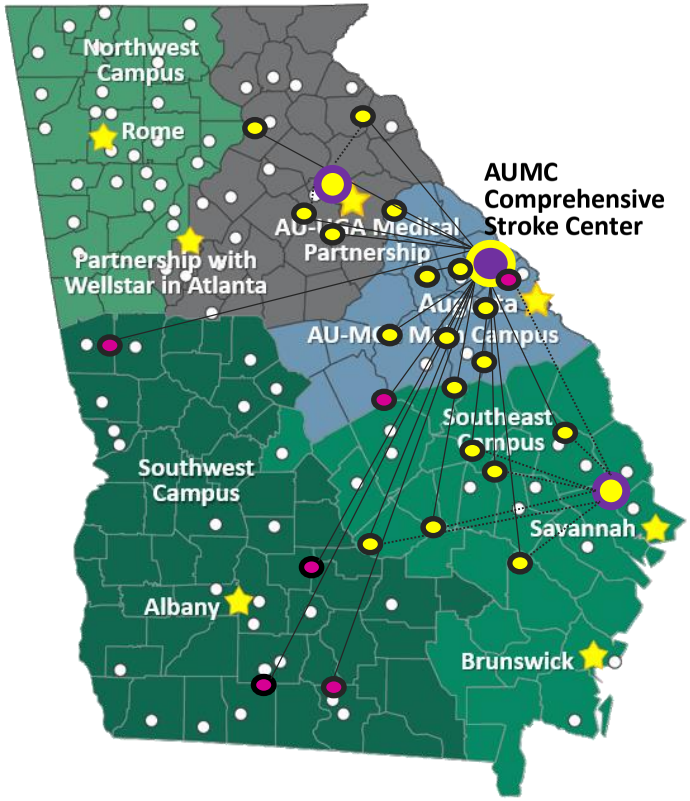
REACH Hub & Spoke Telestroke Model



Hess DC, et al. Lancet Neurol. 2006;36:5:275-8


Drip & Ship
vs.
Drip & Keep
Stroke Patient
0
4.5 hour window
TPA DRIP
DRIP
(100 bed facility)
Stroke Patient
TPA DRIP
DRIP
(200 bed facility)
High NIH stroke scale score?
Large MCA stroke?
ICH with IVH?
YES?
NO?
KEEP
SHIP
SHIP
Comprehensive Stroke Center
HUB (600+ bed facility)
tele-consult from 3rd location

The Two Georgias: Rural Health Care



- 108 of Georgia's 159 counties are rural
- 101 rural counties have death rates above state average
- South Georgia is one of the sickest populations in U.S.
- Majority of rural/critical access hospitals are located in counties ranked in the bottom 50%
- Populations in these counties have more health challenges