

Bringing Neuroscience to Rural Communities



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On behalf of the Medical University of South Carolina
Teleneuroscience Program

Presenter Disclosure Information

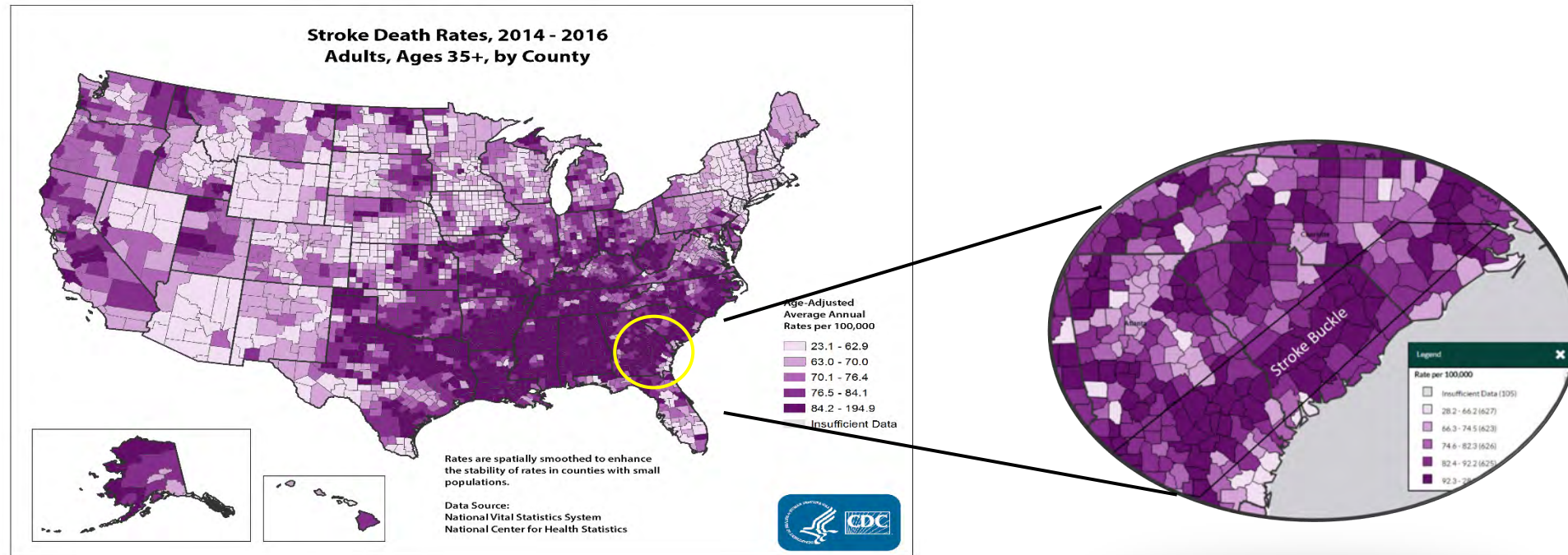
Presenter: Christine Holmstedt, D.O., FAHA

Presentation: Bringing Neurosciences to Rural Communities

- Financial Disclosures: NIH
- Unlabeled/Unapproved Uses Disclosure: None



Background & Need



5th leading cause of death in North America

SC is located in the **Buckle** of the Stroke Belt

1/3 of Americans do not have access to stroke center within 1 hour

Projected total direct medical stroke-related costs from **\$71.6 to \$184.1 billion**

Source: Mozaffarian, Dariush, et al. "Heart Disease and Stroke Statistics—2016 Update." *Circulation*, vol. 133, no. 4, 2016, doi:10.1161/cir.0000000000000350



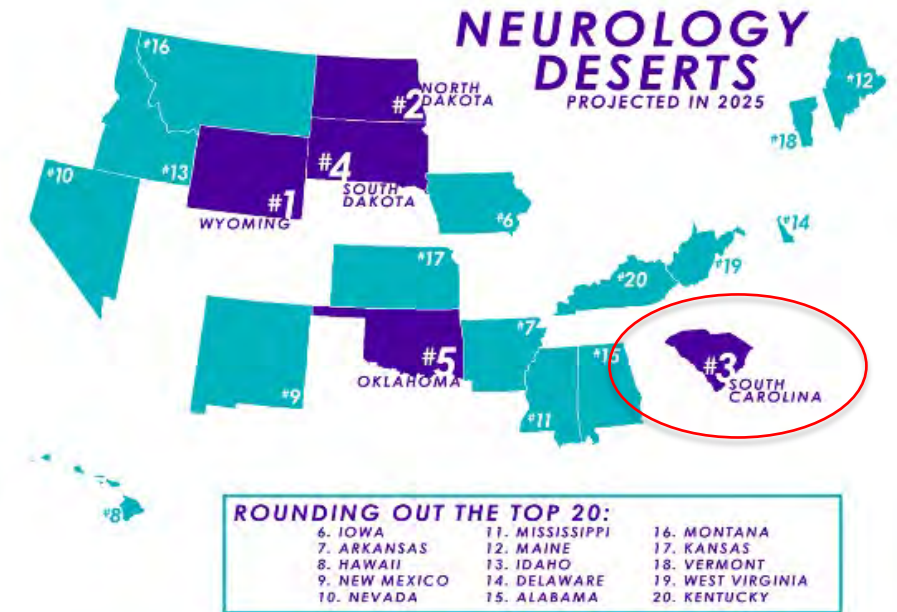
Background & Need

“Neurology Desert”

- › National demand for neurologists projected to increase from 18,180 in 2012 (11% shortfall) to 21,440 by 2025 (19% shortfall)
- › Average wait time up to 35 business days

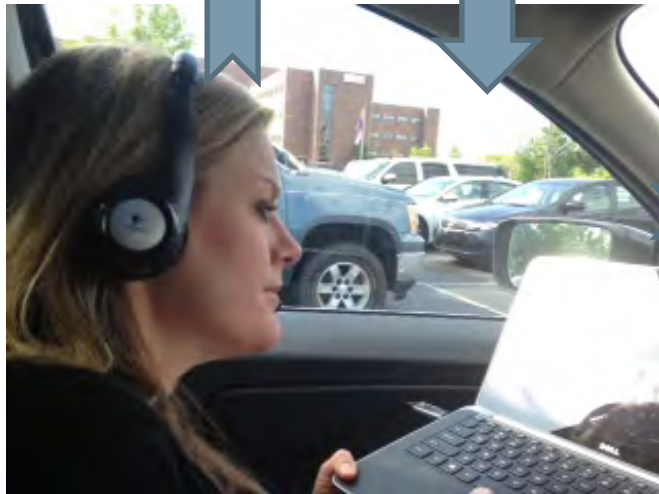
South Carolina

- › Population **4.96** million
- › Neurologists **160**
- › **31,007** patients/physician



Sources: Dall, Timothy M. et al. "Supply and Demand Analysis of the Current and Future US Neurology Workforce." *Neurology* 81.5 (2013): 470–478. *PMC*. Web. 21 Jan. 2018.
South Carolina Physician Workforce Profile. Association of American Medical Colleges, 2015, www.aamc.org/download/447228/data/southcarolinaprofile.pdf

Teleneurology is Good



Internet Explorer window showing the REACH Cell interface. The URL bar displays <http://reachcell.com>. The page title is "REACH Cell". A box labeled "MUSC" is overlaid on the top right of the interface.

Technical Support: +1.706.955.4581

Consult MyPac Reports History

Patient and Unmet Summary

First Name: [Redacted]
Last Name: Doe
Patient ID: 100
Onset: 07/24/2008 12:00 CDT
Gender: MALE
Age: [Redacted]

Vitals

BP: 120/80
HR: 100
Temp: 100
Wt: 75 kg
CBG: 100

Pain Scale

Pain Intensity: Unspecified
Pain Location: 100

3 hr Win: 2-28-40
4.5 hr Win: 3-55-40
End Consult

Spoken Comments

REACH Demo ER

CTScans Viewer

CTScans for: REACH DEMO

Head CT
Date & Time Unspecified

BODY PART--Unspecified, DESCRIPTION--Head CT, DATE & TIME--Unspecified

CT Scan image showing a cross-section of the head.

Page Info: Currently you are viewing Page 1 of the total 5 page(s).

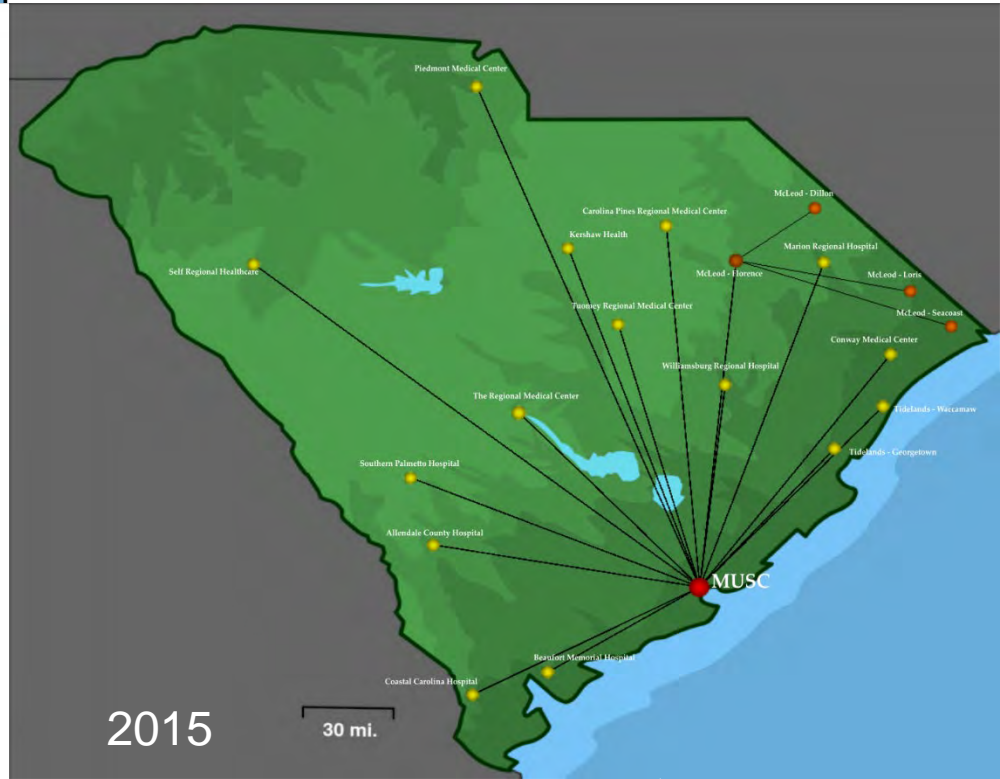
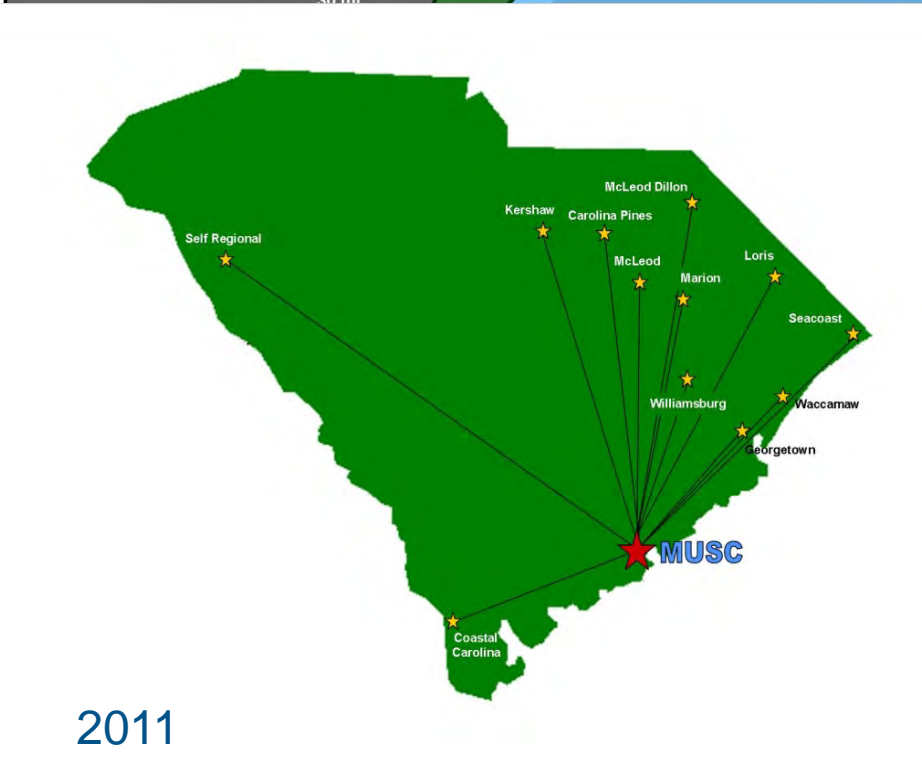
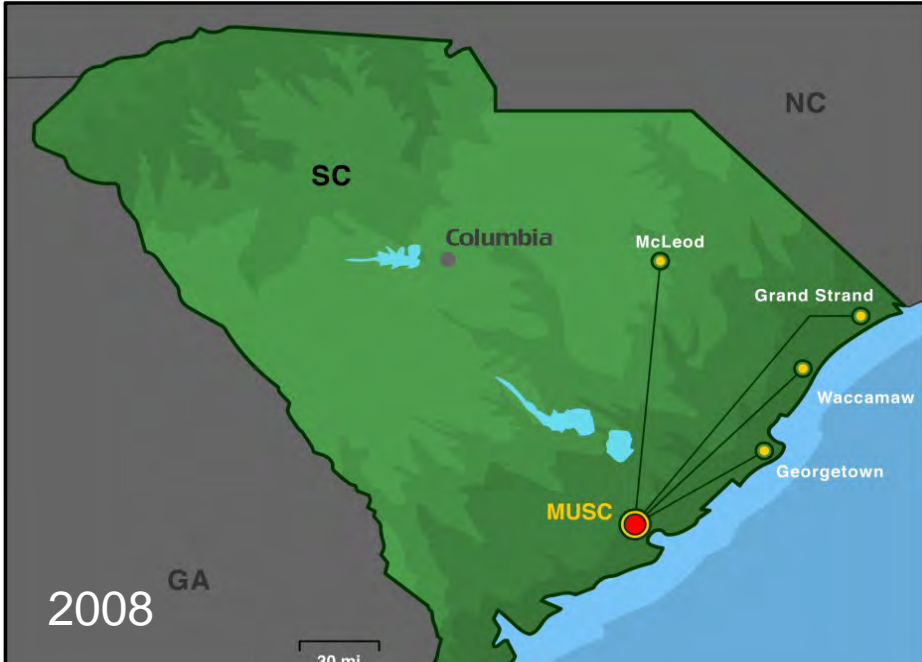
Hub Comments

Consultant Comments

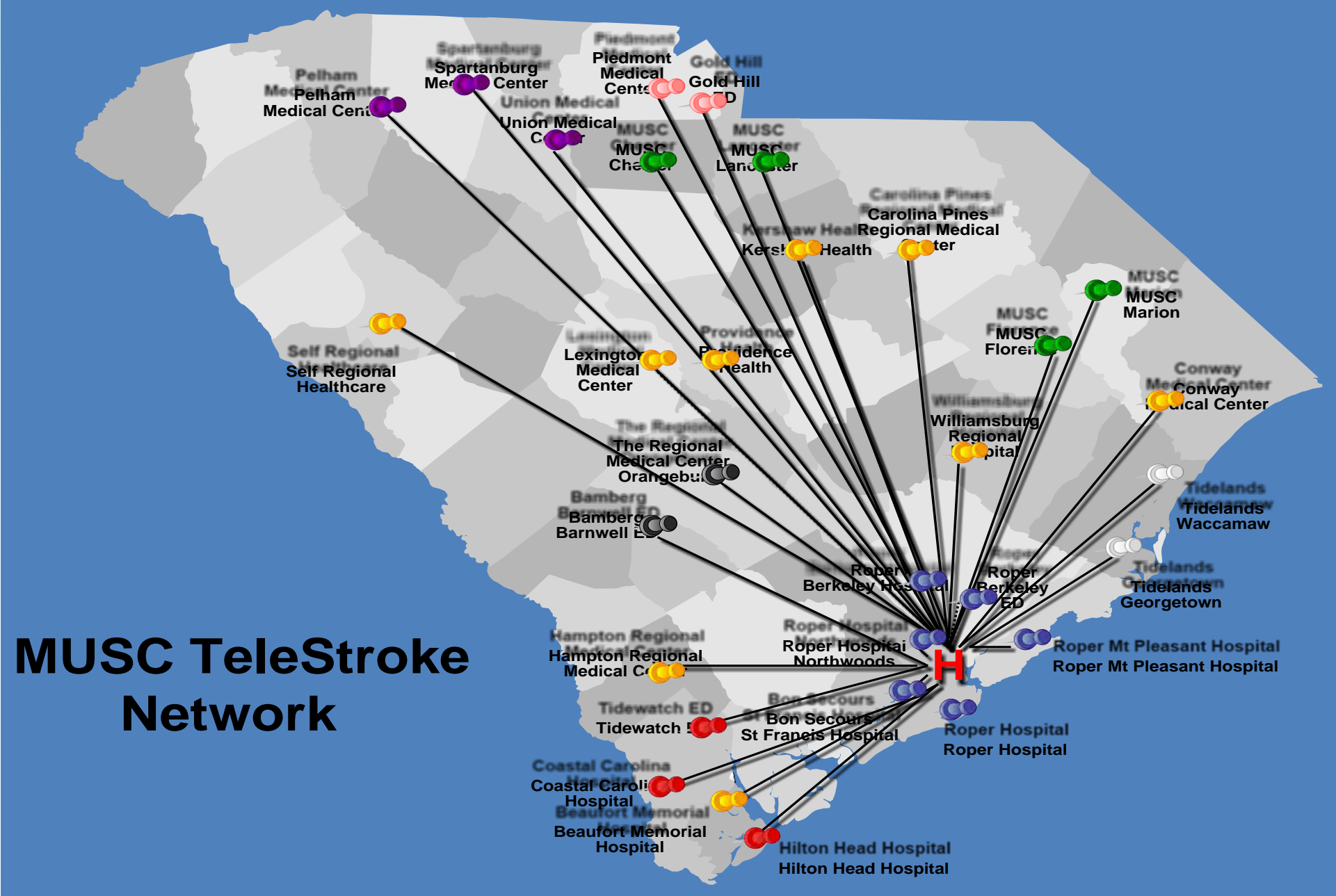
Show/Filter

No difficulty in breathing
Heart: regular rate & rhythm
No seizure activity

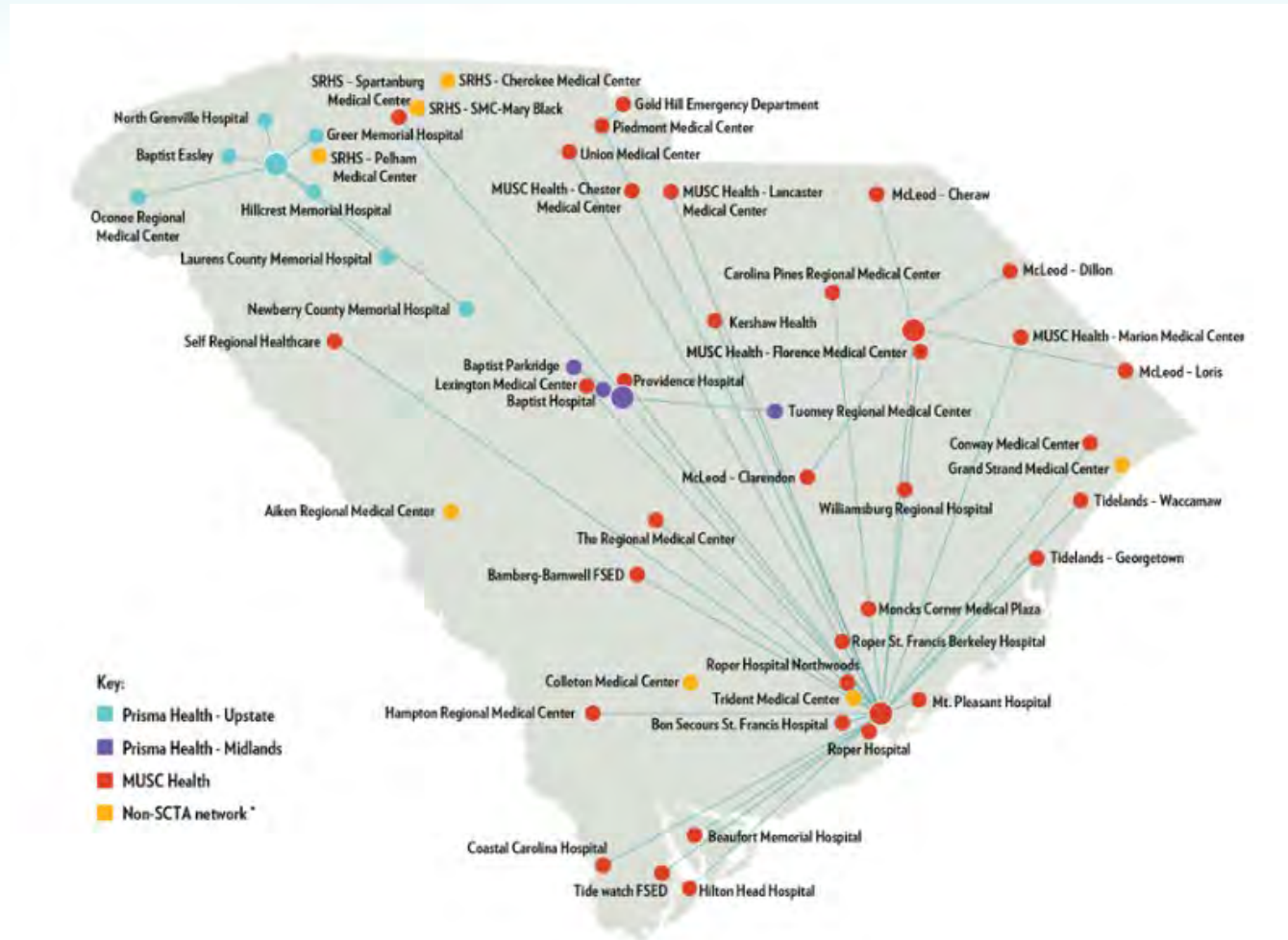
Submit



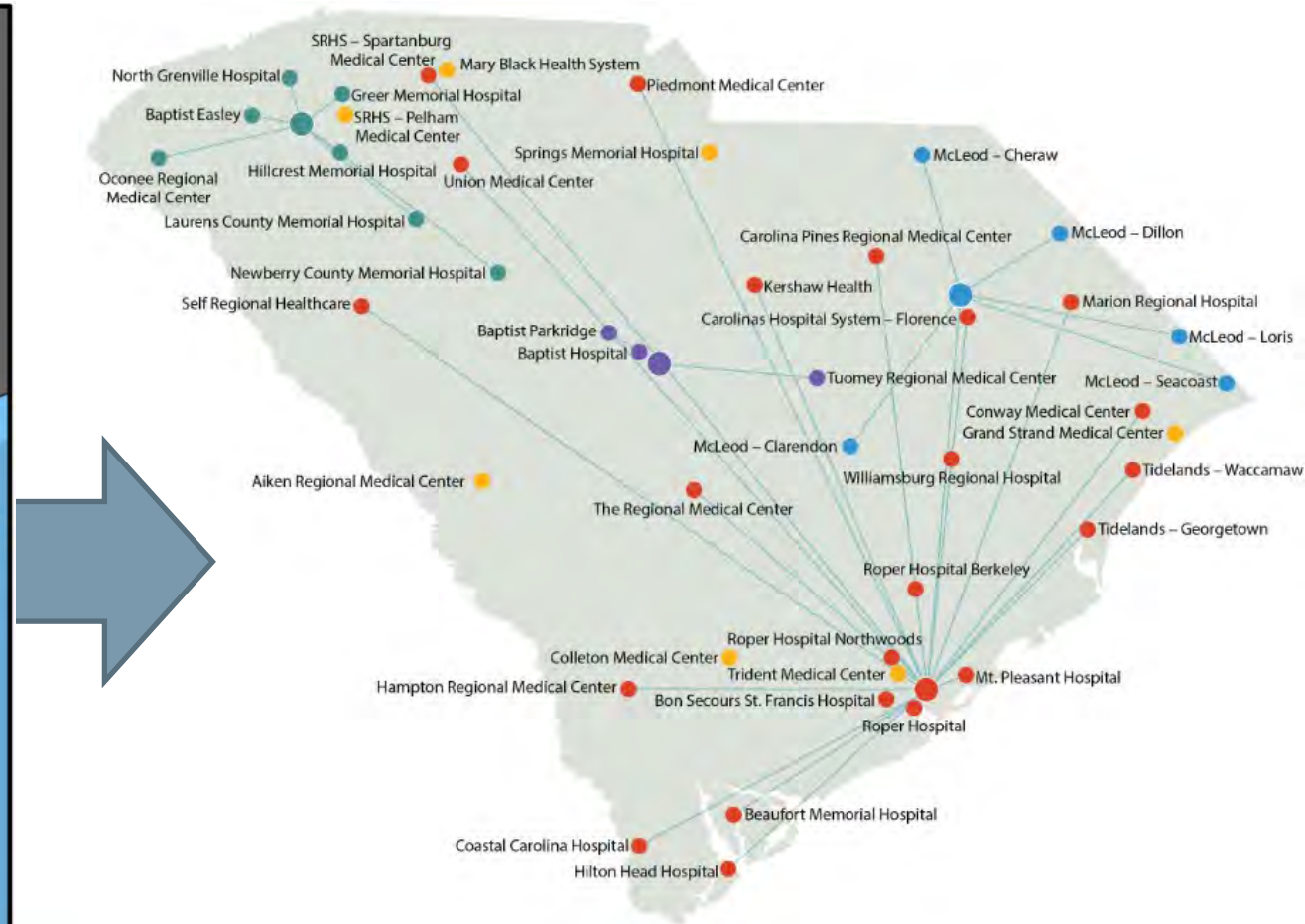
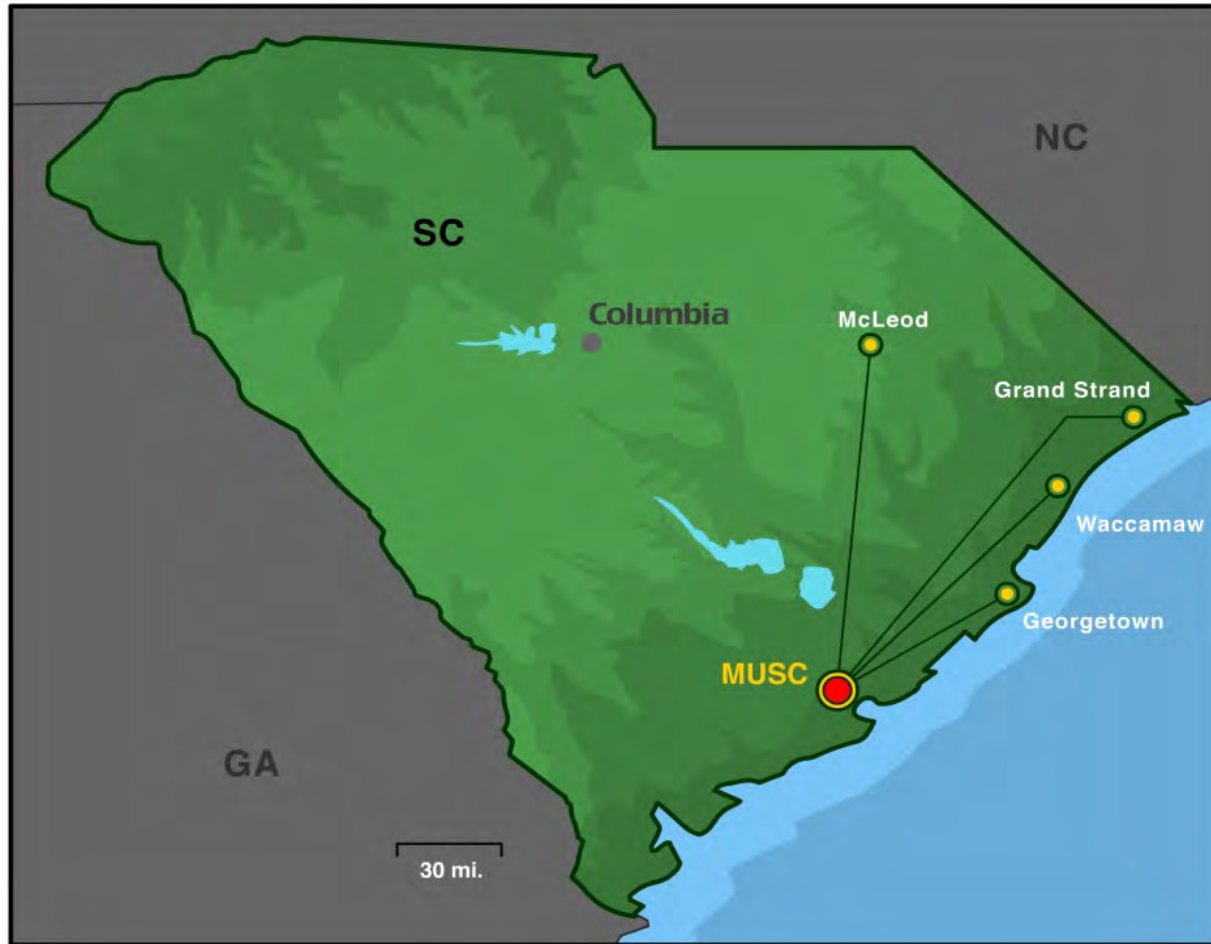
MUSC TeleStroke Network



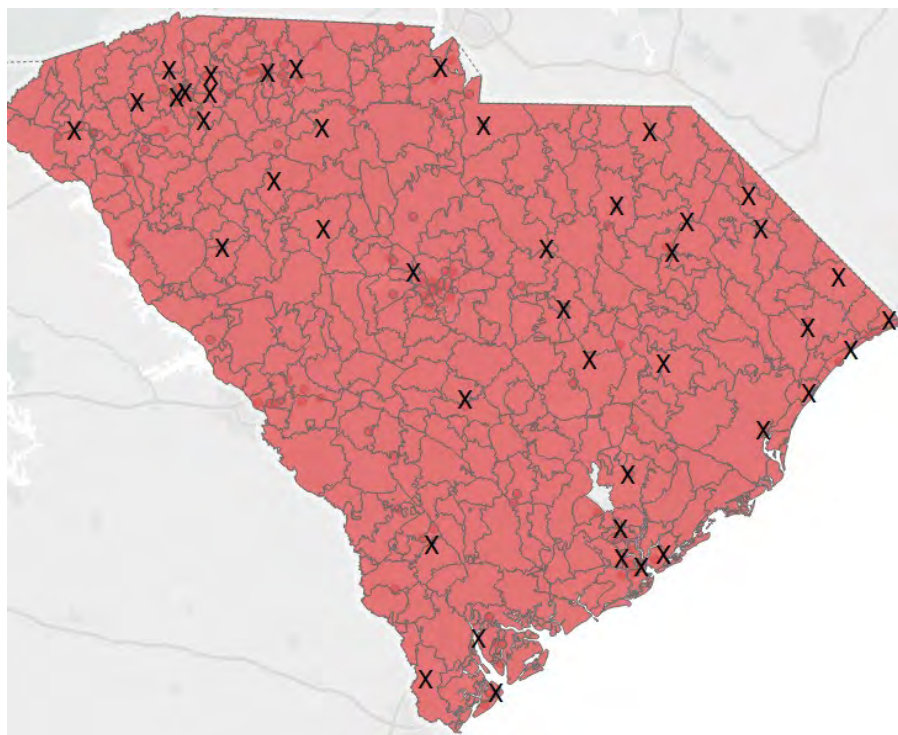
SC Telestroke Alliance



For Perspective



Access to Expert Stroke Care

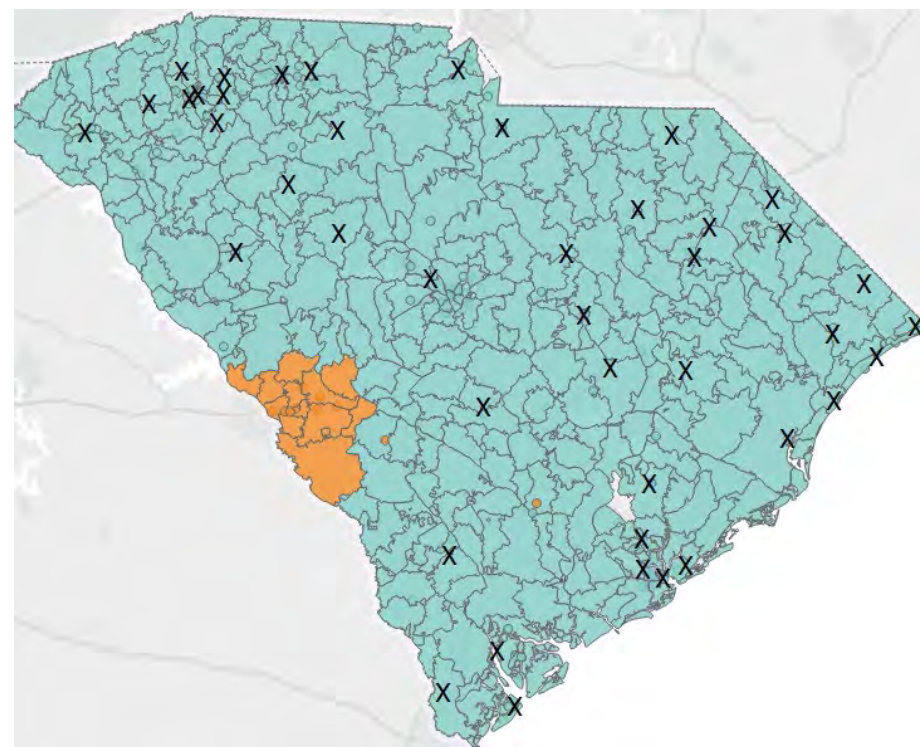


60 Miles Out

- Within 60 Miles
- Outside 60 Miles

30 Mile Out

- Within 30 Miles
- Past 30 Miles



MUSC Health Teleneuroscience Patient Experience



Tele EMS



Telestroke



Teleneurology

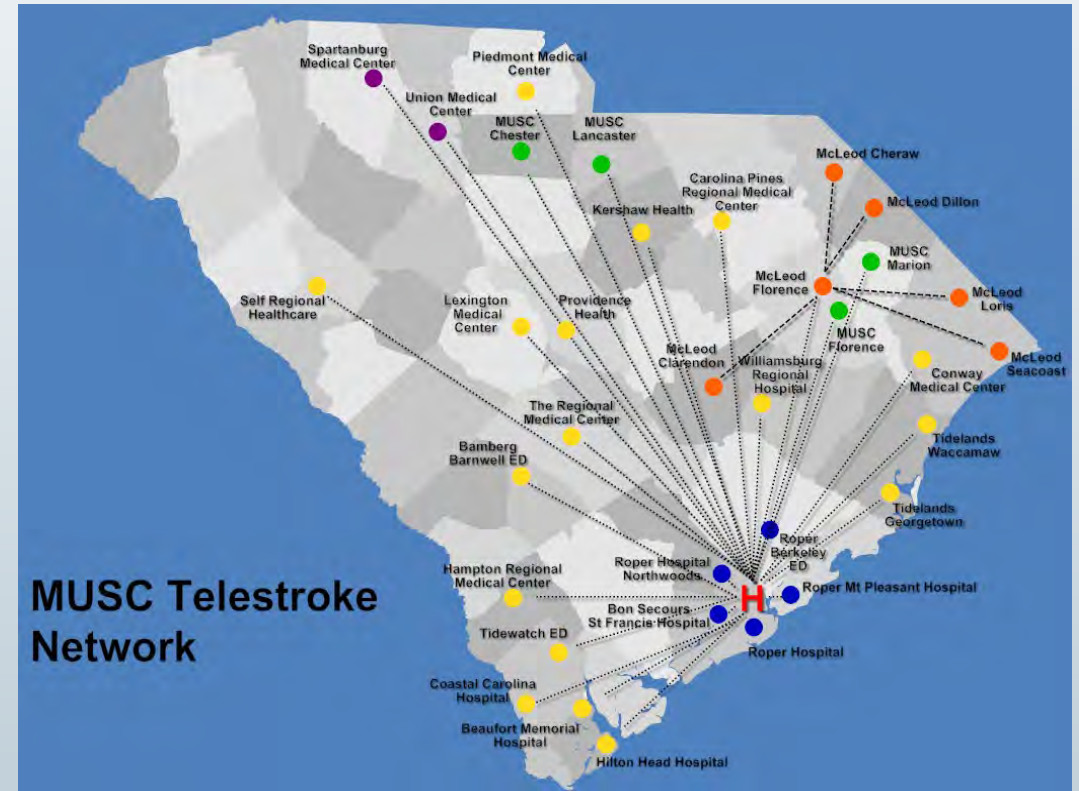


Outpatient
Tele Clinic



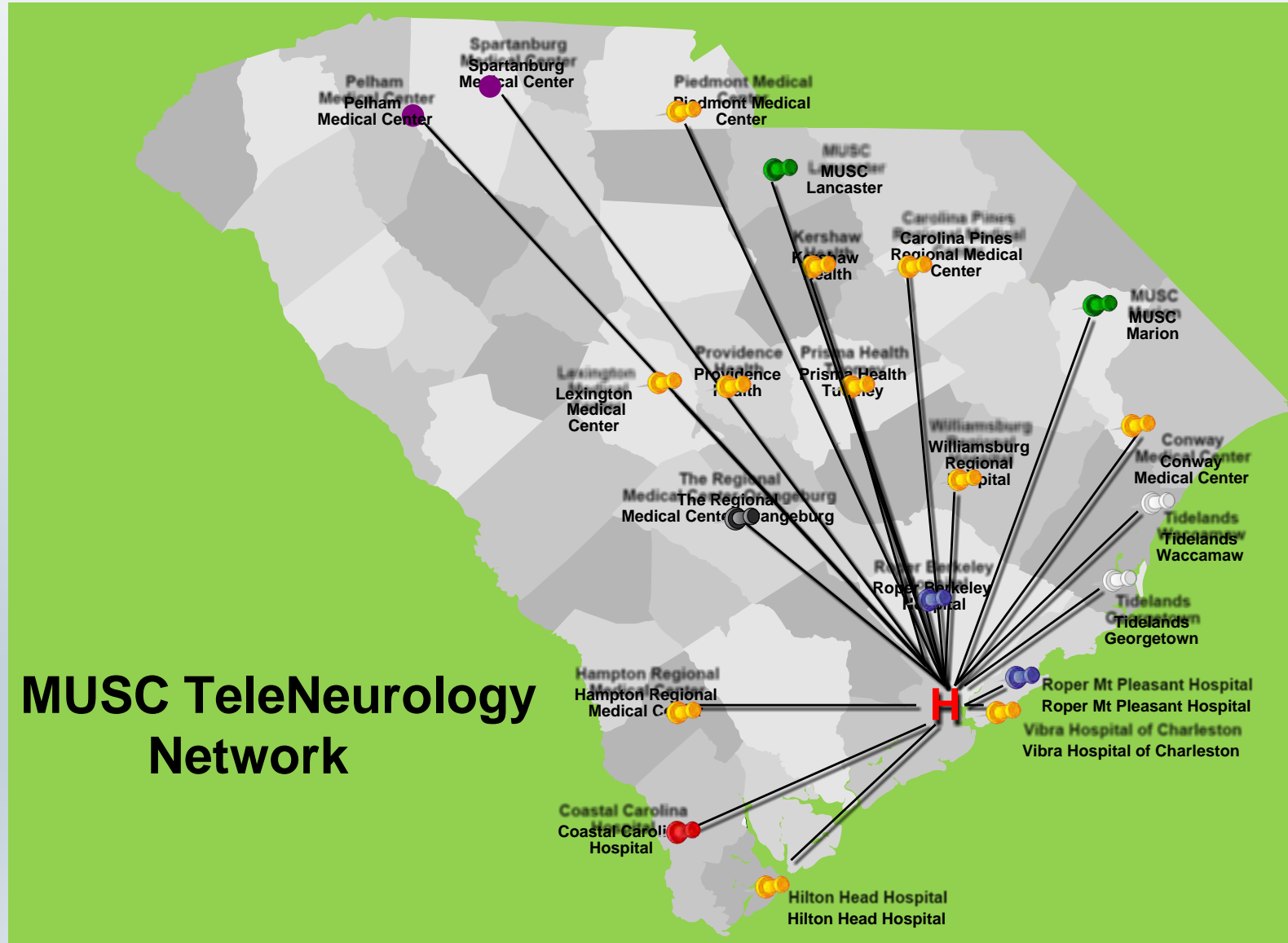
2020 MUSC Health Telestroke Program

- 37 telestroke partners
- 2 thrombectomy capable stroke center
- 17 primary stroke centers
 - Teleneurology service partnerships
 - Increased support post tPA
 - Secondary prevention recommendations
- 5 Acute Stroke Ready
- 29,145 consults



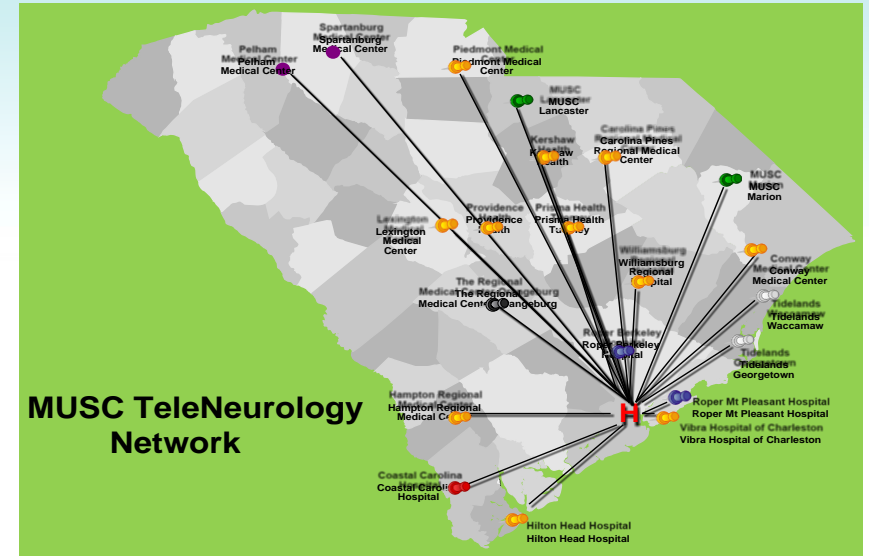
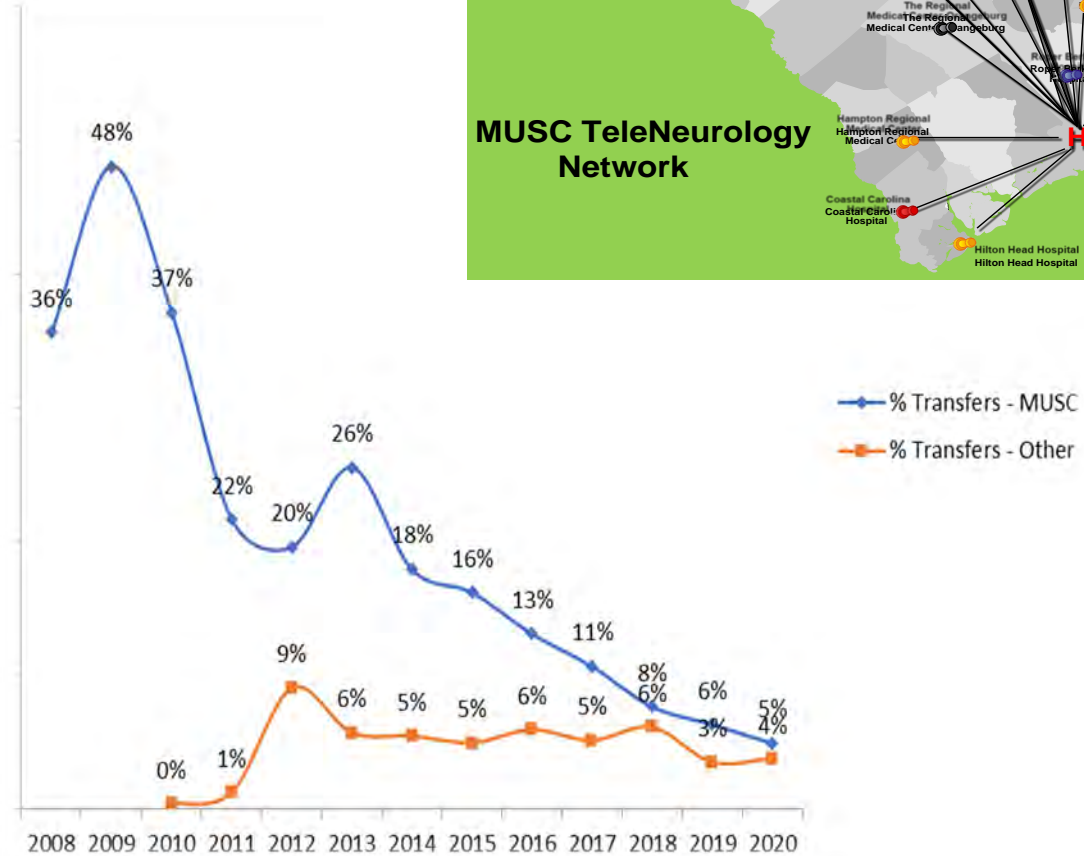
Total Consults	Ischemic Strokes	Alteplase Recommended	Alteplase Given	# Transfer - To MUSC	# Transfer - To Other	# IA Thrombectomies
29145	13210	4247	4059	3285	1384	514
# Transferred - No Thrombectomy	% Ischemic Strokes	% tPA Given	% Transfers	Male	Female	
2771	45%	31%	11%	47%	53%	

MUSC Health Teleneurology Program



MUSC Health Teleneurology Program

- Inpatient teleneurology consultations
- Acute/scheduled consults
- **Goal: Provide high quality Neurologic care to South Carolinians**
- **Reduce unnecessary transfers**
 - ✓ 2015 – 5 partner sites and 64 consults
 - ✓ 2016 – 6 partner sites 818 consults
 - ✓ 2017 – 9 partner sites and 2,057
 - ✓ 2019 – 17 partner sites and 3,031
 - ✓ 2020 – 21 partner sites and 2673
 - ✓ **Total consults 11,921**



Prehospital Stroke Care



Prehospital Stroke Care

- Cost roughly \$1,000,000
- Appear to be superior in densely populated areas
- Cost analysis ongoing
 - Decreased treatment times
 - Less disability
 - Reduced complication rate
 - Reduced interfacility hospital transfers



Prehospital Stroke Care

- Challenges for South Carolina
 - Predominantly rural
 - Lack of funding
 - Additional funding for technologist and nurse

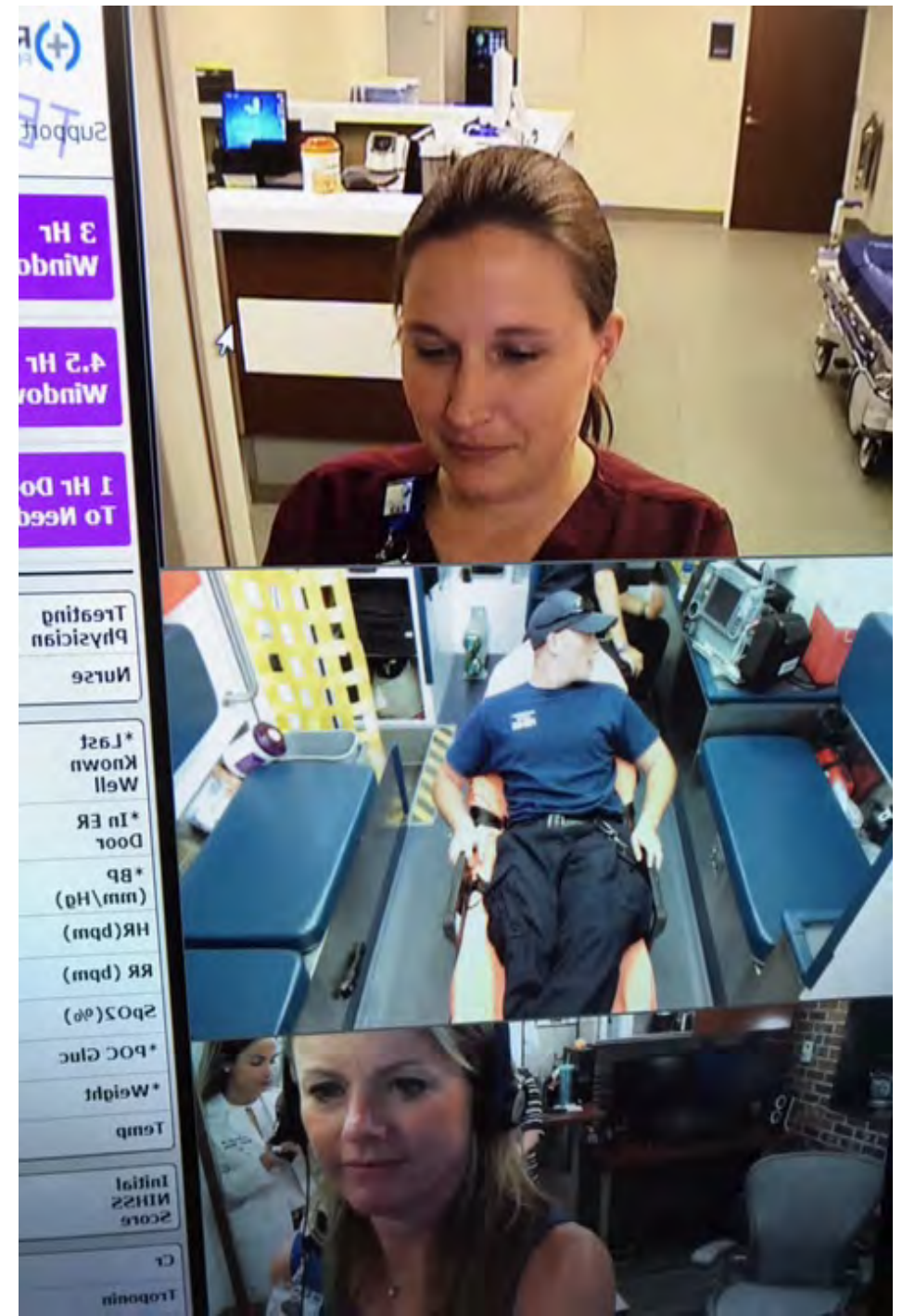
Where would we place them

- Possible solutions
 - TeleEMS



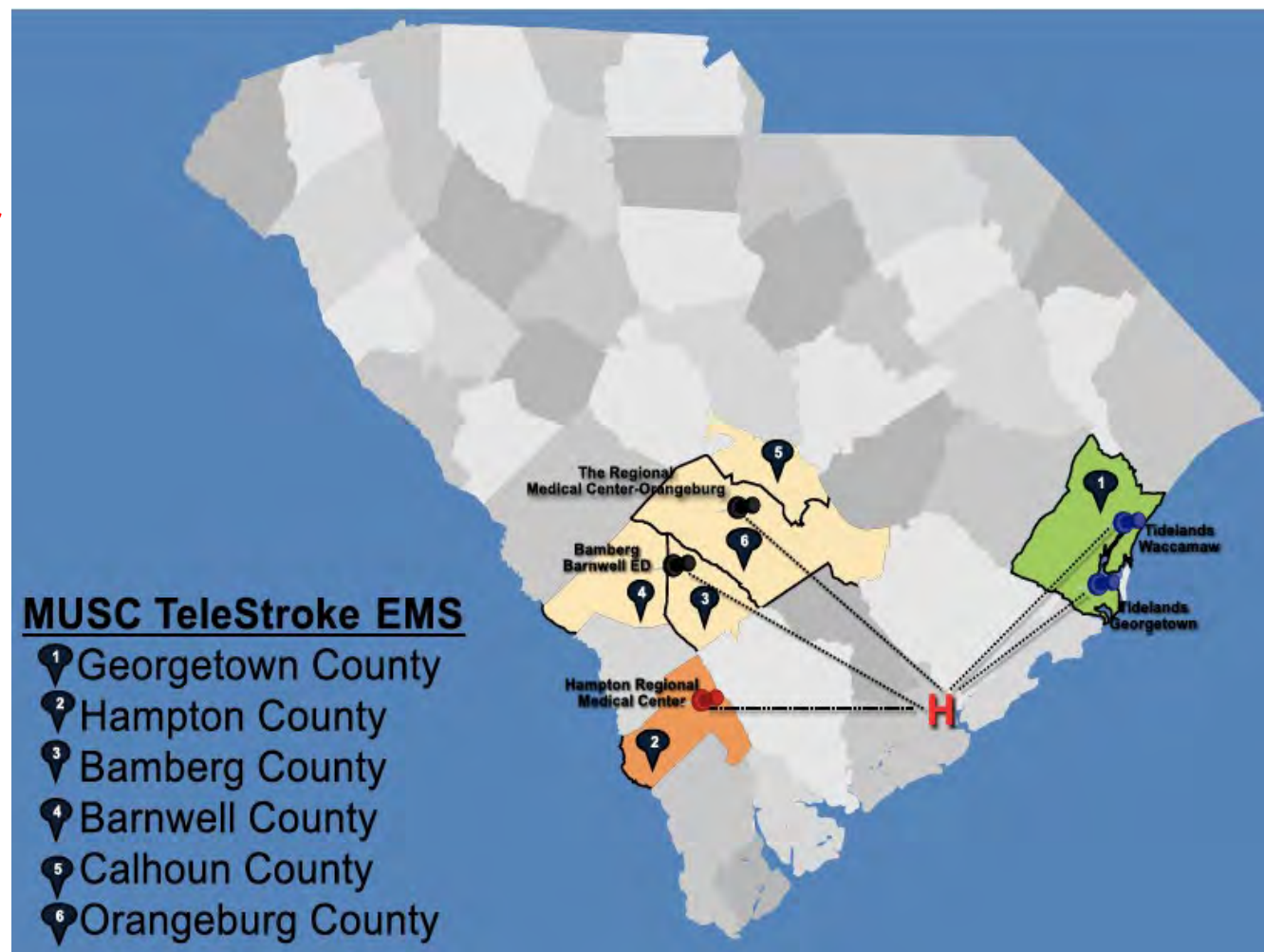
TeleEMS Workflow

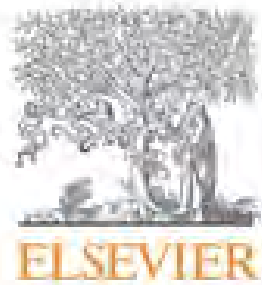
- EMT calls receiving hospital regarding potential stroke patients
- Receiving hospital calls ATC to page Telestroke consultant
- Consultant and receiving ED team log on to platform
- Three way communication
- Bypass recommendations made if needed
- Straight to CT
- tPA recommendations recommended in scanner



TeleEMS

- Equipment cost \$2250 per EMS unit
- **Goal: Provide rapid assessments of stroke symptoms to improve door to decision and door to needle times**
- Stages of development
 - ✓ Fall 2017 – 1 county, 5 EMS units, coverage M-F 8-5
 - ✓ Winter 2018 – 1 county, 5 EMS units, coverage 24/7
 - ✓ Fall 2019 - 2 counties, 10 EMS units, coverage 24/7
 - ✓ Spring 2021 – **6 counties, 36 EMS units, coverage 24/7**







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Telestroke Consultation in the Emergency Medical Services Unit: A Novel Approach to Improve Thrombolysis Times

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TeleEMS

- 49 patients were evaluated via TEMS between May 2017 and March 2020.
- Median age was 66, 24 (49%) were females
- 15 (30.6%) received intravenous alteplase (tPA) after arrival to a local hospital
- 3 (6.1%) underwent mechanical thrombectomy (MT) after bypassing the NSC
- Compared to 52 tPA patients treated through STS consultation, TEMS patients had shorter door to needle (DTN) time (**21 vs. 38 min**, $p < 0.001$).
- In addition, patients who received MT after bypassing the NSC had shorter onset to groin time compared to those transferred from NSC (**216 vs. 293 min**, $P = 0.04$).



MUSC Teleneurology Research

- Full IRB approval for Teleconsent for acute stroke studies to increase recruitment and provide treatment opportunities for patients in rural South Carolina



Tele Neuroscience ICU



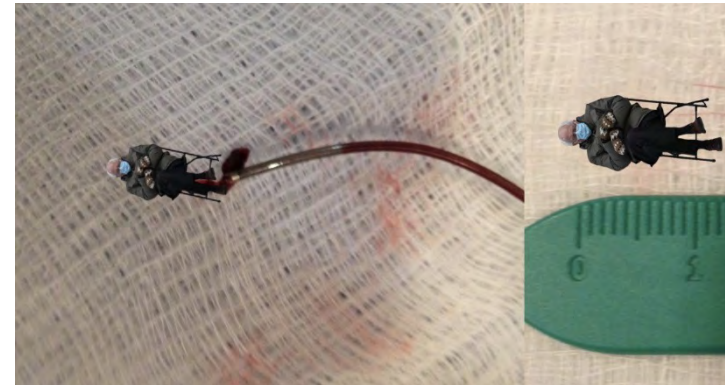
Florence Medical Center



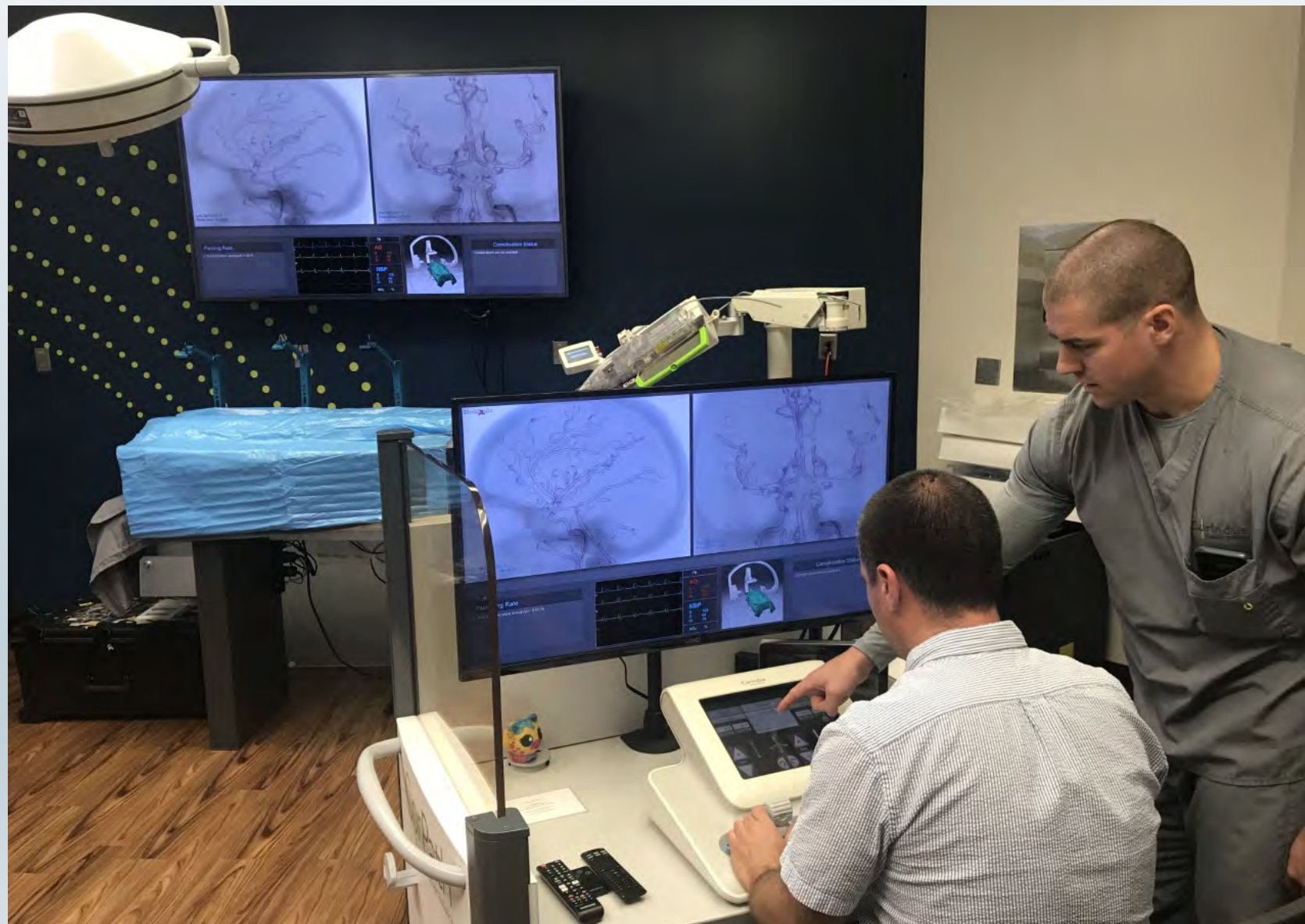
Tele Neuroscience ICU



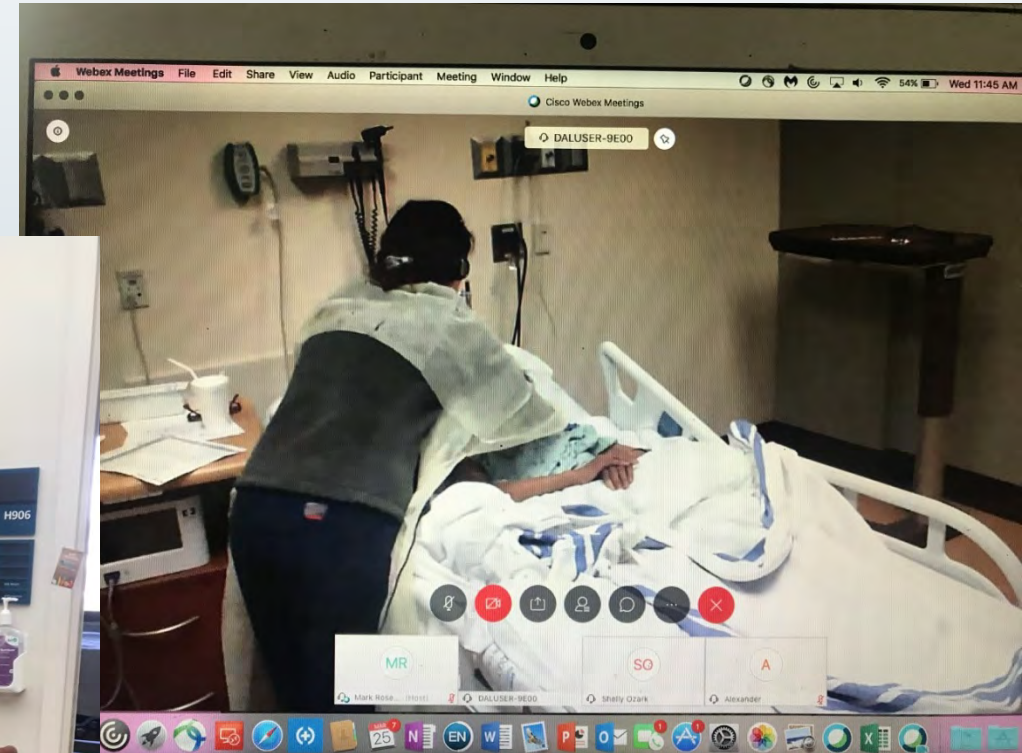
Remote Thrombectomy



MUSC Florence Remote Thrombectomy



MUSC Virtual Multidisciplinary Rounding Pandemic Style



References

1. Mozaffarian, Dariush, et al. "Heart Disease and Stroke Statistics—2016 Update." *Circulation*, vol. 133, no. 4, 2016, doi:10.1161/cir.0000000000000350
2. Dall, Timothy M. et al. "Supply and Demand Analysis of the Current and Future US Neurology Workforce." *Neurology* 81.5 (2013): 470–478. PMC. Web. 21 Jan. 2018. *South Carolina Physician Workforce Profile*. Association of American Medical Colleges, 2015, www.aamc.org/download/447228/data/southcarolinaprofile.pdf
3. Al Kasab, S., Almallouhi, E., Grant, C., Hewitt, D., Hewitt, J., Baki, M., Sabatino, P., Jones, D., & **Holmstedt, C. A.** (2021). Telestroke Consultation in the Emergency Medical Services Unit: A Novel Approach to Improve Thrombolysis Times. *Journal of stroke and cerebrovascular diseases: the official journal of National Stroke Association*, 30(5), 105710. Advance online publication. <https://doi.org/10.1016/j.jstrokecerebrovasdis.2021.105710>





