

# In-ambulance consults cut down on critical treatment time for stroke patients

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Eighteen minutes might be all it takes to ensure a full recovery for stroke patients in rural South Carolina.

By changing EMS workflows and incorporating telemedicine techniques, physicians at MUSC Health have partnered with Georgetown Memorial Hospital and Hampton Regional Medical Center to significantly shorten the time between a patient's stroke symptom onset and their treatment, as recently reported in the *Journal of Stroke and Cerebrovascular Diseases*.

Through MUSC Health's Telestroke Network, emergency medical technicians (EMTs) can video chat with stroke specialists to begin a patient's consult before they even arrive at the hospital.

"We realized that if we could start seeing these [stroke patients](#) before they came into the emergency room, we could reduce the time it took for us to treat them," said Christine Holmstedt, D.O., the medical director of MUSC Health's Comprehensive Stroke Center.

A stroke occurs when blood flow to the brain is

interrupted. In an ischemic stroke, blood flow is clogged by a block in an artery leading to the brain. In a hemorrhagic stroke, there is bleeding into the brain tissue from a burst blood vessel, and in both cases, time is of the utmost importance.

Stroke treatments are extremely time sensitive and need to be started as soon as possible after patients begin experiencing stroke symptoms in order to improve clinical outcomes and reduce their chances of disability or death.

Acute stroke treatments include the intravenous clot-busting agent alteplase (tPA) and/or a mechanical thrombectomy where a device is threaded through the blood vessel to break up the clot. With this quick response, physicians ensure the greatest chance at a recovery, and every minute reduction in treatment improves their patient's chances more. The average human brain contains 22 billion neurons, according to an article in *Stroke*, and during an acute [ischemic stroke](#), 1.9 million are lost every minute.

The new telestroke workflow in the study involved three-way communication between the stroke specialist, the EMT, the patient and the receiving hospital nurse and emergency medicine physician. EMTs could even start the consult while still at the patient's home and ask family members for a more accurate history of the patient. Performing the consult and examination on the way to the hospital allowed [emergency room](#) doctors and nurses to be more prepared for their incoming stroke patient. Holmstedt pointed out a few patients who were rerouted to a comprehensive stroke center while on the way to the closest hospital because the stroke was too severe for the local hospitals. A few patients were even flown to MUSC from their homes if the examination revealed they needed more specialized treatment and care.

Before the telestroke program, stroke patients would be brought directly to the closest hospital,

where they would begin their examination soon after their arrival. Their treatment would continue there, or they could be transferred to another hospital. With the new workflow, that examination happens en route, cutting down on critical treatment time.

"A 15-minute reduction in door-to-treatment time leads to patients with reduced complications from tPA and significant reduction in disability or death," said Holmstedt. "They are more likely to be discharged to an acute rehab rather than long-term care, and they have much better functional outcomes." These new protocols influenced that 15-minute reduction even further by bringing average treatment times down from 38 minutes to 20.

This program is especially important in rural areas where patients are spread out geographically. Other programs in the U.S. have been incorporating mobile stroke units, which are armed with vital stroke equipment like CT scanners, but these stroke units can cost upwards of \$2,000,000 and are not feasible for South Carolina. By comparison, the telestroke console costs about \$2,000 per ambulance and helps rural areas see stroke experts before they even get to the [hospital](#), according to Holmstedt.

In its 2015 infancy, the telestroke program began with a partnership between Holmstedt and Georgetown EMS Director Dale Hewitt and Georgetown Hospital Stroke Coordinator Jessica Hewitt. They started with 5 ambulances in 1 county to test the concept and feasibility of the program and have since grown to 26 additional trucks in 5 different counties throughout the state.

Holmstedt is currently working with the MUSC College of Health Professions and Clemson University to assess the economic impact of the telestroke program and the potential for further expansion.

"These improved outcomes reduce disability and even death for patients seen with acute [stroke](#)," said Holmstedt. "And they don't negatively impact the EMT workflow, so we can bring more efficient treatment options to the state's rural population. And that's significant."

**More information:** Sami Al Kasab et al, Telestroke Consultation in the Emergency Medical Services Unit: A Novel Approach to Improve Thrombolysis Times, *Journal of Stroke and Cerebrovascular Diseases* (2021). [DOI: 10.1016/j.jstrokecerebrovasdis.2021.105710](https://doi.org/10.1016/j.jstrokecerebrovasdis.2021.105710)

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