

## ‘Helistroke’ Presents New Opportunity for Saving Critical Time in Stroke Care

By Michael Stone | June 29, 2017



*Photo courtesy Johns Hopkins Medicine*

**A helicopter arrives to pick up and transport Dr. Ferdinand Hui from Johns Hopkins Medical Center in Baltimore to Suburban Hospital outside Washington D.C. so Hui can assist in the treatment of a stroke patient at Suburban.**

The idea of sending physicians away from their home hospitals came from organ transplants.

Typically, once an organ becomes available, one surgeon will begin prepping the recipient while another will go by plane to harvest the organ from the donor. That makes for a “nearly seamless connection in the timings,” said Dr. Ferdinand Hui of Johns Hopkins Hospital.

And when it comes to one of Hui’s specialties, emergency stroke care, timing is of the utmost importance. So with the well-oiled response of organ transplant in mind, Hui came up with a new method for shaving off precious seconds in stroke care.

He calls the method “helistroke,” which means taking the physician to the stroke patient by helicopter.

This transportation is meant to connect Hui, while at the Baltimore main campus, with Suburban Hospi-

tal, a satellite facility about an hour away. Suburban needs Hui to care for its stroke patients because it doesn't yet have fully prepared specialists who can treat from start to finish.

In a helicopter, Hui gets from A to B in slightly less than 20, shaving off about two-thirds of the time he'd need in a vehicle.

An alternative, bringing the Suburban patient to Johns Hopkins by helicopter, isn't as rapid because she or he needs to be moved to a helicopter, set up in it for monitoring, flown (after already being transported by vehicle to Suburban), and then set up again at the new facility.

"If you fly all of the patients into the one center that can do it, you're probably going to have a lot of patients not treatable by the time they get there," Hui said. "Whereas if you have a robust helicopter coverage system — and a bunch of crazy doctors that are willing to fly — they'll probably get a better outcome for these patients."

Along with time, money is saved in the doctor-to-patient scenario.

When the patient is flown to the doctor, Hui said, transportation costs 50-plus percent more because of the monitoring equipment and nurse needed in the helicopter.

"As it turns out, it's not that expensive," he said of himself being flown between facilities. "It's just transporting a doctor."

Hui gave the helistroke process a try in January, when a patient having a severe stroke was identified at Suburban. The findings from the resulting single-patient study were published in May in the *Journal of Neurointerventional Surgery*.

The study documents the treatment timeline:

**11:12 a.m.:** Suburban identifies patient as having a severe stroke.

**11:46-11:58 a.m.:** CT scans performed of patient's blood vessels and brain. (The two major forms of stroke are: ischemic, which is caused by a clot blocking a blood vessel to the brain and is by far the most common, and hemorrhagic, which is caused by a vessel rupturing and bleeding into the brain. Because each requires different care, scans help determine the stroke type and thus the treatment route.)

**12:07 p.m.:** Hui notified at Johns Hopkins Hospital of the patient, who's having an ischemic stroke.

**12:13 p.m.:** Johns Hopkins Lifeline, the helicopter service, notified and then receives weather clearance for takeoff.

**1:07 p.m.:** Hui inserts catheter into blood vessel in patient's groin shortly after arriving at Suburban via helicopter. (This treatment technique, for ischemic-stroke patients, involves sending the catheter toward the blood clot by threading it through blood vessels and administering clot-dispersing drugs, called thrombolytics, into the catheter.)

**1:41 p.m.:** The catheter treatment is completed.

In most cases, for thrombolytics to be effective, they should be given within 180 minutes of a stroke, but

best results have been found to come within 90 to 100 minutes. From Suburban identifying the stroke to Hui finishing the catheter, treatment took 115 minutes.

Within those 115 minutes, the time between decision to treat and groin puncture was 43 minutes, and the time between the decision and groin closure was 77 minutes.

These times are comparable with those at systems in which patients aren't transferred from one facility to another, Johns Hopkins says.

In other words, Hui being flown to Suburban didn't add to the treatment time. This is because one provider was completing the preparatory procedures with the stroke patient while Hui made his way over — just like with the preparing and the retrieving physicians in organ transplant.

"By the time ... the stroke interventionist gets to the patient, you'll already have done a lot of the logistical work that gets them [prepared]," he said. "So in fact, what we found is that the timings are actually very similar to no transfer at all."

Though the Federal Aviation Administration couldn't find a reason to not allow Hui's transport in general, he would have to remain grounded during bad weather. He described this as the biggest limitation in the method.

Another hurdle is the inability to use an ambulance as a backup: Maryland's ambulance regulators said Hui, as a non-patient, couldn't use the vehicle for simply transportation.

But Hui said him flying to Suburban is meant as a short-term solution at the hospital, which plans to eventually offer 24-hour stroke care on its own once current staffing is trained in all aspects of treatment.

John Hopkins' efforts have generated at least a little buzz: Another U.S. center has shown interest in helistroke, and a major one in China is also evaluating, Hui said.

But whether flying physicians or any other time-saving technique in stroke response can be implemented at any hospital is highly dependent on a multitude of factors, said Dr. Robert Brown, a neurologist and the chair of the Division of Stroke and Cerebrovascular Disease at the Mayo Clinic.

Those factors include: the geographic location of the major center and any satellite facilities, whether the patient is in a rural or urban area, hospital staffing, transportation options, and other available resources.

In the end, though stroke-response technology is quite advanced, there's no one-size-fits-all solution when it comes to transportation, decision-making, and administering care, Brown said.

Two other time-lessening methods being implemented at other hospitals are "telestroke" — which uses an audio-video feed (in general known as telemedicine) to connect a stroke specialist with the on-site provider and the patient — and care directly from the responding ambulance.

Such ambulances are equipped with small CT scanners for patient evaluation and are prepared to give thrombolytics through the arm (rather than via the groin, which is more targeted but requires a specialist), Brown said.

"It's an exciting time, to be sure, because we have so many new treatments available," he said, "and we just want to be sure that patients have access to them."

Turning attention to logistical maneuvers is positive in a way, Hui said, because it symbolizes that the treatment itself is already in place for what he calls an "under-recognized disease."

"Everyone knows [stroke is] bad, but I think still too few people recognize that it can be treated effectively," he said. "And ... every chance I get, [I] tell people that effective treatment exists, and the biggest barrier is actually logistics."