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## Horizon Scan Monthly

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With telestroke networks heralding future of stroke care, many hospitals face the dilemma—join up, or go it alone?

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Amid evidence that telemedicine can help improve notoriously low intervention rates for ischemic stroke patients, hospitals with around-the-clock neurology coverage and well-established stroke teams are under increasing pressure to step up their stroke programs to the point where they can spearhead regional telestroke networks.

Domestically, average intervention rates for ischemic stroke continue to hover between one and three percent, largely because stroke patients fail to present within the three-hour treatment window for intravenous (IV) tPA. Some telestroke networks, by comparison, have achieved intervention rates of up to 30 percent, raising the question of why more facilities are not pursuing the model.

A major driver of that improvement is the availability of newer treatments that expand the treatment window. These intra-arterial (IA) therapies, including the Merci Retriever System, the Penumbra device, and IA tPA, can be performed up to eight hours after symptom onset.

Telestroke networks also accelerate transfer decisions by facilitating communication between the “hub” hospital—a fully equipped center capable of performing IA treatment—and outlying “spoke” facilities that are linked to it through telemedicine.

However, this model requires hubs to maintain—at minimum—a 24/7 neurointerventional team and a biplane angiography suite, costly necessities for even the most progressive mid-sized facilities. Hospitals without these elements in place are therefore facing a dilemma. They can either equip themselves as comprehensive centers—and serve as the hub of their own telestroke network—or join an existing or emerging network in their region and focus primarily on IV tPA delivery.

There is little room in this two-tiered model for facilities that straddle the divide between hub and spoke, perhaps offering the requisite technology and neurology expertise but with subpar neurointerventional coverage. In an era when telemedicine can help fill gaps in stroke programs, hospitals are finding themselves with less and less of an excuse for middle-of-the-road stroke care.

### **A mutually beneficial relationship**

While patients may be the most significant beneficiaries of telestroke networks—given their increased chances of receiving an intervention—hospitals participating as either hub or spoke also derive considerable benefits from these partnerships.

Outlying hospitals, for example, receive continuous remote neurology coverage that

enables them to more expertly and comfortably administer IV tPA; the ability to seamlessly communicate with the hub also helps ensure that the right patients are transferred for IA therapy.

From a volumes standpoint, this dynamic is highly desirable; spoke facilities can effectively offload certain high-acuity cases while maximizing retention of patients who can be treated locally.

The hub also gleans benefits from the model, not least of which is profitable volumes of interventional stroke cases transferred from outlying facilities. Hubs also capture the clinical prestige of mounting a well-publicized stroke network—a halo effect that can drive growth in its broader neurosciences program.

### **Varied menu of options...**

Given these benefits, facilities capable of mounting a comprehensive stroke center should be looking to take the next step and create a telestroke network, drawing on a range of technologies that can help them achieve that goal. While hospitals can still opt to cultivate a home-grown solution, a range of telestroke products are now commercially available through third-party vendors, including some modeled on early networks.

The spectrum of solutions varies in cost, complexity of deployment, and ease of use. In its most basic incarnation, a telemedicine system can rely solely on a phone consultation, affording ED physicians at outlying hospitals access to an on-call neurologist at the hub who can help make a care decision.

One progressive network, spearheaded by Saint Luke's Hospital in Kansas City, Mo., operates on a phone-consultation model serving more than 50 referring EDs. The network's outcomes are impressive, including intervention rates that rose from 16.1 percent in 2000 to 29.1 percent in 2004. The hospital also posted a compound annual growth rate of approximately 29% for transferred stroke interventions across the same period.

While there is little evidence that phone consultations are clinically inferior to more advanced telestroke systems, some physicians may be uncomfortable providing consultations by phone, given the inability to view CT scans or perform visual exams. The decision to go with a more sophisticated telemedicine system—often at a considerable cost premium—is therefore driven by physician preference.

However, when the University of Pittsburgh Medical Center (UPMC) began developing a telestroke network several years ago, there was no commercially available solution it could purchase. As a major system with the IT resources to develop its own network, the facility simply purchased two-way audiovisual (AV) conferencing equipment off the shelf and began implementing it at UPMC facilities.

“We emphasized simplicity on the spoke end,” says Dr. Lawrence Wechsler, the director of UPMC's Stroke Institute. That meant using strategies like color-coding the Ethernet cord on the telemedicine carts, which cost roughly \$20,000 a piece, with the plug in community EDs' treatment bays.

“It may sound silly, but if we can't make a connection, we're going blind,” Wechsler says, adding that neurologists would not be able to access the CT scan or see the patient to perform a visual exam. “We discovered from experience that simple [mistakes] can bring

down the whole system.”

The UPMC stroke network has since grown to include 13 spoke facilities, including the first from outside the UPMC network, a milestone that nonetheless added complexity by requiring the system to go outside its institutional firewall.

While the UPMC network has proven successful in extending access to IV tPA—administering the treatment in 60 of 250 remote consultations—these homegrown telestroke platforms are likely to be confined to major systems, given that at least one FTE in the IT department is necessary to drive the development and expansion of the network. It is also difficult to provide around-the-clock IT support in the event of a system failure.

### **...but no need to reinvent wheel**

Since UPMC launched its system, vendors have commercialized several telestroke solutions, including the REACH Call model based on the successful stroke network at the Medical College of Georgia. REACH Call is a 100% Web-based system that enables two-way AV communication and image transfer between the hub and spoke.

Providers in the outlying ED simply register the patient in REACH’s Web interface—inputting data such as age, weight, and time since symptom onset—and page the neurologist at the hub facility.

“It’s just like accessing your Gmail or Yahoo account,” says Ani Agate of REACH Call. “You just go the website and have a consultation,” made possible by a wireless telemedicine cart that can be wheeled on an IV pole to the patient’s bedside. Remote neurologists, meanwhile, can be located anywhere with access to a high-speed, DSL connection, including their homes.

Logistically speaking, REACH Call is an attractive option, and given that the company is working with roughly 50 facilities, the system has been pressure-tested enough to be a turn-key solution.

However, the moderate upfront costs of adoption—coupled with monthly service fees for each spoke—can become prohibitive as the network expands to include more cash-strapped rural facilities.

Using a similar platform and cost structure—although without a monthly service fee for the hub—Imogen Systems provides yet another option to facilities launching a telestroke network.

Imogen’s major differentiator is a stroke informatics package that allows it to function as a “total stroke management system,” according to company executives. This feature, paired with a Web-based telestroke system, allows networks to gather comprehensive patient and pre-hospital data, helping fuel research initiatives and internal efforts to track compliance with Joint Commission standards and the American Heart Association’s Get With The Guidelines metrics.

The system’s Web interface also includes customizable, hardwired tPA order sets, algorithms for contraindications for therapy, and a coding module that improves revenue capture, says Pierre Finn, the company’s vice president of operations and business development.

However, these potentially powerful capabilities may pose adoption hurdles, especially for neurologists who want a more straightforward telestroke system. Additionally, Imogen has yet to go live at any facilities, limiting the potential to glean lessons from early adopters of the system. That may soon change, though, because Imogen is currently in negotiations with several hospitals.

Another commercial solution offers something of a different value proposition: maximum functionality and visibility—but at substantially higher costs. It's the InTouch RP-7 Robot, which goes beyond a standard telestroke link and enables remote neurologists to control the robot while they interact with patients, perform examinations, and view CT scans.

Despite their obvious marketing cachet, InTouch robots come at a considerable premium: \$5,000 per month per robot if facilities opt to lease them from the company. Given that these costs can easily mount as the stroke network expands, these robots are likely to be limited to well-funded centers able to make a major investment in telestroke—and confident that the system will yield substantial referrals for profitable neurointerventional procedures.

### **More than plugging cart into wall**

The challenge of developing a stroke network, of course, does not end with the selection of a telemedicine platform. Hubs must pursue long-term, organic outreach to spoke facilities, framing the benefits of participating in a telestroke network in both clinical and financial terms.

Some facilities have succeeded by targeting past partners—perhaps in cardiovascular referrals or clinical trial participation—as the initial cadre of spokes in their network. Others have found it useful to put their clinical capabilities on display through in-person site visits highlighting their acute stroke team and advanced technologies.

Once partners are recruited and the telemedicine cart (or robot) deployed, hubs also provide ongoing education for spoke-based ED providers, who may lack familiarity with best practices in stroke diagnosis and management.

This outreach helps ensure that the telemedicine system is used appropriately, encouraging ongoing utilization while helping minimize unnecessary consultations and transfers.

Beyond educational outreach, hubs must also decide how to allocate telemedicine costs across participating hospitals. While some hubs donate or subsidize the costs of spokes' technology and subsequently charge them on a per-consultation basis, there is no single template for structuring these processes, and decisions are likely to be highly contingent on local circumstances.

Given the lack of telemedicine reimbursements in many areas, neurologists may also demand on-call pay for the additional burden of taking call from remote EDs.

Networks have addressed these requests by providing per-consultation or per-night call pay, but once again, hubs face cost allocation challenges—particularly if their network includes facilities outside of their health system.

While it is important not to underestimate the magnitude of these challenges, facilities on

the bleeding edge of stroke network development are positioning themselves for the future of stroke care. These regionalized networks, made possible through relatively simple telestroke links, will continue to broaden access to tPA and enable more patients to be quickly transferred to centers capable of performing IA therapy.

As evidence of telestroke networks' clinical success continues to mount, mid-sized facilities will only face further pressure to make a decision on whether to join an existing network or field one of their own. And while some of the most successful telestroke networks are currently relying on phone consultations, the hub-and-spoke models of the future are likely to favor true telemedicine links with two-way AV capabilities, especially if payers eventually condition reimbursement on having an actual telemedicine consultation—not just a phone conversation.

Some evidence is also emerging to reinforce anecdotal evidence that two-way AV consultations are superior to phone calls between ED physicians and neurologists. As the *Horizon Scan Monthly* was going to press, *Lancet Neurology* published a randomized study finding that two-way AV consultations for acute stroke patients in rural California yielded superior treatment decisions compared with telephone consultations.

If additional studies prove that these superior treatment decisions—namely more use of tPA—translate into better patient outcomes, facilities could be further pressured not just to form telestroke networks, but to do so with a more advanced communications infrastructure than a simple phone call.