

**Telemedicine/Telehealth: Case History**

## Robotic Assistance Remedy

**The Michigan Stroke Network utilizes remote presence robots to bring needed specialists to stroke patients at remote hospitals.**

*By E. Victor Brown, Senior Editor*



One promise of telemedicine/telehealth technology is greater access to healthcare professionals, regardless of the remoteness of patient location. Although the physical presence of physicians at the bedside cannot and should not be supplanted, an aging population, rise in chronic illness and the need for the limited number of specialists to be everywhere at once are key drivers in the development of one form of telemedicine/telehealth — robotic assistance. Solutions and cooperative efforts that serve the best interests of patients are being explored and vetted around the nation and the world. One such success story regarding the use of robots began 10 years ago in Pontiac, Mich.-based St. Joseph Mercy Oakland hospital (SJMO).

SJMO is a 443-bed comprehensive community hospital and is a member of Novi, Mich.-based Trinity Health — the 4th largest Catholic healthcare system in the United States. Ranked in the top 5 percent of hospitals throughout the nation for clinical excellence, and among the top 100 cardiovascular programs in the U.S., SJMO was Michigan's first certified primary stroke center and is, today, one of 21 in the state with this designation.

By 1997, SJMO was treating a large number of stroke patients. Major advancements in stroke care began to improve patient outcomes, with clot-busting agents becoming part of stroke therapy. However, time to intervention still ruled patient outcomes.

The hospital leadership had concerns, not only about those patients with significant distance from the hospital working against them, but also the fact that many of the other hospitals in the state could not afford or attract the specialists who could perform any of the specialized interventions. "If you are trying to get patients to this technology within a very short time frame, it requires some different kind of program deployment than what we had in any other system or procedure at the time," says SJMO CEO Jack Weiner.

## Robot Discovery

Over the next several years, SJMO began looking at technological advancements in the intensive care unit (ICU) when leadership came across a story of a Los Angeles hospital that was using a very basic robotic technology to make rounds

in its ICU. In 2006, this led SJMO to contact the California-based InTouch Technologies Inc., which engaged hospital leaders in a demonstration of the vendor's latest remote presence robot, known as the RP-7, at a clinical systems meeting.

The RP-7 is a wireless, mobile, remote presence robot that can be placed under the direct control of a remote physician seated at the vendor's proprietary ControlStation, or software-equipped laptop, for those physicians who are not in a fixed remote location.

The ControlStation or laptop allows the remote physician to control the RP-7, which can move untethered, allowing the physician to freely interact with patients, family members and hospital staff from anywhere, anytime. The laptop is outfitted with an EV-DO wireless card, enabled by 3G wireless technologies from Calif.-based Qualcomm Inc. When necessary, physicians may use the card to gain connectivity virtually anywhere, through the region's broadband networks. Ultimately, the solution bolsters patient care by allowing doctors to interface with nurses and patients when sick or traveling.

The ControlStation and RP-7 robot are linked via a secure combination of broadband, Internet and wireless technologies. Together with the software and the vendor's RP Connectivity Service, the user has a unified system that doesn't require the involvement of IT personnel on either end.



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**Robert Jones**  
IS Director

## Michigan Stroke Network

Although intrigued by the technology, SJMO leadership voiced numerous concerns about deployment, acceptance and a unified strategy for stroke care. As leadership began brainstorming on different program approaches, they also looked at the broader challenge of stroke intervention across the state. "Many of these smaller hospitals had some very significant shortcomings in their ability to provide stroke therapy," says Weiner. "Lack of an onsite specialist to make treatment decisions meant that transport by air ambulance would come well outside the optimum treatment window, making for a very expensive patient."

SJMO felt that robotic technology provided a basis for a physician on one end of an Internet connection to evaluate a patient and also communicate effectively with somebody on the other end of that

communication. The Michigan Stroke Network (MSN) concept emerged from this line of thought. The hospital had now identified a technology and devised a program that would take its stroke expertise into rural hospitals by leveraging the newfound technology.

The emerging concept rested on deployment of robots into smaller hospitals — or essentially any hospital that lacked an onsite specialist in stroke therapy. The first human link in the concept revolved around an on-call team at SJMO that would provide almost instantaneous access to a stroke specialist.

## Robot Vetting

Assessing the technology's visual/audible acuity to ensure that the appropriate information could be conveyed was the first order of business. "Portability and mobility were paramount in order to facilitate a relationship with the patient and family that wasn't scary or overwhelming," says Weiner.

With effective two-way communication, time of deployment became the next question. "We couldn't have a technology that required a technician's intervention or took 30 to 45 minutes to activate," says Weiner. "With the RP-7, a physician with a laptop, software and an access code can start the unit and control it remotely."

After preliminary testing in the ICU, clinics and ED, a multidisciplinary team of endovascular surgeons, neurologists and interventional cardiologists; intensivists, clinical nurse specialists and nurse educators; as well as, administrators and finance personnel from SJMO developed the program concept and rollout plan.

A central tenet of MSN is that there would be no cost to participating hospitals in the network, as the technology is provided as part of SJMO's community benefit ministry program. "We ask all participating

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hospitals to do two things," says Weiner. "Agree to become a Joint Commission-certified stroke center, and make an investment in enhancing the awareness of stroke symptom identification so community members can do a better job of getting to a hospital early."

## Rollout

Rob Fisher, associate VP, Rural Network Development at SJMO, and Connie F. Parliament, RN, clinical director, Neuroscience Services at SJMO, conduct the initial outreach to area hospitals. According to Parliament, she and Fisher first present the technology to the remote hospital's administration with Parliament conveying the clinical side while Fisher handles the business aspects. If all are in agreement, SJMO offers a contract for inclusion in MSN.

Once signed, Parliament conducts onsite clinical education for the medical and nursing staff. After conducting a clinical tutorial in the ED on whether patients are appropriate for inclusion in MSN, Parliament takes the robot to the ICU and repeats the process. "I have the robot with me and the laptop set up on a cart, which allows me to demonstrate the laptop control and the robot," says Parliament. "At



that point, I encourage staff to drive the robot around the unit and work with both sides of the system, so they can see how the two-way communication occurs."

The SJMO campus was already equipped with an 802.11g wireless network, so the first order of business was making sure that the remote hospitals in the network had a compatible and robust wireless infrastructure and Internet capabilities. According to SJMO IS Director Robert Jones, each robot must be provided with an IP address to allow them to connect via the Internet to SJMO. In order to pass through the firewall at SJMO, certain ports

must be opened to allow connectivity to other sites.

Wireless access points and the mix of wireless devices also are significant considerations. "You may encounter some bandwidth limitations if you're simultaneously running wireless devices utilizing 802.11g while others utilize 802.11b, but that is true of any wireless devices that you may put on the network," says Jones.

Joseph Bander, M.D., director of adult critical care for SJMO, had worked with earlier versions of the RP-7 in addition to other robotic technology. According to Bander, earlier versions of the robot were more difficult to steer and visualization was not quite as sharp. Today's RP-7 has a different lens that provides a broader view for easier maneuvering. With simple and fluid operation, high visual acuity and a number of potential accessories available – such as use of a stethoscope via the robot – Bander pointed out one use beyond stroke care. "I have assisted in cardiac arrest and resuscitative efforts in the middle of the night, which is superior to assistance by telephone," says Bander.



## Results

With more than 34 robots in the field around the state, but with only a single year of the robots in use, there has not been sufficient time to conduct longitudinal studies that accurately reflect less morbidity or mortality. However, the network has a plethora of anecdotal data of patients who come in, get identified, transferred and treated and then walk home instead of being wheeled home.

Early data presented by MSN to the 2008 International Stroke Conference shows that 16 of 23 eligible patients (70 percent) received the intravenous clot-busting drug rt-PA; 36 percent of consults resulted in transfer; and, a total of 190 robot hours were logged for training, education and consultation.

MSN developed an extensive support system for patients and families who are thrust into unfamiliar settings after transport to SJMO. The support includes special packages for stroke transfer patients, which are placed in the EDs of participating hospitals. Each package contains an ID badge, directions, parking and other info for the patient and the family. Additionally, the program so impressed one SJMO donor, he arranged for hotel services for families of stroke victims. "We tried to make the total experience a supportive one and as anxiety-free as possible," says Weiner.

Keeping control of patient care with the primary physicians was an initial concern of hospital staff throughout the network. MSN assured them that primary physicians and hospitals would still be in charge to ensure that patients, once stabilized, go back to their local hospitals for follow-up treatment. With the

success of MSN, discussions regarding deployment to Trinity Health institutions in other states have begun.

Although the robots have been highly effective, MSN cautions against implementing technology for technology's sake. "This technology provides significant opportunities for major advancements in access to healthcare for rural, underserved and international communities where needs outpace distribution," says Weiner. "If you can generate even base incomes to support deployment and share resources, it opens some very interesting possibilities."

### **The MSN Process**

Upon arrival by ambulance at the network hospital, clinical staff performs a CT scan of the stroke patient's brain to facilitate assessment. If the patient is within the eight-hour window, the local hospital ED staff calls MSN. The MSN specialist – whether at the stroke center or some other location removed from the network hospital – connects and appears on the robot within eight minutes of receiving the page. That page includes the hospital name, onset time of symptoms and the name of the ED physician making the call. Within moments, the specialist "arrives" in the hospital ED via the robot.

After introductions, the robot gets escorted to the patient where the MSN specialist conducts an assessment, reviews lab reports with the ED nurse or the physician, and obtains a medical history from the patient and the family as to the time the symptoms appeared and what was observed. The MSN specialist uses the remote software to drive the robot over to the computer to personally study the CT scan or hard copies, and then inform the patient and family of his diagnosis and discuss treatment options with the ED physician.

If the patient is within the three-hour window, the MSN specialist may recommend giving the patient the IV rt-PA (Activase) – a clot-buster drug. The onsite ED staff administers the drug, sometimes with the help of the MSN specialist (who is operating the robot remotely) to manage blood pressure. The ED staff may also recommend drugs that should be given at that time. The MSN specialist can view the cardiac monitor as if he was standing at the bedside assisting the ED staff managing the patient's care.

If the network hospital has an ICU, the patient may stay if the IV treatment alone results in improvement. If there is no improvement with the drug, the patient is still within the extended eight-hour treatment window for possible adjunct therapies and critical care management. In this scenario, the MSN specialist contacts the case manager in the participating hospital to authorize transport of the patient to SJMO. The case manager then informs Medflight of a patient ready for transport. Upon arrival at SJMO, the patient receives a CT scan and then goes to the catheterization lab for a procedure or admittance to the ICU.

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