

## 'The Doctor Is In' with RP-7 Robotic System

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The mobile robot (left) can roll to a patient's bedside and enable two-way, real time communication between a physician and a patient, patient's family, other physicians and nurses. *Photo by Army Institute of Surgical Research*

"Hey, Dr. Chung, can I talk to you a minute?" Not an unusual greeting in a busy hospital hallway - unless Dr. Chung is actually at home, or on temporary duty in another city, or perhaps sitting in a cafe while on leave.

MAJ Kevin Chung, medical director for the Institute of Surgical Research's burn intensive care unit (ICU) at Brooke Army Medical Center, is accustomed to people addressing his image on an RP-7 robotic system while he is sitting at a keyboard in another location.

"I have taken it to [Salt Lake City](#), Las Vegas, St. Petersburg, Washington, Baltimore. I've accessed it on TDY. I've been called while on leave. If I have Internet access, I can access the ICU," Chung said. "Being mobile adds a dimension not available with other forms of telemedicine. It's like you are there."

The five-and-a-half-foot tall RP-7 looks vaguely like one of the Daleks from Doctor Who with a viewscreen mounted on top. But it's not science fiction. It may be an answer to inevitable local shortages of medical expertise.

"We need this technology to help. We can't have subspecialists everywhere," Chung said. The mobile robot can roll to a patient's bedside and enable two-way, real-time communication between a physician and a patient, the patient's family, other physicians or nurses.

The advanced digital camera can be panned, tilted or zoomed. The camera's resolution allows the physician at the control station to read monitor screens or printouts.

The robot's base rolls on three balls rather than wheels, allowing easy and safe maneuvering in any direction. It has a battery good for two hours before it must be plugged into a wall outlet to recharge. Infrared sensors at the robot's waist detect obstacles so the controller may avoid them, but a human escort is needed to open doors or push elevator buttons.

"Early on it was used for rounds. Then we started using it for acute problems," Chung said. "I ran a cardiac arrest from home. It would have taken 15 minutes for me to drive in, but I was there instantaneously by robot."

"The only thing you can't do is procedures. I can guide residents through that," he added.

The system is being used at a number of civilian medical facilities for surgical mentoring, to facilitate patient rounds, train health-care personnel and facilitate remote language translation. The Michigan Stroke Network uses 20 units for acute stroke evaluation and care.

A study of weight-loss surgery patients at Sinai Hospital in Baltimore, Md., found that 92 out of 376 patients had shorter hospital stays when the robot was used. A study at UCLA's David Geffen [School of Medicine](#) also found shorter patient stays in the neurosurgery intensive-care unit, resulting in lower costs and increasing ICU capacity by 11 percent.

The Telemedicine and Advanced Technology Research Center (TATRC), an activity of Medical Research and Materiel Command, is evaluating how this technology may best be put to use in a military medical setting. Physicians, nurses, residents and patient Families at ISR all reported more than 80 percent satisfaction. Large majorities agreed that the robot advanced patient care, saved time, had good audio and video quality and was better than communication by telephone.

"The response of families has been quite remarkable," Chung said. "When I show up when I'm not in the hospital, they get this bright look on their faces. You've demonstrated you still have a hand in their family member's care."

TATRC is going to fund robot systems for additional study at Madigan Army Medical Center and the Ryder Trauma Center at the University of Miami, where forward surgical teams train. Madigan will use the system in its simulation center for training.

"TATRC based its site selection on the quality of the research proposals submitted by clinical investigators," said Cynthia Barrigan, telemedicine program manager for TATRC.

In addition, QualComm has donated a robot, four remote control laptop devices and support services for one year to be used at Landstuhl Regional Medical Center. The initial goal is to enable members of the neurosurgical team to remotely monitor traumatic brain injury patients in the intensive-care unit.

A robot system may be deployed to an Army hospital in Iraq, but having sufficient communication bandwidth consistently available there will be a problem that must be overcome. The system's manufacturer, InTouch Health, recommends an ideal bandwidth of 600 kilobytes-per-second in both directions, but Chung said the RP-7 can operate with 300 kbps.

"It's not perfect. Bandwidth is an issue. Security is an issue - you don't want it hacked into. There are multiple obstacles that need to be negotiated," Chung said. Still, he said the system's potential is "limitless."

"Whatever subspecialties we are short could beam in wherever this robot is," he commented.

"The ideal would be to beam to Baghdad as soon as a patient arrives there. Then connect to Landstuhl as the patient is evacuated. We could have continuity of care throughout the process."

"It makes you more efficient, and extends your capabilities as a physician," Chung said. "For me it has been a career saver," he added. "Availability 24/7 is very taxing. I can do that now without burning out."

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