

Medical Logistics:

MRI to the Fight

In a joint effort lead by the U.S. Navy Medical Logistics Command (NMLC), state-of-the-art magnetic resonance imaging (MRI) technology will now be used to support the prognosis and diagnosis of warfighters with traumatic brain injuries.

By Sheila A. Gorman, (title), Naval Medical Logistics Command (NMLC)

In an unprecedented medical equipment initiative, three mobile Magnetic Resonance Imaging (MRI) systems will be procured and sent to Afghanistan to aid in the diagnosis and treatment of mild traumatic brain injury (mTBI). The Naval Medical Logistics Command (NMLC) was tasked by Navy Surgeon General Vice Adm. Adam M. Robinson, Jr. to spearhead the procurement and sustainment issues for this initiative.

Headquartered at Fort Detrick, Md., NMLC is the center of logistics expertise for U.S. Navy medicine, designing, executing and administering individualized state-of-the-art solutions to meet customer's medical material and healthcare needs. The command supports the Navy with acquisition and logistics systems training, healthcare services strategies, operational forces support, medical equipment and logistics solutions, acquisition management, deployable platforms and eyewear fabrication.

A JOINT EFFORT

A collaborative military effort among NMLC and its technical and operational partners, including the Bureau of Medicine and Surgery, U.S. Army Medical Material Agency, Task Force Medical-Afghanistan, Central Command, Office of the Joint Chiefs of Staff, Air Force Medical Logistics Office, National Intrepid Center of Excellence, Walter Reed National Military Medical Center, and the Army's Rapid Equipping Force, this

fielding initiative is based on findings from a report submitted from the Gray Team III, a panel of experts from industry, academia, and Department of the Army tasked by the Chairman of the Joint Chiefs of Staff to study mild traumatic brain injury care in theater and beyond.

Initial findings from the Gray Team III recommended the use of MRIs near the highest concentrations of mTBI injured personnel in theater due to the proven diagnostic and prognostic value over computerized tomography (CT) scanning. From the Gray Team III's report, "MRI systems of today are capable of showing greater brain detail and have been shown to be helpful in revealing causes for persistent symptoms or potential for higher risk from repeated injury not identifiable from CT."

RESPONDING TO A COMMON INJURY

Considered the signature war wound for soldiers serving in Iraq and Afghanistan due to the numerous improvised explosive devices (IEDs) and roadside bombs, mTBI has become one of the most common combat wounds for the warfighter. In 2008, RAND Corporation completed and published a comprehensive study of post-deployment health-related needs among Operation Enduring Freedom and Operation Iraqi Freedom veterans, titled Invisible Wounds of War. Based on the percentages related to the study, 320,000 individuals experienced probable TBI during deployment. Sometimes not appearing to suffer from outward signs or injury, many soldiers have lingering and long-term health and psychological effects that are not immediately apparent including headaches, balance problems, hearing problems, lack of self-control, mood changes, ringing in the ears, problems sleeping and memory loss.

PROCURING THE TECHNOLOGY

NMLC, as part of Navy Medicine, was in a unique position to take on the responsibility for procuring the MRI systems. To secure the MRIs that will aid in the diagnosis and treatment of mTBI, NMLC has taken the lead in researching, planning and procuring these systems to support the request from the Chairman of the Joint Chiefs of Staff.

An initial order was placed for two MRI systems to be located at the NATO Role 3 Multinational Medical Unit in Kandahar and the Role 3 trauma hospital in Camp Bastion, Britain's main base in Afghanistan. Since the initial order, a third MRI system has been added to the contract and will be deployed at the Staff Sgt. Heathe N. Craig Joint Theater Hospital located on the Bagram Airfield.

"We had the clinical engineering, logistics, legal and procurement professionals under one roof in addition to the necessary contracting authority, which has moved NMLC and Navy Medicine further along in the process and cutting months off the procurement," said NMLC Commanding Officer Capt. J.B. Poindexter, III.

Knowing the MRI initiative was coming their way, Bert Hovermale, NMLC Director of Acquisition Management, assumed a forward leaning approach to the initiative before the formal requirement surfaced and funding was secured.

"Before we received money for the procurement, we had the Statement of Objectives and Statement of Work completed," said Hovermale. "We were able to send out a Request for Proposal (RFP) the day the funding was received, which puts us ahead of schedule."

According to Hovermale, it also saved time in the procurement process by utilizing already existing Department of Defense contracts to secure the MRI systems.

SURVEYING FOR OPTIMAL LOCALE

An NMLC team from the Medical Equipment & Logistics Solution (MELS) Directorate consisting of the lead clinical engineer, a logistician, and two biomedical equipment technicians, went to Afghanistan in April 2011 to complete a site survey of the areas that were being considered for the MRI placements.

The site survey team answered questions such as: Is there an adequate power supply at each site?; What happens when that power supply is interrupted?--the systems must

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be continuously powered and the cryogenics (gases) must be kept continuously chilled; for the physical location of the units, is there proper support in place?; Due to outside ferrous objects that affect image quality and diagnostic capability, does there need to be extra shielding for the MRI systems and do the MRI systems need to be shielded from interfering with traffic on the airfields?; Is there air transport large enough to accommodate the airlift into theater?; How will the units be transported to their final locations?

CONSTRUCTING AND MOVING THE EQUIPMENT

Getting the systems built and into theater presented some unique challenges for NMLC and their vendor partner, Philips Healthcare, the manufacturer of the systems.

“This is a one-of-a-kind piece of equipment,” said Margaret Ely, NMLC Acting Director for Medical Equipment and Logistics Solutions (MELS) and whose team is working on the logistics and engineering piece of getting the MRIs up and running and into theater. “The systems will be specially built from the ground up directly onto a trailer and each system will have its own power supply to accommodate the austere environment in Afghanistan.”

Transportation into Afghanistan was addressed by utilizing a Russian Antonov AN 124 Ruslan, a mega-sized cargo lifter, also known as Condor. Similar in features to the Lockheed C-5A Galaxy cargo lifter, the Condor is a massive aircraft having a greater cargo capacity than the C-5A and heavy-duty landing gear for rough field conditions.

“Building the systems on a mobile trailer addresses the challenge of physically getting the systems to their points of deployment and destination,” said Ely. “It also addresses the need for a clean environment as MRIs are extremely



Top: An Uninterruptible Power Supply (UPS) machine is unloaded from an Antonov 124-100M cargo aircraft at Joint Operating Base Bastion, Afghanistan, in the early hours of the morning prior to delivery to the Role 3 Medical Facility at Bastion Oct. 5.

Left: A Magnetic Resonance Imagery (MRI) machine and generator await unload from an Antonov 124-100M cargo aircraft at Joint Operating Base Bastion, Afghanistan, in the early hours of the morning prior to delivery to the Role 3 Medical Facility at Bastion Oct. 5.



A Magnetic Resonance Imagery (MRI) Uninterruptible Power Supply (UPS) machine is unloaded from an Antonov 124-100M cargo aircraft at Joint Operating Base Bastion, Afghanistan, in the early hours of the morning prior to delivery to the Role 3 Medical Facility at Bastion Oct. 5.



A Philips Magnetic Resonance Imaging (MRI) Achieva 1.5T machine is set up at the Role 3 Medical Facility at Joint Operating Base, Bastion, Afghanistan, on Oct. 6, 2011. Royal Air Force Photo by Sergeant Mitch Moore/Released

susceptible to dust and dirt. To address this concern, unique entry system and filters have been provided via the trailer.”

POWER AND WEIGHT CHALLENGES

In theater, power supply can frequently be interrupted. As such, MRI systems need to be kept running continuously and the cryogenes chilled. To address that challenge, each system will have its own power supply as well as a self-contained trailer self-cooling unit built directly into the trailer. Likewise, in order to accommodate the huge weight of the systems and the trailers, up to 70,000 pounds each, special concrete pads have been poured and cured at the destination points.

IMAGE QUALITY ASSURANCE

Because the MRIs work on giant magnets and create a magnetic field, ferrous objects such as iron, steel, nickel and cobalt affect the resolution and quality images. Each MRI system will be shielded from outside interference to provide top quality imaging and usage as well as not disrupt airfield operations.

KEEPING SYSTEMS ONLINE

While the site survey team was addressing issues in Afghanistan, members of the team who remained behind addressed such questions as replenishment and sustainment of the systems, vendor support, and availability of trained personnel to operate the systems while in theater.

Working on replenishment, sustainment and vendor support, Philips has contracted to provide an MRI technician in Afghanistan to service the systems and project management during the warranty period, while DoD personnel are trained on the systems.

“NMLC has contracted with qualified personnel to operate and maintain the systems while in theater,” said Ely.

“Having no operational medicine requirement for MRI, the military does not have trained personnel on these systems.”

NMLC is using outside contractors to fill this requirement and qualified personnel are required to pass a rigorous screening, security and vetting process in order to be cleared to operate on the military bases. “Working both requirements simultaneously will allow the systems to be operable after delivery, installation and testing is completed,” Ely added.

SAFETY THE PRIORITY

Entering a room where an MRI system is in operation with any type of metal object could severely injure personnel and/or the systems themselves, due to the magnetic qualities. Safety training is a top priority and classes are being created at all final MRI system destination points for all personnel.

HIGH VISIBILITY AND SUPPORT

“The Navy is working closely with our sister services to field an unprecedented MRI capability for our forces in Afghanistan as part of the overall comprehensive approach to diagnosing and treating concussive injuries,” said U.S. Navy Surgeon General, Vice Adm. Adam M. Robinson, Jr. “The fact that our team was able to design, acquire and deliver this new capability to the battlefield in less than 12 months is a testament to the commitment and creativity of the joint medical and logistics teams.”

The first two systems have been delivered to the British Role 3 hospital in Camp Bastion. The NATO Role 3 hospital in Kandahar with a third system scheduled for delivery in early fall 2012.

More info: www.nmlc.med.navy.mil