

## **Minutes, lives saved using litter assist in mine-resistant ambulances**

U.S. Army

FORT DETRICK, Md. -- The terrain in Afghanistan is tough.

Drivers face roads that wind down treacherous hillsides with hairpin turn after hairpin turn, sandy valleys between tree-spotted ranges, snow-chilled mountains and plains, mud from snowmelt, narrow passes filled with boulders, and rivers, and more mud. Add in extremes of temperature, the danger of flash flooding and earthquakes, and the expectation of unexploded land mines and improvised explosive devices. Add in sniper gunfire, heavy artillery, and wounded warriors.

How can the U.S. military safely evacuate its casualties without endangering the rescuers?

Given the mountainous terrain and inclement weather, which restrict the use of MedEvac helicopters, reaching casualties is one thing. Treating them while getting them off the battlefield, under fire, to combat support hospitals is another.

Minutes saved using litter assist to load wounded warriors into a mine-resistant, ambush-protected ambulances, known as MRAPS, can make the difference between life and death. MRAP vehicles are armored vehicles with a blast-resistant, V-bottomed hull designed to protect the crew from mine blasts, fragmentary and direct-fire weapons.

The U.S. Army Medical Research and Materiel Command's Medical Materiel Development Activity, Medical Support Systems Project Management Office, or USAMMDA MSS PMO, works with military, government and industry partners to improve equipment and evacuation capabilities, giving minutes back, saving lives.

"The existing litter loading system on the MaxxPro Plus solid-axle ambulances used in Operation Enduring Freedom does not fully meet objective requirements for safe and easily accessible litter loading," said Jaime Lee, Medical Support Systems Project Management Office product manager. "The current MaxxPro Plus ambulance requires four Soldiers to lift and load, so that medics and casualties remain safe during medical evacuation."

Loading a casualty into and out of the back of a current MRAP MaxxPro ambulance is a time- and labor-intensive task. The back of the ambulance is elevated and requires a step ladder to enter the back hatch.

"A time trial, using a four-man team without gear in a secure environment to load a litter bearing a 200-pound soldier, took more than four minutes and involved some safety issues, such as the litter team losing balance while ascending the step

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ladder," said Lee.

"Once the litter is inside the ambulance, maneuvering the casualty and litter onto the litter support arms is very awkward, because space is limited. If soldiers did not need to climb the stairs while loading the litter and then readjust the litter onto the litter support arms, the physical demands would be lessened on the litter team," said Lee.

Based on a Request for Information from theater, the USAMMDA's MSS PMO was asked to find a solution, according to Steve Hawbecker, MSS PMO project manager.

The MSS PMO mission is to develop, procure, and sustain the best medical evacuation, combat casualty care support, and operational and preventive medicine solutions for the combat Soldier.

"The solution is the MRAP MaxxPro Plus long wheel base vehicle with the litter assist system retrofitted from the MaxxPro Dash DXM variant of MRAP vehicles," said Lee. "The loading and unloading takes less than a minute and is much safer and easier to use than the current system. Using the Dash ambulance litter loading system would eliminate the difficulty of climbing stairs to load the litter."

The Army Medical Department verified the load time in fiscal year 2012, at a review in Detroit, when the kit was first installed.

The vice chief of staff of the Army selected the MRAP III study course of action, March 14, 2013. Currently, 301 MaxxPro Plus vehicles with independent suspension systems will be converted to ambulances. AMEDD worked with the Joint MRAP Vehicle Program and found that the MRAP Dash litter loading system was an acceptable course of action for the Plus ambulance.

"AMEDD has a contract in place through Tank Automotive Research, Development, and Engineering Center to install a retrofitted Dash system into a government-owned Plus ambulance for user evaluation, coordinated with the Joint MRAP Vehicle Program," said Lee. "Work is expected to be finished 4th quarter of (fiscal year 20)13."

Why not use the very maneuverable MaxxPro Dash ambulance itself?

The Army Test and Evaluation Command completed the limited user test of the Dash DXM ambulance with the independent suspension system in November 2011 at Yuma Proving Ground, Ariz., in accordance with the Director of Operational Test & Evaluation (DOT&E)-approved test plan. The ambulance kit was inserted into the Dash MRAP vehicles in FY12.

DOT&E provided an operational assessment of the Dash DXM ambulance in August 2012: The patient compartment is small, and litter births are not long enough to accommodate patients taller than 5 feet 11 inches. The small interior does not store enough medical equipment and hampers the ability of the medic to treat patients. Aligning the litter into the rail system is often difficult while loading patients into the

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Dash ambulance. On the other hand, the Dash ambulance vehicle is reliable and survivable.

The Dash litter loading system will be retrofitted into a government-owned MaxxPro Plus vehicle with independent suspension for test and evaluation. The MaxxPro Acquisition Program Management team plans to take the demonstrator vehicle design and complete an engineering change proposal in January 2014 for potential production of retrofit kits.

Army Medicine and Navistar Defense, builder of the MaxxPro line of vehicles, through U.S. Army Tank Automotive Research, Development, and Engineering Center/Primus, are working together to create a demonstrator Plus ambulance retrofitted with a Dash litter loading system to conduct a limited user test.

To better handle the tough terrain, USAMMDA worked with Navistar Defense to retrofit vehicles with an independent suspension system that dampens the rough ride and is critical to prevent further damage to wounded warriors, especially to those with traumatic brain injuries.

According to John Akalaonu, deputy program manager for the Navistar Defense MaxxPro family of vehicles, the solid axles were replaced by putting the MRAP MaxxPro Base vehicle body onto a new rolling chassis with independent suspension and bigger engine to create the long wheel base MaxxPro Plus that will be used for the 301 new ambulances. The Dash, which was designed to be lighter, smaller, and with a shorter turning radius, has a shorter wheelbase.

"The chassis swap gained 18 inches in length," said Scott Zion, MaxxPro chief engineer.

The interior can accommodate litters up to 91.5 inches, more than 7.5 feet long, surpassing the need for litters that can comfortably carry soldiers taller than 6 feet 3 inches (the Army standard). The Plus ambulance is compatible with all litters, including the new 7309 NATO Litter and the TALON II. Patients will be side-by-side, providing a better working space for the medic.

"The litter loading sequence takes about 15 seconds," said Akalaonu. "Unloading is about the same, with a maximum of 20 seconds. Two people are required to load and secure a patient in the long wheel base ambulance."

The litter trolley is wider in the prototype to handle more kinds of litters, and the alignment is adjustable. Magnets along the trolley rails help keep the litter aligned and in place. The landing brackets have been increased, and the litter arms are stationary.

The rear dual-wheeled design helps carry increased payload such as the ambulance kit. The Plus was further modified to accommodate additional armoring for more protection against explosively formed penetrators.

"Medical Research and Materiel Command has always worked closely with the

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program managers at Tank-Automotive and Armaments Command to design, develop, build, test and field ambulances for the DOD," said Lee. "The MaxxPro Plus ambulance with this new litter loading system is truly a state of the art vehicle for medical evacuation."

"We have now achieved our objective requirement," said Hawbecker. "The MaxxPro Plus ambulance retrofit is a move forward to safeguarding medics and their wounded warriors at point of injury."

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