

Shock to the Heart



EXTERNAL DEFIBRILLATORS ARE READY FOR MILITARY USE.

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MMT CORRESPONDENT

Sudden cardiac arrest can kill a person within minutes. The American Heart Association (AHA) recommends a shock to the heart from a defibrillator within three to five minutes after someone suffers a sudden cardiac arrest (SCA), and the response time necessary to save a victim of SCA is extremely vital. That is why the use of automatic external defibrillators (AEDs) is becoming more common in the military for application in the field.

An AED is a portable electronic device that automatically diagnoses potentially life threatening cardiac arrhythmias. It is able to treat them through defibrillation—the application of electrical therapy to stop ventricular fibrillation that in turn allows the heart to re-establish an effective rhythm.

The use of AEDs in the field can provide major advantages to a warfighter at risk. Given the short window of time in which the arrhyth-

mia must be corrected, transportation to a major medical facility may not occur quickly enough. After approximately three to five minutes, irreversible brain and tissue damage may begin to occur. For every minute that a person in cardiac arrest goes without being successfully treated, the chance of survival decreases by 10 percent.

That is why Patricia Dubill, a biomedical engineer at the U.S. Army Medical Materiel Agency (USAMMA)

at Fort Detrick, Md., is working toward making AEDs more widely available in the military.

"We do not currently have them in our sets, kits and outfits [SKOs] for our field hospitals," Dubill said. "Right now, at our various venues where we are using defibrillators, we are using conventional defibrillators. What we are doing is looking to add automatic external defibrillators to our SKOs where we want technology that's smaller, lighter, less expensive and easier to use."

Because AEDs are designed for public use in a pre-hospital environment, most are well-equipped to handle the difficult environmental circumstances of the field, including temperature extremes and vibrations.

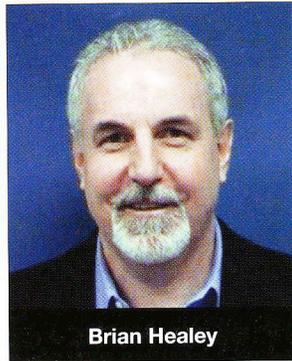
"We have completed a market analysis to see what is on the market and collect product information from a variety of manufacturers, and look at the technical characteristics to identify which characteristics are really critical [for our needs]," Dubill said. "There is quite a range of capability out there. You have AEDs designed for the lay user, and then you have the ones that are designed for a somewhat-trained medical professional."

Dubill's team is currently developing a list of necessary characteristics that will be required in the AED units. The next step will be to publish that request for proposal and evaluate the industry responses they receive. Dubill hopes to issue the request for proposal fairly soon—within the next few months.

COMPETING PRODUCTS

A number of medical device companies will likely be competing for the USAMMA contract, offering AEDs designed for the military that are on the market today. The following is a rundown of a few manufacturers and their products.

Bothell, Wash.-based Cardiac Science, for example, is promoting its family of Powerheart AEDs to the military. The AEDs feature technology that self-tests



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the battery, defibrillation pads and internal electronics daily to ensure they are ready to perform whenever needed. They can be kitted in rugged hard-shell carry cases, soft-sided carry bags and rescue backpacks for training activities and field operations. Cardiac Science AEDs currently are used by Army National Guard, Air National Guard, Navy, Marines and Air Force.

Cardiac Science markets two particular AEDs to the military. The G3 Pro features a manual mode and can be used by an individual with some medical training. The other model, the G3 Plus, has a fully automatic mode that allows even people without medical training to use the device.

Andover, Mass.-based Philips Healthcare, meanwhile, produces the HeartStart MRx ALS, a monitor and defibrillator with a rugged design for pre-hospital users.



The Philips HeartStart MRx features a full-color display. [Photo courtesy of Philips]

"We try to provide portable tools that the medics or transporters can easily use," said Brian Healey, senior marketing manager at Philips. "We take technology that is being used at the hospital level and convert it into our transportable products."

Philips HeartStart MRx features a large, full-color display that the company says can be seen in any environment or lighting condition. Philips HeartStart MRx offers monitor views designed to assist the user in specific scenarios, such as "code view," in which critical information that

is enlarged, unnecessary and potentially distracting information goes away, and alarms are silenced. In "ECG view," the caregiver can see all 12 leads at once and know at a glance that the tracings are clear for all leads. This provides a real-time view of the patient's condition, not just a snapshot, while also avoiding wasted time printing and storing poor quality or incomplete 12-leads. The MRx utilizes the Philips 12-lead ECG algorithm, which can also assist the responder in diagnosing the cause of the cardiac arrest.

"For example, it can actually look at the characteristics of the 12-lead and identify a probable culprit artery that is blocked and causing acute symptoms," said Bill Grube, the company's product manager for MRx.

The Philips HeartStart MRx Monitor/Defibrillator has been granted airworthiness certification from the U.S. Army and completed aeromedical testing and evaluation in the laboratory and aboard medevac H-60 helicopters.

Another AED manufacturer, Redmond, Wash.-based Physio-Control, which is a division of Medtronic, began manufacturing AEDs more than 50 years ago. The company says its Lifepak 15 is its most advanced and rugged AED, can detect hard-to-diagnose conditions, and is the first monitor integrating noninvasive monitoring for carbon monoxide, SpO2 and methemoglobin (to detect chemical exposures and certain drugs).

The Lifepak 15 also provides advanced support for treating STEMI patients. It can continuously monitor all 12 leads in the background and alert users to changes. The device also gives the option of escalating energy dosing up to 360J for difficult-to-defibrilate patients. The device may also aid users in performing compressions and ventilations within the recommended range of the AHA guidelines.

Physio-Control says its monitor and defibrillator have passed 30-inch drop tests and can work in various types of harsh weather.

Guilford, Conn.-based Defibtech focuses its efforts solely on producing AEDs, and argues that this helps make its products better than competitors.

"We're not a division of a division. We deal strictly with treating cardiac arrest," said Greg Slusser, a Defibtech vice president.

Defibtech has thousands of units of its Lifeline AED in place in different military applications, from National Guard units to Air Force and Army bases. The device uses biphasic technology to adjust the shock delivery automatically to the person's individual needs.

The Lifeline AED weighs 4.2 pounds and meets U.S. military "drop and shock" specifications. It has passed a 750-pound anti-weight test and has the ability to withstand temperatures between zero and 122 degrees Fahrenheit. Slusser said the ability of the device to operate automatically is critical.

"The units [now in the field are] fine for people that [have] been trained," Slusser said. "But you can't always count on someone being trained [in how to use the AED]."

Finally, the AED Pro from Chelmsford, Mass.-based Zoll features an LCD display that allows responders to visualize

a patient's ECG while using a three-lead monitoring cable. The AED Pro is geared toward the rescuer with medical training, but the device does include a feature that lets rescuers see and hear how well they are performing the rate and depth of chest compressions during CPR. Adult victims need compressions at a rate of 100 per minute and at a depth of 1 1/2 to 2 inches, and compressions must be done well to effectively move blood and oxygen. The AED Pro includes a metronome set at the AHA-recommended 100 beats per minute and a screen display that helps rescuers achieve optimum rate and depth of compression levels through audible and visual prompts, such as "push harder" or "good compressions."

It also shows CPR compression depth on the display screen and allows clinicians to see organized electrical activity while CPR compressions are being performed. By filtering out compression artifact, the device lets rescuers see a patient's underlying cardiac rhythm during resuscitation efforts and eliminates the need to stop

compressions to see if defibrillation has been successful.

Also, the device can withstand a 1.5-meter drop, allowing it to handle the rough treatment typically found in the field.

Zoll also makes the M Series CCT, which is used in military deployments worldwide and offers "advisory" AED functions as well as advanced patient monitoring and defibrillation.

Other manufacturers of defibrillators and related products include Cardiac Science, Heartsine Technologies, MRL, GE Medical Systems Information Technologies, Welch Allyn Protocol, Creatron, Automated Medical Products, Netech, Ansen, Datascope and Concord Medical Products. Of course, who may ultimately prevail in a potential USAMMA RFP remains to be seen. For more information on the health service agency, visit www.usamma.army.mil. ★

For more information, contact MMT Editor Ted McKenna at tedm@kmmidiagroup.com or search our online archives for related stories at www.MMT-kmi.com.

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