Implantable Medical Device is Designed to Warn Patients of Impending Heart Attack

More than 30% of the one million heart attack victims in the United States each year die before seeking medical attention. Although widespread education campaigns describe the warning signs of a heart attack, the average time from the onset of symptoms to arrival at the hospital has remained at 3 hours for more than 10 years. In their upcoming *Ergonomics in Design* article, "'This is your heart speaking. Call 911,'" authors Mary Carol Day and Christopher Young study the benefits of the AngelMed Guardian®, an implantable medical device currently undergoing clinical trials that alerts users about a potential heart attack through a combination of vibrations, audible tones, and visual warnings.

What makes the device distinctive is this combination of alert modes. Although vibrotactile (vibrating) alarms are sometimes used to warn medical personnel in operating rooms or ICUs of an emergency, very little research has focused on their potential as a self-monitoring device for patients. Auditory alarms are provided with selected implantable heart defibrillators, but research indicates that some patients - particularly the elderly - are unable to hear the alarms.

"A vibrotactile alarm provided by the implanted device has two major advantages," says Day. "First, the implanted device can't be left behind like a portable device. Second, a vibrotactile alarm from the implanted device is more likely to be felt than an auditory alarm is to be heard because, for example, the patient may be wearing heavy clothing, has hearing loss, or is in a noisy environment."

The device offers two levels of alarm urgency: A high-priority alarm indicates that the patient may be having a heart attack and should call 911, and a low-priority alarms indicates that a condition has been detected that requires a doctor visit within 48 hours. The alarms are provided by an implanted medical device, similar in size to a pacemaker, that is placed in the upper left chest, plus an external device, similar to a pager, that emits an auditory alarm and flashes a red or yellow warning light.

In a series of studies with older adults designed to test the device's design and user-friendliness, participants were able to tell the difference between the low-priority and high-priority vibration patterns and respond appropriately. They also reported that they liked the vibrating alarms and the redundancy of the auditory, visual, and vibrotactile warnings.

"If the Guardian is approved for sale by the FDA," continues Day, "it might be extended in ways that will change the way the patient interacts with the system as a whole. This would require more research and simulated-use studies to refine and validate the new interactions between the patient and the system."

For a full copy of the article, contact HFES Communications Director Lois Smith.

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