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The Device That Saves Lives, But Can Be Hard to Find

By RON WINSLOW

If you needed an automated external defibrillator to help a victim of sudden cardiac arrest, chances are you would have trouble finding one, even if a device were located nearby.

That's despite the fact that about one million AEDs—portable devices that can jump-start the heart and save lives when sudden cardiac arrest strikes—are installed in office buildings, malls, schools and sports stadiums around the U.S.



Charles Fox

Jennifer Yuan won a prize for locating 400 of the heart devices tucked away in Philadelphia buildings.

AEDs are widely considered an important public-health tool. Once they are mounted in a public space, however, they are often forgotten, or at least neglected. Few public agencies, including 911 dispatch centers, maintain a database of AED locations or systematically check to make sure available devices are in working order. While reliable data are scant, of the estimated 225,000 reports each year of people collapsing of sudden cardiac arrest, some experts estimate AEDs are generally used to help fewer than 5% of victims.

Now, researchers at the University of Pennsylvania have undertaken a project that aims to change that. They enlisted residents of Philadelphia in a crowdsourcing project, with an incentive of cash rewards, to hunt down as many AEDs in the city as they could find. Armed with a special

smartphone app, more than 300 teams and individuals spent eight weeks last winter knocking on doors throughout the city. They photographed the devices

they found and recorded GPS coordinates and other details about their location in a building.

The result: a map pinpointing the location of more than 1,400 AEDs in 500 buildings in nearly every ZIP Code in the city. Among other benefits, researchers expect the information will be valuable to the city's 911 dispatchers, who could provide AED locations to callers reporting episodes of sudden cardiac arrest.

"It has been a major public-health undertaking to make sure the devices are available," says Raina Merchant, an emergency-medicine doctor at Penn who is spearheading the project. "But it's a disservice that we don't in fact know where they are. As a result, they are not used." Dr. Merchant presented findings from the project, called the MyHeartMap Challenge, and related research at the annual scientific meeting of the American Heart Association this month.

Sudden cardiac arrest occurs when the heart unexpectedly stops beating. The cause in about half the cases is ventricular fibrillation, an electrical disturbance in the heart that is most responsive to a shock from an AED. Emergency-services experts say that in general odds of survival are reduced by 10% for every minute a person is collapsed from a sudden cardiac arrest without cardiopulmonary resuscitation or defibrillation.

Chances of surviving vary widely across the U.S. In Seattle and surrounding King County, Wash., and in Rochester, Minn., half of those who suffer a public sudden cardiac arrest survive. But mostly the survival rate is low: 3% in Chicago, 5% in New York and 7% in Los Angeles, for example, according to information compiled from medical reports by Resuscitation Academy, a Seattle-based training school for leaders of emergency-medical-services programs.

King County has about 3,000 AEDs in public locations registered with 911 dispatch. Mickey Eisenberg, medical director of the county's emergency medical services, says the devices make a "modest" but important contribution to the county's success against sudden cardiac arrest. In about 10% of cases, either a member of the public or a policeman applies an AED before the EMTs arrive, he says. In those cases, 60% of the victims survive.



Publicly accessible AEDs are only part of a comprehensive community strategy experts say is required to make meaningful inroads against the death rate from sudden cardiac arrest. Also needed are greater awareness of the importance of CPR and an emergency medical system actively working to improve survival rates. Currently, experts say, only about 50 cities or states publish survival rates of sudden cardiac death cases.

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Finding an AED in Philadelphia was often difficult for the small army of citizens enlisted for the MyHeartMap Challenge. "If you're going to collapse outside in Philadelphia, the block by the Federal Reserve is 'the' place to do it," says Jennifer Yuan, a technology-communications analyst at Penn who located more than 400 of the devices during the project and won \$9,000 for her effort. Every building on the block had the devices, she says, and security staff at the Fed were eager to share information about them.

By contrast, in areas largely made up of private businesses, "you're at far more risk" of not being able to locate an AED, Ms. Yuan says. For instance, staff members she approached at shopping malls "didn't know where they were or what I was asking for. If it had been somebody collapsing, they would have been long gone."



Raina Merchant led a crowdsourcing contest to pinpoint Philadelphia's AEDs.

Some hotels had the devices, including those belonging to the Sheraton hotel chain, which has a policy of placing the devices in their properties. Other prominent hotels had few AEDs or none. "I was shocked," Ms. Yuan says.

One defibrillator near a downtown food court was found in a padlocked container, Dr. Merchant says. Another was on a wall in a public office building but barely visible behind a plant.

Generally, the need for the

crowdsourcing volunteers to get special permission from building managers or security personnel significantly prolonged the time it took to get information about the devices, a delay which would steal critical minutes from a lifesaving effort in a real emergency.

The MyHeartMap study was funded in part by the Robert Wood Johnson Foundation, a health-care philanthropy, and supported by several AED manufacturers.

The crowdsourcing effort was welcomed by other researchers who regarded it as a pilot test of an idea that other communities might adopt. "It was creative, and the study itself raised awareness for all the participants," says Jonathan Drezner, a family medicine doctor at University of Washington in Seattle who works to make AEDs available in schools.

The information could help direct better placement of the devices. "We found deserts where there were lots of people and few AEDs," Dr. Merchant says. Higher-income areas tended to have more of the devices, she says.

The study also could be an early step to help fill in gaps in understanding about how to allocate public-health resources. "We know [AEDs] have lifesaving potential," says Roger White, an anesthesiologist at Mayo Clinic, Rochester, Minn., and an expert in sudden cardiac arrest. "Not a lot is known about how well they're performing, how frequently they are attached to patients" and what the outcomes are. "We need to know what's really happening with the devices," he says.

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