

EVALUATING YOUNG ADULT PERSPECTIVES RELATED TO EARLY
BYSTANDER DEFIBRILLATION

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Abstract:

Background: In order to improve survival rates for out-of-hospital cardiac arrest (OHCA), bystander defibrillation is imperative. Nationally, however, only 9 percent of patients who arrested in a public space in 2020 had an automated external defibrillator (AED) applied before medical personnel arrived on scene. The aim of this study was to understand why young adults might not apply an AED in response to a witnessed OHCA.

Methods: A mixed methodology study was conducted to first quantify the baseline knowledge of cardiopulmonary resuscitation (CPR) and AED use among young adults. Subsequently, qualitative data was obtained from focus groups to identify common barriers to early defibrillation and to discover interventions that might improve a bystander's confidence to use an AED. Quantitative data was obtained using a Qualtrics survey distributed to students enrolled in select General Education courses at the University of Arizona, Tucson. Based on those responses, some students were invited to participate in the focus groups.

Results: The Qualtrics survey generated 431 responses, and 266 of those students (61.7 percent) had participated in a CPR training course at some point. While 57.9 percent of CPR-trained individuals felt confident about how to use an AED, only 32.7 percent were certain they would apply an AED before EMS arrived on scene. Of the CPR-trained individuals who were invited to participate in focus groups, only 28 students completed a session. Among those 28 students, 57.1 percent felt confident about how to use an AED, but only 42.9 percent believed they would follow through with device application. Potential barriers to early intervention included lack of confidence, inability to pinpoint the location of an AED, fear of litigation, or simply not realizing that defibrillation was time sensitive. Potential solutions included creating media campaigns that reinforce the simplicity of AED operation, building public AED registries, rehearsing CPR skills at more regular intervals with modalities that are free, fast, and convenient, and clarifying/enacting legislation that guarantees bystander protection.

Conclusions: Realizing the significance of early defibrillation, young adults agreed that bystander involvement is necessary. They gauged that many of the barriers which preclude eyewitness involvement in OHCA would be eliminated by employing smartphone technology and/or garnering legislative support.

Introduction:

According to the Cardiac Arrest Registry to Enhance Survival (CARES), almost 300,000 out-of-hospital cardiac arrests (OHCA) occurred in the United States in 2020.¹ Nearly 90 percent of those events were fatal, making OHCA the fourth leading cause of death among Americans during that period.^{1,2}

Data has shown that providing quality cardiopulmonary resuscitation (CPR) and early defibrillation for OHCA victims does result in improved outcomes, but for each minute that passes without defibrillation, a patient's chances of survival are reduced by 7 – 10 percent.³ Nationally, the average response time for Emergency Medical Services (EMS) personnel to arrive on-scene is 7 minutes.⁴ Given these estimates, survival following an OHCA may only reach 30 – 51 percent, unless a bystander can intervene and offer defibrillation sooner.

Publicly accessible defibrillators (PADs), also known as automated external defibrillators (AEDs), do provide the opportunity for earlier bystander involvement. For example, 70 AEDs were strategically located throughout Chicago O'Hare and Midway airports (well-marked with a 60-90 second transition time between device access points). Eleven of eighteen OHCA patients with ventricular fibrillation were successfully resuscitated with intact neurological function—a 61 percent survival rate.⁵ Bystanders without previous AED training provided care to 64 percent of these individuals.⁵ Moreover, if defibrillation occurred within 5 minutes, long term survival (at 1 year) was 67 percent.⁵ In a separate example, security officers from 32 casinos across the country participated in a hands-on AED training course; casinos were then asked to place enough AEDs on their premises to facilitate defibrillation within 3 minutes from a point of collapse.⁶ Of 90 patients with OHCA due to ventricular fibrillation, 59 percent survived to hospital discharge.⁶ The mean intervals for initiation of CPR, attachment of defibrillator, first shock, and arrival of

EMS were 2.9, 3.5, 4.4, and 9.8 minutes, respectively. For those patients that received their first defibrillation within 3 minutes or less, 74 percent survived to hospital discharge.⁶ In comparison, for those patients who received their first defibrillation more than three minutes after collapse, only 49 percent survived.⁶ These results reiterate that the effectiveness of defibrillation is time-sensitive and that nonmedical personnel can make a significant impact on survival if an AED is utilized before EMS arrival.

Despite this evidence, rates of defibrillation by bystanders remain low. Nationally, CARES data from 2020 found that only 9 percent of patients who arrested in a public space (i.e., not a residential area) had an AED applied before medical personnel arrived on scene.¹ For those patients who were first defibrillated by a bystander, 38 percent survived to hospital discharge.¹ In contrast, when defibrillation was deferred until EMS arrival, only 25 percent of those patients survived.¹ Given the importance of early defibrillation but the paucity of bystander involvement, this research was undertaken to examine why college-aged students might (or might not) apply a AED in response to a witnessed cardiac arrest.

Methods:

The University of Arizona is a land-grant university located within Tucson, Arizona. Nearly 37,000 undergraduate students are currently enrolled; all matriculating students, regardless of major, must complete the University's General Education curriculum prior to graduation.⁷ For this study, four instructors who taught courses within the General Education curriculum were contacted. All agreed to share a Qualtrics survey with their enrolled students.

The Qualtrics survey was used to gauge which students had ever completed a CPR training course. Students were also asked about their general knowledge of automated external

defibrillators (AEDs) and whether they might consider applying an AED to a cardiac arrest victim before EMS arrived on-scene.

Based on the results of the Qualtrics survey, some students received an emailed invitation to participate in a focus group session. Ten sessions were offered over a two-week period. Students could sign up for one 30-minute session using an on-line scheduling tool. Although there were 8 spaces available for each session, students could not see who, or how many were signing up for each group.

Focus group invitations were initially offered to those students who expressed they had received CPR training but would never consider applying an AED to a cardiac arrest victim. After 48 hours, when that approach failed to generate enough sign-ups, recruitment was expanded to CPR-trained students who were uncertain if they would apply an AED before EMS arrived on-scene; these students felt the decision to apply the AED would be dependent upon certain circumstances. After an additional 96 hours, enrollment was still low, so invitations were opened to those CPR-trained students who would always attempt to apply an AED when the situation warranted, even before EMS arrival.

During the focus group sessions, participants were asked more detailed questions about their CPR training like how much time had lapsed since their last course, did the course include an AED demonstration, and what was their motivation to register for CPR training? Students were then asked about their knowledge of AED locations on campus. Finally, the floor was opened to discuss why bystanders who witnessed an OHCA might not apply an AED. Students were encouraged to voice their concerns, and as barriers were identified, students were asked to share ideas that might make bystanders more confident to intervene while awaiting EMS arrival. Of note, focus group participants were asked to refrain from repeating what others shared during

a session, and given the number of potential scenarios, students were reminded that no single answer should prevail.

This research was reviewed by the Institutional Review Board responsible for human subjects research at The University of Arizona and was found to be acceptable, according to applicable state and federal regulations and University policies designed to protect the rights and welfare of participants in research.

Results:

The Qualtrics survey to identify individuals with CPR training and some degree of AED knowledge generated 431 responses. The average age of respondents was 19.3 years. Overall, 266 students (61.7 percent) reported that they had completed a CPR training course at some point. Of those 266 individuals, only 32.7 percent expressed they would definitely apply an AED (if available) prior to EMS arrival; 54.9 percent said the decision to apply the AED would depend upon the circumstances; and 12.4 percent answered they would never consider applying an AED regardless of the situation. This information as well as other findings are summarized in Table 1 (CPR-trained students) and Table 2 (students without CPR training).

Table 1: Responses from CPR-trained students (n=266)

Average Age (years)	19.6	--
Recalled seeing an AED within campus bounds at some time	211	79.3%
Could pinpoint the location of an AED within campus bounds	44	16.5%
Felt confident about operating an AED	154	57.9%
Had some doubts about operating an AED	90	33.8%
Did not know how to operate an AED	22	8.3%
Would apply an AED before EMS arrival, every time	87	32.7%
Would consider applying an AED, dependent on the situation	146	54.9%
Would not apply an AED	33	12.4%
Felt confident about AED operation, but still not willing to apply	5	1.9%

Table 2: Responses from students with no previous CPR training (n=165)

Average Age (years)	19	--
Recalled seeing an AED within campus bounds at some time	135	81.8%
Could pinpoint the location of an AED within campus bounds	16	9.7%
Without CPR training, still felt confident about operating an AED	28	17.0%
Had some doubts about operating an AED	92	55.8%
Did not know how to operate an AED	45	27.3%
Would apply an AED before EMS arrival, every time	28	17.0%
Would consider applying an AED, dependent on the situation	89	53.9%
Would not apply an AED	48	29.1%

Of the 266 respondents with previous CPR training, 244 students were invited to participate in one of ten focus groups (22 email addresses were incomplete, such that an invitation was not offered). In response to these invitations, 38 students signed up for a session; however, 10 students failed to attend. Among the 28 students that remained, the smallest focus groups consisted of 2 students each, while the largest session had 7 participants.

The average age of focus group contributors was 18.8 years and isolating the initial Qualtrics survey responses from these 28 individuals generated the following: 42.9 percent expressed that they would apply an AED; 35.7 percent said the decision to apply the AED would depend upon the circumstances; and 21.4 percent reported that they would never consider applying an AED. This information as well as other findings are summarized in Table 3.

Table 3: Qualtrics responses from CPR-trained focus group participants (n=28)

Average Age (years)	18.8	--
Recalled seeing an AED within campus bounds at some time	23	82.1%
Could pinpoint the location of an AED within campus bounds	6	21.4%
Felt confident about operating an AED	16	57.1%
Had some doubts about operating an AED	10	35.7%
Did not know how to operate an AED	2	7.1%
Would apply an AED before EMS arrival, every time	12	42.9%
Would consider applying an AED, dependent on the situation	10	35.7%
Would not apply an AED	6	21.4%
Felt confident about AED operation, but still not willing to apply	0	--

Upon arrival to a focus group, participants did provide some additional information. Most contributors were seeking a degree in a STEM-related field. Although CPR course completion cards are valid for 2 years, only 42.9% of respondents believed that their last CPR training occurred within that timeframe. In fact, averaging all responses (of note, most students were only able to estimate), the average time since last CPR training was 28.5 months, and only 6 students had participated in a CPR renewal course at some point. Fulfilling a job requirement was the most frequent reason cited for enrolling in a CPR course, and this was true for a little more than one-third of the focus group contributors. This information is summarized in Table 4.

Table 4: Other focus group characteristics (n=28)

Gender	Female [21] Male [8]	75% 25%
Degree Aspirations	STEM [22] Other [6]	78.6% 21.4%
Average time since last CPR training (months)	28.5	--
CPR course included an AED demonstration	22	78.6%
Completed a CPR renewal course at some time	6	21.4%
Had used Campus 360 Maps	23	82.1%
Knew that Campus 360 Maps included AED locations	6	21.4%
Used wearable health technology in last 12 months	26	92.9%
Reasons cited for taking a CPR course:		
Job requirement	10	35.7%
Curriculum requirement (High School)	6	21.4%
Babysitting course	4	14.3%
Boy/Girl Scouts	3	10.7%
Curriculum requirement (College)	2	7.1%
Resume	1	3.6%
Incentive offered	1	3.6%
Desired skillset	1	3.6%

As it happened, each focus group was comprised of individuals who held different opinions about AED application. Even for groups with only 2 participants, one student might always apply the AED while the second student might never consider applying the AED. Only

the investigator was aware of each participant's opinion (because of the initial Qualtrics survey responses) and to facilitate open communication during these focused sessions, such information was not divulged to the participants. Contributors were encouraged to speak freely and generally, without having to admit that a voiced concern was their own.

Some concerns were voiced and discussed in all nine sessions (a tenth session was cancelled due to no sign-ups). These included lack of access to a defibrillator or ignorance that a device was nearby, fear of making the patient worse, not knowing how to apply the device to an infant or small child, forgetting what to do / panicking in a stressful situation, fear of litigation, or harming an unborn child in a pregnant patient. These and other dilemmas are summarized in Table 5.

Table 5: Areas of concern surrounding AED application

<p>Frequently voiced concerns:</p> <ul style="list-style-type: none"> • PAD not readily available • Fear of harming the patient / making things worse • Infant or small child • Forgetting what to do / panicking in the stress of the moment • Potential for litigation • Patient is pregnant • Simply not realizing the importance of early defibrillation
<p>Other concerns:</p> <ul style="list-style-type: none"> • Fear of hurting oneself / defibrillating self • Inadequate knowledge / training despite course completion • Elderly patient with co-morbidities
<p>Rare concerns [only voiced by one or two participants]:</p> <ul style="list-style-type: none"> • Gender of patient / undressing a woman to apply pads • Body habitus / hygiene • Rescuer's emotional status if failed attempt • Relationship with patient vs. stranger

Discussion:

Although 62 percent of the students who completed the Qualtrics survey reported that they had taken a CPR certification course, only about 58 percent of those trained individuals expressed a high level of confidence regarding AED mechanics. Focus group participants presumed this could be related to several factors. For example, about 21 percent of focus group members reported that no AED demonstration was offered during their certification class. Others expressed that audio cues were played by the instructor, but no hands-on experience was provided. Some had forgotten about the audio prompts and the pictograms for pad placement; perhaps not unexpected given the length of time that had passed since their last CPR certification [average time since last class for focus group participants was 28.5 months].

Regardless of manufacturer, the sequence of four steps to operate an AED is universal. These include power on, attach electrode pads, analyze the rhythm, and advise shock.⁸ Once the AED is powered on, voice prompts automatically instruct the user on how to complete each step, and to demonstrate that untrained bystanders could use these AEDs without difficulty, one study compared sixth graders against EMS personnel during a mock cardiac arrest scenario.^{8,9} The sixth graders only required an additional 23 seconds to deliver the first shock.⁹ However, if ease of operation is never demonstrated and/or not revalidated at appropriate intervals, this could represent one reason for attenuated bystander confidence.

Many focus group participants also argued that popular media does not reinforce the simplicity of AED use. For example, medical dramas depict doctors wielding handheld metal paddles that they rub together in a certain fashion, making the process look very intimidating. Instead, some focus group members suggested that AEDs should be compared to other wearable health technology—both are portable, and both automatically analyze data upon placement.

Almost 93 percent of focus group members were wearing or had worn some type of fitness tracker, sleep monitor, or smartwatch at least once during the last year. This type of comparison made the prospect of employing an AED seem less daunting.

Beyond technical issues, several recurring themes as to why AEDs might not be applied by bystanders were generated during the focus group sessions. These included locating an AED, the ability to remain calm under pressure, type of patient, litigation, or simply not realizing the importance of early defibrillation.

Locating an AED

College campuses often represent a best-case scenario in terms of AED distribution. In Arizona, for example, Grand Canyon University maintains more than 100 defibrillators across its campus.¹⁰ Maps delineate where each unit can be found.¹⁰ The same is true for Arizona State University.¹¹ There are also other campuses across the country that have been recognized as HeartSafe Campuses, in part, due to their robust PAD programs; the University of Arizona in Tucson is one of these locations.¹² Using a smartphone, any visitor, student, or faculty member can find the nearest AED location on Campus Maps, under the “health & safety” resource.¹³ With more than 120 devices across a 0.8 square mile radius, a PAD is always nearby. Unfortunately, only 23 focus group participants (n=28) were aware of Campus Maps. Of these, only 6 students knew that the application had a special feature for health and safety (i.e., AED locations). Additionally, while greater than three-fourths of students recalled seeing an AED within campus bounds at some juncture, few could still pinpoint that location. Therefore, in an effort to increase public awareness of AED locations on campus, several strategies were suggested by focus group members; these are outlined in Table 6.

Table 6: Strategies to increase public awareness of AED locations on a college campus

- Ask professors to announce the location of the nearest AED on the first day of class; include that information in the syllabus.
- Create a competition for Greek Life or other campus organizations to locate AEDs.
- Improve signage; install a blinking light on the outer box.
- Include signs at the main entrance to each building.
- Locate all safety resources together (i.e., install fire extinguisher, AED, Narcan cabinets all on the same wall)
- Many college students look down. Place signs on the floor (like the distancing markers that were used during the pandemic)
- Promote Campus Maps and associated features on social media.
- Rather than distributing the devices in buildings, coordinate placement with the blue light (emergency) phone system on campus.

Unfortunately, public access defibrillation is not uniformly regulated across the country, meaning AED distribution in non-collegiate areas may be sparse. For example, a 2017 Centers for Disease Control factsheet reported that only 25 states had ordinances for AED placements in schools, only 15 states supported targeted placement in fitness/athletic facilities, only 10 states required that AEDs be placed in state-owned facilities, 2 states had requirements for gambling venues and 1 state stipulated that the devices be available at public golf courses.¹⁴ Even so, many businesses and office buildings do elect to maintain AEDs voluntarily, but without a national registry to track available devices, efforts to pinpoint an AED in a timely fashion could prove futile (especially if it is hidden from public view in a manager's office that is only open during business hours).¹⁵ While the Occupational Safety and Health Association requires employers provide fire extinguishers and first-aid kits for employees to use while on premises, AEDs have yet to be addressed in these standards and may not be available.^{16,17}

Given the lack of standardization that is associated with AED distribution, several focus group members cited this as a reason for not applying a device. Even if another bystander was able to go search for a device, keeping all parties on-scene was deemed more valuable than blindly searching for an AED that might not be available in the first place. Focus group

participants expressed disappointment that methods for 911 dispatchers to find a nearby AED unit (assuming there was one in close proximity) were lacking.^{18,19,20} Most felt that this type of mapping/technology should be a requirement for EMS systems such that 911 dispatchers could connect bystanders with an available device.

Unmanned aerial vehicles, or drones, may represent one opportunity to improve AED accessibility in the future. Drones speeds can reach up to 60 miles per hour, and GPS signals from a bystander's cell phone can steer a drone to its target location.²¹ To demonstrate the potential impact of using drones, Salt Lake County, Utah found that only 4.3 percent of the county could be reached within one minute if vehicles were dispatched from existing EMS stations.²¹ In contrast, drones dispatched from those same stations could reach 80.1 percent of the county within one minute.²¹ Not only would this be beneficial for early defibrillation in public spaces, it would also be advantageous in residential areas as well (where few AEDs are currently available).

Ability to remain calm under pressure

Participants in every focus session worried about “choking” under pressure. Indeed, studies have shown that psychological stress can impact behavior and that panicking during an OHCA event is not uncommon.^{22,23} To combat this, researchers have suggested expressive writing techniques or reframing tactics, but repetition is also important.²³ Studies do confirm that CPR and AED skillsets decline rapidly after the initial training.²⁴ Although regular retraining can improve retention, focus group participants cited financial concerns and/or time constraints as reasons for not recertifying. In response to such issues, Ahn et al., evaluated the impact of text messages to remind recently trained individuals to watch a short video clip about CPR and AED

use.²⁴ Psychomotor skills were assessed at baseline (immediately after the initial training) and 3 months later. Compared to the control group, retention of skills in the video-reminded group was demonstrated to be significantly higher.²⁴ While focus group members did like the idea of regularly texted reminders, other possible solutions are highlighted in Table 7.

Table 7: Strategies to prevent a decay in AED skills

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| <ul style="list-style-type: none"> • Upon completion of a CPR class, allow participants to opt in for text messages or emails that include links for brief refresher videos. • Implement annual retraining for students living in dorms or students that are part of Greek Life (not unlike annual training for alcohol poisoning). • Offer free pop-up events during club fairs or other festivals where previously trained individuals could practice on manikins / ask questions / have the ability to interact with the equipment outside of a classroom environment. • Incentivize recertification (e.g., employer paid, course credit, free gift). • Install practice equipment at public libraries. • Allow individuals to recertify with sensor-linked equipment and computer-based technology. This may reduce need for instructors and allow participants to complete skill renewals at more convenient times. |
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Type of patient

Across all focus group sessions, participants expressed more anxiety about applying AED pads to a pregnant patient or to a pediatric patient vs. other patient populations. Indeed, one analysis did find that children (ages 1-8 years) were less likely to have an AED applied by a bystander compared to adults.²⁵ Devices were applied by a layperson 9.5 percent of the time in the pediatric age group whereas AEDs were applied 11.3 percent of the time in the adult group aged 18 years or older.²⁵ No similar data was found for pregnancy.

The procedure to apply pads for these special patient populations is not necessarily different. If pediatric pads are not available, rescuers can use adult pads for children older than 8 years.²⁶ Adult pads can also be used for younger children, but the placement may need to be altered so that the two pads do not touch.²⁶ Focus group participants suggested that more targeted

training in these areas would help assuage fears. Several members did propose that “womanikins” could be helpful in this regard.²⁷

Litigation

Another reason arguing against early defibrillation was fear of legal consequences. However, one study recently determined that litigation was more likely when bystander intervention was not initiated.²⁸ Using an online database, 170 jury verdicts, settlements, and appellate opinions directly related to CPR or defibrillation were identified in the United States from January 1989 to March 2019.²⁸ Of those, only 32 cases were directed at individuals, of which only 3 cases were due to alleged battery (i.e., CPR caused harm).²⁸ Two of the three cases of alleged battery ruled in favor of the defendant.²⁸ The final case involved a nursing home employee that performed CPR on a patient with a preexisting “Do Not Resuscitate” order.²⁸ The authors urged that this case should not be factored into the risk calculation for the general public because code status cannot be reasonably known to a bystander.²⁸ Otherwise, these findings serve to reiterate that the legal implications for a bystander who initiates early defibrillation are scant, and this has been the case for over 30 years.

Although all 50 states have Good Samaritan laws that protect citizens who choose to act during an emergency, the language of these statutes may vary from one jurisdiction to another.²⁹ To circumvent such issues, members of the 118th Congress recently introduced the Cardiac Arrest Survival Act of 2023.³⁰ Building upon legislation from 2000, the hope is that this bill will establish universal liability protection for businesses that provide AEDs as well as for the Good Samaritans who use those devices. Disseminating such information to potential rescuers will be important to improve bystander confidence to intervene.

Not realizing the importance of early defibrillation

The majority of focus group participants reported that they understood the importance of high-quality CPR following their training course. They felt that instructors had accurately stressed the impact of compression depth, compression rate, and the need for full chest recoil. In contrast, the value of early defibrillation was less emphasized. Focus group members gauged that bystanders would be more willing to apply an available AED knowing that a 3-minute window significantly improved survival rates. Perhaps the tendency for an individual to wait for another bystander (who might have more experience) or to delay defibrillation until EMS arrived would be diminished. All participants felt that this type of information should be more publicized.

Separate reasons that bystanders might not apply an AED have been described by other authors.^{31,32} Some possibilities included the presence of bodily fluids, fear of infection, patient is a female (concern for exposing breasts), patient is of a different race, patient shows evidence of intravenous drug use, or relationship to patient. However, for this study, these concerns were infrequent or nonexistent. Researchers have also examined the emotional challenges that can follow a rescue attempt by a layperson, suggesting that feelings of anxiety, confusion, insomnia, or guilt can be significant.³³ Even so, focus group participants in this study did not cite these as concerns that would impact their decision to intervene.

Limitations:

This study likely has selection bias that favors inclusion of a study population with higher CPR training rates and greater comfort using AEDs. By distributing the Qualtrics survey to general education classrooms, the goal was to recruit students from a variety of different majors,

all with unrelated experiences. Ultimately, however, the students that signed up to participate in focus groups were predominantly female and primarily STEM majors. Additionally, the final number of focus group volunteers was small, only representing about 7 percent of the total number who completed the Qualtrics survey. Consequently, these focus groups were likely not a representative sample of college-aged students as a whole.

The Qualtrics survey used to recruit focus group participants was not validated.

While an individual's decision about applying an AED was not announced or linked to any participant, some students may have felt uncomfortable sharing their genuine opinions in a group setting. This may have impacted the information contributed.

Students who had not yet completed a CPR training course were not invited to participate in a focus session. Without a working knowledge of AED mechanics, the concern was that these individuals might be unfamiliar with some of the terminology, making it difficult for them to fully contribute. However, the perspectives of this cohort should not be ignored. Future focus groups could align them with other students of similar skillsets, but due to the limitations of the online scheduling tool, students could not be sorted into "trained" or "untrained" sessions for this present study.

Conclusions:

Regarding defibrillation, young adults with previous CPR training often lacked confidence, feared litigation, or acknowledged that they were unaware of the importance of early intervention as reasons for not applying an AED. However, upon learning that the window of time to significantly impact OHCA survival is small, most young people agreed that greater bystander involvement is necessary. In order to increase this type of engagement, students hoped

that several barriers would be addressed. For example, the simplicity of AED technology needs to be reinforced to the general public. Television media portrays the devices as complex, only to be used by professionals. This sends the wrong message. Next, AED registries must be created so that bystanders and/or 911 dispatchers can quickly direct potential rescuers to available devices. Access points need to be more standardized across all businesses such that safety resources (e.g., AEDs, fire extinguishers and first-aid kits) are displayed together with prominent signage and always near the same landmark (e.g., restrooms on the ground floor). Training should be reinforced at regular intervals. Whether that means more pop-up events at community festivals or text messages that link to a short video, modalities need to be fast, free, and convenient. Finally, legislators need to clarify existing laws and/or create new regulations that guarantee protection for any bystander who acts in good faith.

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