Cardiopulmonary Resuscitation Training in Select Rhode Island High Schools: A Descriptive Study

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ABSTRACT

Fewer than 15% of people who have out-of-hospital cardiac arrests survive, but chances of survival can be tripled with effective bystander cardiopulmonary resuscitation (CPR). The majority of states, including Rhode Island, require high school CPR training, yet the impact of this is not well studied. A 33-question REDCap survey regarding cardiac arrest preparedness, CPR education, and barriers to CPR training was emailed to high school staff in Rhode Island. There were 62 responses; 26% reported their school taught CPR and 94% felt it was important for students to have CPR certification. Barriers included time (85%), budget (82%), and materials (79%). Over 80% felt students would not be able to perform high-quality CPR or properly use a defibrillator. Despite laws requiring CPR training and the belief by school staff of the importance of CPR training, the majority of students are not receiving CPR training. Staff report students do not have the ability to perform effective CPR or use a defibrillator.

KEYWORDS: cardiopulmonary resuscitation (CPR) instruction; automated external defibrillator instruction (AED); high school; students; cardiac arrest

INTRODUCTION

Over half a million people each year experience a cardiac arrest in the United States.[1] Less than 15% of people who have an out-of-hospital cardiac arrest survive, but survival can be tripled with bystander cardiopulmonary resuscitation (CPR).[1,2] Rates of bystander CPR range from 32–61%.[3,4] Use of automated external defibrillators (AEDs) has also been shown to increase cardiac arrest survival, yet layperson use of AEDs is around 2–7%.[3,4]

One out of every 250–600 cardiac arrests occurs on school grounds.[5] Both the American Heart Association (AHA) and the American Academy of Pediatrics (AAP) endorse CPR training of school staff and high school students.[6,7] Currently, 40 states have laws requiring CPR training for high school graduation.[8] In 2013, Rhode Island passed a bill requiring CPR training and an overview of AED use for all high school students.[9] The law requires hands-on practice to support cognitive learning, but formal certification is not required. Similar to many other states, no funding was allocated for the implementation of this law.[10] Teachers in the state of Rhode Island are not required to have CPR certification; however, school nurses and coaches must be CPR-trained.[11,12]

CPR instruction results in improved knowledge of CPR. A study of 7th–9th grade students who participated in a presentation on basic life support (BLS), a discussion session, and simulated scenarios had significant improvement in BLS skills.[13] In addition, interventions with high school students such as chest compression-only CPR training and brief CPR videos have resulted in students starting chest compressions earlier compared to students who were not trained.[14]

The impact of CPR training laws has not been well studied. One study found people who lived in states with mandatory CPR training for high school graduation were more likely to be trained in CPR, showing a positive effect of training mandates.[15] It is unknown how the legal requirement of teaching CPR and AED use in Rhode Island high schools has been implemented. This study aimed to assess Rhode Island school employees' perspectives on cardiac arrest preparedness. In addition, it aimed to examine school employees' perspectives on the training of and barriers to teaching high school students CPR and AED use.

METHODS

Five Rhode Island school districts were contacted via email about participating in a survey study of CPR and AED education. We contacted staff in the four core cities of Rhode Island, which are the cities with the highest percentage of children living in poverty (33%).[16] We focused on these four districts because we felt they would have the greatest number of barriers to teaching CPR. We also reached out to the principal of a fifth school district where the childhood poverty rate was closer to the state average to have survey data from a variety of school districts. Three school districts, out of a total of 32 school districts in the state, agreed to participate in the study, including two core cities and one additional school district. These three districts enroll 26% of the students in the state of Rhode Island.[16]

Between October and November 2020, an online survey was distributed using REDCap. The survey took approximately five minutes to complete. One point person from each district, such as a principal or school leader, forwarded

our brief, anonymous survey to teachers, coaches, administrators, and nurses. The total number of survey invitations sent out is unknown because of how the survey was distributed. As an incentive, participants received a five-dollar Amazon gift card for completing the survey. Consent was obtained at the start of the survey, and respondents answered yes to consent or no to end the survey. Participants were told the purpose of the survey was to understand their experiences with cardiac arrest preparedness in schools and CPR certification for high school students. Participants were informed that responses would be de-identified before use. The survey was anonymous; however, if participants wanted to receive a gift card, their email address was collected for gift card distribution.

INSTRUMENTATION

The survey consisted of 33 questions. The first section focused on respondents' characteristics, including their role at the school, whether or not they are certified in CPR, reasons they are certified in CPR, and history of witnessing cardiac arrest or performing CPR. The next section focused on questions about schoolwide preparation for a cardiac arrest, such as which adults are CPR-certified and the presence of an AED on the school campus. The third section of the survey focused on student CPR and AED training, such as when CPR is taught in schools, what grade it is taught in, and how it is taught. The last section of the survey asked questions about respondents' opinions on the importance of CPR training and barriers to CPR training.

DATA ANALYSIS

The data were described using descriptive analyses. Responses about the importance of CPR training were dichotomized into not important ("not at all" or "slightly important") and important ("moderately important," "very important," or "extremely important"). Responses about preparation for cardiac arrest were dichotomized into not prepared ("not at all prepared" or "slightly prepared") and prepared ("somewhat prepared," "moderately prepared," or extremely prepared"). Responses about the agreement with statements were dichotomized into agree ("strongly agree" or "agree"), neutral, and disagree ("disagree" or "strongly disagree").

IRB Approval

This study was determined to be exempt by the Rhode Island Hospital Institutional Review Board.

RESULTS

A total of 62 responses were collected from teachers (n=46, 74%), coaches (n=9, 15%), school nurses (n=7, 11%), school administrators (n=6, 10%), and others (n=5, 8%).

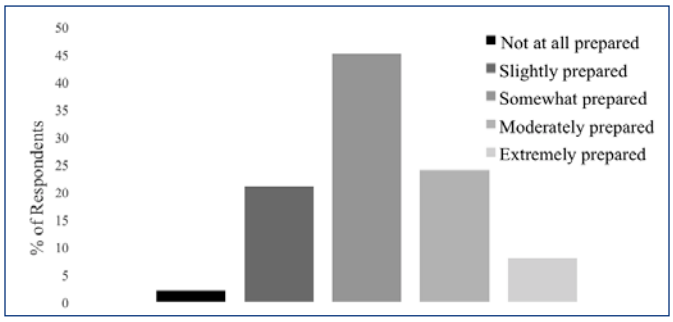
CPR Training in School Staff

The majority (n=34, 55%) of staff were not CPR-certified. However, the majority of respondents felt it was important for school staff to be CPR-trained, including school CPR instructors (n=61, 98%), coaches (n=60, 97%), administrators (n=60, 97%), and teachers (n=59, 95%). The most common reasons respondents were CPR-certified were: as a job requirement (n=20, 71%), to support job preparedness (n=10, 36%), and to support preparedness for other roles in the community (n=14, 50%); 18% of respondents (n=11) reported CPR has been performed at their school.

Cardiac Arrest Preparedness

The majority (77%, n=48) of respondents reported their school had an AED, which was most often located in the gym (54%, n=26), front office (46%, n=22), or nurse's office (44%, n=21); 27% of respondents (n=17) did not know if their school had an AED or where the AED was. A minority of respondents reported that their school had a cardiac arrest action plan (n=14, 23%), with most responding "I don't know" (n=41, 66%). However, 77% (n=48) of those surveyed felt their school was prepared to respond to a cardiac arrest (see **Figure 1**).

Figure 1. Preparedness of Schools to Respond to a Cardiac Arrest



CPR and AED Instruction in High Schools

One in four respondents reported their school provided training in CPR to students (n=16, see **Figure 2**), with most responding CPR training was not provided (42%, n=26) or unsure (32%, n=20). Of schools with CPR training, 81% taught CPR in 12th grade (n=13), with CPR being also taught in 11th grade (50%, n=8), 10th grade (25%, n=4), 9th grade (13%, n=2), or after school (1%, n=1). Eighty-one percent taught CPR in health class, but CPR was also taught in physical education (31%, n=5) and elective (25%, n=4) classes. CPR was taught by a variety of instructors, including teachers (69%, n=11), coaches (19%, n=3), and American Red Cross instructors (6%, n=1); 25% (n=4) reported that those who give CPR instruction were officially certified in CPR. The majority of those surveyed reported that the curriculum used to teach CPR was a teacher or instructor self-designed course. CPR instruction was most often done by demonstration, video, or lecture, with only one-third reporting

Figure 2. Percentage of Respondents Who Report Their School Teaches CPR

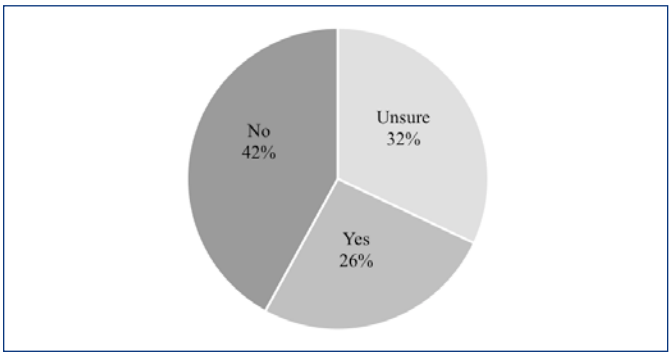


Figure 3. Agreement with the Statement that Students are Prepared to Respond to a Cardiac Arrest by Performing Effective and High-Quality CPR or Properly Using an AED

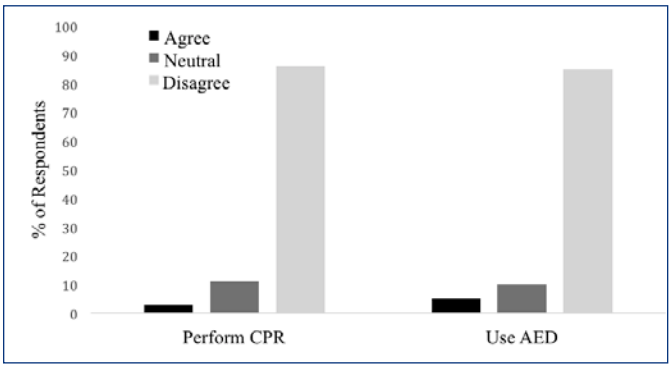
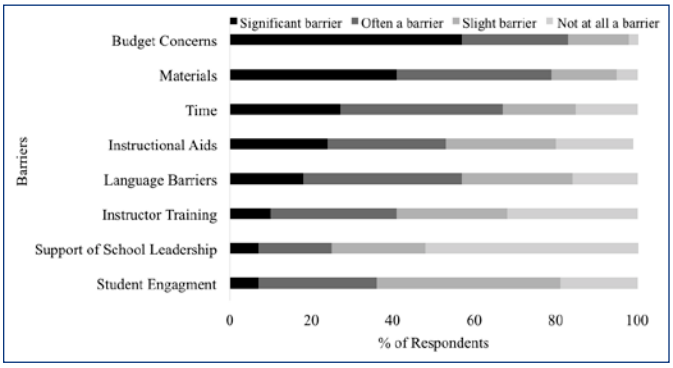


Figure 4. Barriers to Teaching CPR to High School Students



hands-on practice. Instruction in AEDs was done in the minority of schools (22%, n=13) and was mainly done using lecture (46%, n=6), video (46%, n=6), and demonstration (46%, n=6). Only 31% (n=4) reported hands-on AED practice.

Importance and Challenges of Teaching CPR and AED Skills

CPR certification for high school graduates was believed to be important by most (94%, n=58). The majority (86%, n=53) disagreed with the statement that most students would be able to perform effective and high-quality CPR until EMS arrived (see **Figure 3**). A minority (3%, n=2) of respondents felt students graduated with the confidence to perform CPR. In addition, only 5% (n=3) felt most students would be able to find and properly use a defibrillator. The biggest barriers to training all high school students in CPR were: time (68%, n=42), budget concerns (82%, n=51), and materials to practice (79%, n=48) (see **Figure 4**).

Open Response to CPR and AED Instruction

Over 50% of respondents answered the free-response question, "Anything else you would like to say about CPR training in high schools?," and all were positive regarding CPR and AED instruction. Selected responses include:

"It could save a life. I had a brief course many, many years ago in high school but I used it to keep my mother alive when she had cardiac arrest until the EMTs arrived." —Teacher

"This is a definite need….because of their economic situation our students are less likely to have these trainings."—Teacher

"This type of training can be highly engaging for students and a gateway into many topics about the human body (anatomy and physiology). We NEED this in our school!" —Teacher

DISCUSSION

This study aimed to assess CPR and AED training in select Rhode Island high schools. Despite state-level laws requiring CPR and AED training, only 26% of respondents reported students are receiving CPR training. Importantly, the majority (94%) felt it was important for students to have CPR certification. Other studies in states which require CPR training for high school students have found that up to two-thirds of school administrators report their school has CPR training, which is higher than what we found in our study.[10] The difference in reporting may be due to who was surveyed, as school administrators may be more likely than other school staff to know what is being taught or may feel pressure to report that state-mandated training is being done. Unsurprisingly, given the low rates of CPR instruction, most staff reported students would not be able to perform effective and high-quality CPR until EMS arrived or find and properly use a defibrillator. These findings highlight the need to increase rates of school CPR training and are an opportunity for local hospitals and community health advocates to partner with schools to offer CPR training, as lack of knowledge has been cited as the number one reason teachers do not feel comfortable teaching CPR.[17] Our data support the idea that school staff would be engaged in such training.

In regards to CPR instruction, we found students were most often informally taught CPR, without CPR-certified instructors or state-mandated hands-on practice. In addition, we found that the majority of staff in our study were not CPR-certified, yet 18% reported CPR had been needed

at their school. Although we found low rates of CPR certification, over 95% of those surveyed felt it was important for CPR instructors, coaches, administrators, and teachers to be trained in CPR. At this time, CPR training is not universally required for teacher certification and varies by state.[18] Given that an increasing number of states are mandating CPR to be taught in schools, requiring teachers to become CPR-certified would likely increase the quality of CPR instruction in schools as well as the ability of schools to respond to an on-campus cardiac arrest. A community health initiative that leverages the expertise of local medical trainees such as nursing, physician assistant, and medical students or residents may be one avenue to increase the percentage of CPR-certified students and staff. In addition, training school nurses as CPR instructors may be another way to help increase rates of CPR certification in schools.

Several areas were identified that could positively impact cardiac arrest preparedness. Professional development in schools should focus on making sure staff members are familiar with the location of the school's AED and ensure an AED is in place, as about one-quarter of those surveyed reported their school did not have an AED. It is impossible to know from this study if respondents simply did not know that their school had an AED or if there is actually no AED present at their school; however, this rate is similar to a study of school nurses which found approximately 28% of schools do not have an AED.[19] In addition, only half of respondents reported their school had a cardiac arrest action plan, suggesting that reviewing an emergency response plan during professional development could support staff members in their comfort with responding to a cardiac arrest.[19]

Lastly, school budget concerns and materials to teach CPR were identified as two of the largest barriers to training all students in CPR, which have been found as barriers in similar studies.[10,20] Despite overall increasing rates of bystander CPR, there continue to be health disparities in rates of bystander CPR, with people in low-income, Black, and Hispanic neighborhoods initiating CPR at lower rates than in high-income White neighborhoods.[21–23] If states can provide funding and materials for training, this could help to eliminate barriers to teaching CPR. Targeting lower-income school districts for CPR funding may be one way to reduce inequities in bystander CPR and increase cardiac arrest survival rates. Time was also cited as an important barrier to teaching CPR. We found a vast variation in what setting as well as with what resources students were taught CPR. A state or national curriculum for teaching CPR and AED use could eliminate some of the variances in this, improve instruction, and remove the time pressures of where to teach cardiac arrest training.

Our study has several limitations. First, this study was conducted with school staff members rather than students, thus students may feel more (or less) prepared and confident with CPR and AED skills than staff report. In addition, this study was done in a single state with a CPR/AED law in place for over seven years, and thus may not be generalized to other states. Lastly, we do not have an official response rate, as we distributed the survey to school leadership. Thus our sample may reflect only a minority of school staff, with distribution selected by school administrators, and further self-selection bias among individual recipients.

CONCLUSIONS

The majority of states, including Rhode Island, have taken the first steps toward improving CPR and AED education by passing mandates for training; however, this study highlights that legislation is not enough. Our study shows that simply passing legislation does not result in compliance with statewide CPR and AED mandates. Unfortunately, our study shows the vast majority of school staff do not believe high school students would be able to perform effective and high-quality CPR until EMS arrived or be able to find and properly use a defibrillator. Further advocacy is needed to ensure Rhode Island students graduate high school with the ability to perform the lifesaving skills of CPR and defibrillation.

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Disclosures

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