

The Introduction of an
Automatic External Defibrillator (AED) System into
Knutson Construction

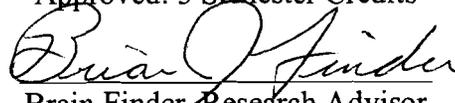
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A Research Paper
Submitted in Partial Fulfillment of the
Requirements for the
Master of Science Degree
in

Risk Control

Approved: 3 Semester Credits


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August, 2006

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Title: *The Introduction of an Automatic External Defibrillator (AED)
System into Knutson Construction*

Graduate Degree/ Major: MS Risk Control

Research Adviser: Dr. Brian Finder

Month/Year: August, 2006

Number of Pages: 29

Style Manual Used: American Psychological Association, 5th edition

ABSTRACT

The purpose of this study is to identify the needs and best practices for the implementation of an Automatic External Defibrillator (AED) program within Knutson Construction. A survey was used to identify and thus extinguish possible gaps before they occurred during the AED implementation processes. Seven staff members were surveyed on items which may discourage the deployment of the program if not properly identified and corrected. It was concluded that additional staff members need to be trained on the usage of an AED system, each job site needs to distinguish how many AEDs need to be present to meet the maximum three-minute response time requirements, and a certified vendor should be used for purchasing a prescription of an AED and to assist in placement.

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Chapter I: Introduction

Coronary heart disease is the number one cause of death in the United States (American Heart Association [AHA], 2006b). On average, nearly 350,000 individuals die from cardiovascular distress, each year. To assist an individual who is experiencing cardiovascular distress an AED may be used. An AED is a device that delivers electric shocks to assist with re-establishment of constant heart rhythms of a cardiovascular distress victim (Constantine, 2005). AEDs have become more available in businesses since President Clinton's signing of the Cardiac Arrest Survival Act (CASA) which assisted in the promotion of AEDs and set more implementation guidelines (Starr, 2001). With AEDs becoming more accessible, many companies are now implementing them into their company's safety programs. Over the last several years, businesses have experienced lawsuits when an AED program or immediate accessibility to an AED has not been provided. These devices are even becoming legally required in that 11 states currently require AEDs to be implemented in schools, state buildings, nursing homes, health clubs or/and state vehicles (Constantine, 2005).

This study will focus on assessing AED needs for a construction company. Knutson Construction is a commercial firm that has been serving companies since 1911 in Minneapolis/St. Paul and Rochester, Minnesota and in Iowa City, Iowa (Knutson Construction, 2004a). A variety of construction services are offered by this contracting firm including pre-construction, general construction, construction management, and designing/building (Knutson Construction, 2004b). From a workforce standpoint, finishers, masons, iron workers, carpenters, laborers and operators of heavy machinery are employed by Knutson Construction. Many subcontractor facilities are also an

intricate asset to this organization; Knutson Construction takes responsibility for the wellbeing of these employees as well as other organizations /consultant agencies that are on Knutson Construction work sites.

Staff within the construction industry can be exposed to numerous hazards, including the potential for falls, lacerations, physical stress, heat and cold exposures, electrical hazards, and hazardous materials. Knutson Construction is concerned about lowering the number of injuries as well as reducing the severity of an injury when it does occur, while forming a healthy work environment (Knutson Construction, 2004c). Best practices are important to Knutson Construction's safety culture. Even though AEDs are not required, Knutson Construction still wants to introduce AED devices to assist in the well being of their employees. Without AEDs on-hand or an AED program implemented, Knutson employees also stand an increased chance of experiencing a more serious problem or even death. Being proactive rather than reactive to these kinds of situations is extremely important, and Knutson Construction could benefit greatly by implementing an AED program. Consequently, Knutson Construction workers have the potential to experience greater losses in the event of sudden cardiac arrest (SCA) without the implementation of an AED program.

Purpose of the Study

The purpose of this study is to identify the needs and best practices for implementation of an AED program within Knutson Construction.

Goals of the Study

1. Examine the current techniques and procedures used by Knutson Construction for assisting those experiencing cardiovascular distress.
2. Assess the employee training practices and the first aid equipment placement approaches that are utilized by Knutson Construction.

Background and Significance

Construction workers are often subjected to harsh environmental conditions and hazards on the job. Some areas, like the Midwest, take these conditions to extremes with exposure to below-zero weather, strong winds, changing precipitation, humidity, temperatures above 80 degrees Fahrenheit, etc. Many job duties which involve these conditions tend to place people in a high risk situation that could lead to cardiac arrest from the physical strain that is placed on the body. With the equipment and the tasks required for construction, electrical hazards are also a concern for staff, although they are not one of the top two reasons why SCA occurs (Starr, 2001). Both environmental hazards and electrical hazards are daily exposures which Knutson Construction employees endure.

Knutson Construction is concerned with the needs of their employees. Up to this point in time, Knutson Construction has experienced one death because of cardiac arrest, although it is not known if this situation could have been avoided with the assistance of an AED. Knutson Construction's goal is to have the most recent and best practices in place to help ensure the safety of their employees.

Assumptions of the Study

It will be assumed the workers are already in adequate health with no life threatening health concerns that would increase their probability of a heart attack.

Definition of Terms

Automatic External Defibrillators (AED). “An AED is a portable device that analyzes the heart’s rhythm and, if necessary, allows a rescuer to deliver an electric shock to an SCA victim” (Constantine, p. 36).

Defibrillation. “... may halt the rapid chaotic heart activity of SCA and help the heart to reestablish an effective rhythm of its own” (Constantine, p. 36).

Chapter II: Literature Review

The purpose of this study is to identify information needed for Knutson Construction to transition AEDs into the company's emergency response program. Knutson Construction is concerned with employee safety as well as morale related to having an AED program. The information being covered in this review includes the history of AEDs, physical aspects of how AEDs work with the body, placement of an AED within a business, government regulations that support AEDs, concerns when implementing an AED program, training, environmental exposures, and the costs that are associated with purchasing as well as maintaining such devices. All of these related areas should be examined when considering an AED program.

The History of the Automatic External Defibrillator (AED)

Defibrillators have been part of the medical profession for the last 50 years (Starr, 2001). Through various technological advances, defibrillators have become more mobile. Since 1979, mobile AEDs have been slowly adapting into non-medical workplace environments. President Clinton introduced the Cardiac Arrest Survival Act (CASA) on November 13, 2000. Since the passing of this nation's law which was identified as House of Representatives (H. R.) 2498, the CASA regulatory controls have been forming and are still expanding the awareness of AEDs. CASA also required the assistance of the Department of Health and Human Services to promote and regulate guidelines of facilities when using AEDs in a non-medical, professional setting. This particular task was assigned directly to the Secretary of Health and Human Services.

Physical Aspects of How AEDs Work with the Body

An AED works with the fibrillation of the heart when an individual goes into cardiac arrest and is only meant to work when an individual has no sign of heart rhythm (AHA, 2006a). When a person first starts experiencing the onset of SCA, it is necessary that he/she receives immediate medical attention because the chance of survival usually decreases 10% for every minute that medical assistance is not given (Constantine, 2005). After 10 minutes, the body is unable to sustain life (Latty, 2003). According to the AHA (as cited in Constantine) "...early defibrillation could raise survival rates 20% or more" (p. 36). An AED allows an inexperienced rescuer to rapidly administer defibrillation to a SCA victim. It is estimated, in the United States, that almost 40,000 lives could be saved each year from proper accessibility of AEDs to SCA victims (Constantine, 2005).

A major health concern one could experience from a cardiac arrest is lack of oxygen to the brain. Thus, besides preventing death or cardiac arrest complications, AEDs also provide great assistance in preventing brain damage. The brain is able to survive for approximately six minutes after the heart stops beating (Biology-Online.org, 2006). After four minutes without oxygen, brain cells have already started dying and the first stages of brain damage may have already occurred. The average human will experience permanent brain damage after four minutes without oxygen and by the sixth minute, brain death starts to occur. An AED used with Cardio-Pulmonary Resuscitation (CPR) allows for the necessary immediate medical attention one needs when experiencing any kind of cardiac distress for a variety of health concerns and/or issues (Constantine, 2005).

In order to maximize the effectiveness of an AED, CPR should be implemented with the use of an AED to assist with supplying oxygen to the body. Half of all individuals who collapse due to a form of heart distress require defibrillation with the use of CPR to supply oxygen to the body. Constantine (2005) stresses the importance of utilizing CPR in the AED process.

Early CPR is an integral part of providing lifesaving aid to people suffering sudden cardiac arrest. CPR helps to circulate oxygen-rich blood to the brain. After the AED is attached and delivers a shock, the typical AED will prompt the operator to continue CPR while the device continues to analyze the victim. (para. 8)

The combination of AEDs and CPR is a vital tool when assisting an individual who is experiencing cardiac distress. CPR should always be used with an AED. An AED is not beneficial to a SCA victim when the body is not receiving oxygen (Constantine, 2005).

Placement

The AHA supports placing AEDs in areas that have large gatherings of populations or have significant numbers of individuals who are at high-risk for cardiac arrest (AHA, 2006a). Places of high risk include shopping centers, office complexes, sporting events, and living centers. For the best practices of implementing an AED system, the AHA strongly encourages that a solidly formed AED program be developed. This means any place of high risk should also have a well established set of procedures along with assigned job duties for every employee who is a part of the response team in the event that a person experiences a SCA. Currently, 11 states require public buildings

to have AEDs. However, it is not enough to just have the necessary materials on hand; also required are staff, set procedures, and first-hand practice or experience in order to operate the AED effectively (Constantine, 2005).

Given the nuances that exist within each organization, it would seem reasonable that the placement of AEDs needs to be examined by each place of business. The National Center for Early Defibrillation; recommendation is that every staff member must be reached in a three minute interval once they have collapsed by a responder with an AED (National Center for Early Defibrillation, 2001). Call-to-shock is the time allowed for the sequence of events when assisting a cardiac victim and such time should not be more than a five minute period. It includes the trained responder being notified of the situation, the AED being gathered, reaching the victim, and the delivery of the first initial shock once the electrodes have been placed. The local EMS team may assist with the best placements of an AED to reach the most staff. When a company is not able to abide by the five minute call-to-shock rule, more than one AED should be placed in a given area (National Center for Early Defibrillation, 2001).

Regulations

Industries as well as certain regulatory agencies have made AED programs mandatory for some organizations. Commercial airlines are an example of an industry that is required to provide AED, as well as a set program for their usage. This requirement was established in 1998 with the Federal Aviation Medical Assistance Act which stated that all passenger carrying commercial aircraft must be equipped with AEDs (Constantine, 2005). In June of 2004, American Airlines was the first airline to have an AED program, and to date they have saved the lives of 50 people through the use of

AEDs. American Airlines has had a 56% survival rate with the implementation of CPR and AEDs, which is significantly higher than the national survival rate of 1% (Constantine, 2005).

Because of the established regulations by the Federal Aviation Medical Assistance Act, other agencies have also started introducing AED programs and are thus experiencing their benefits. Overall, this has encouraged mandating the use of AEDs in other governing agencies such as the Department of Transportation and the Food and Drug Administration, with specific guidelines being established by the CASA, state regulations, and the AHA (Constantine, 2005).

More regulations are being developed as agencies learn from public experiences that are related to AED-related responses to SCA. This practical information helps to provide the specifics needed for better guidelines regarding the use of AEDs. Constantine stated that, "With nearly 1,000 people in the United States suffering from SCA each day, pressure is building on legislators to better protect the public" (2005, p. 36). Certain regulatory agencies govern even higher standards regarding AED utilization above the federal regulations recommended by the Department of Health and Human Services. The Food and Drug Administration (FDA) is an example of an agency that has recently moved above and beyond the Department of Health and Human Services regulations. The FDA requires regulatory facilities to have a physician's prescription to purchase an AED (AHA, 2006a). Companies that are not covered by any industry regulations are governed by the H.R.2498, Public Health Improvement Act, SEC. 404, Good Samaritan Protections. The act legally protects trained individuals while assisting a SCA victim (Starr, 2001).

Methods of Implementation

There is more involved in starting an AED program than simply buying the unit and mounting it on the wall. According to the National Center for Early Defibrillation (2001), there are four main aspects a company should take into consideration before adapting an AED. First, the person(s) who acquire(s) an AED must notify the local emergency medical service office. Even before implementation, it is highly recommended that a company work with the local emergency medical service on AED placement(s) and best practices of usage. This allows the EMS team to understand the company's internal response procedures during an AED usage (National Center for Early Defibrillation, 2001).

Another aspect that should be taken into consideration when implementing an AED program is to have a licensed physician or medical authority provide medical oversight to ensure proper training and placement of an AED (National Center for Early Defibrillation, 2001). In addition, persons responsible for using the AED should be trained in how to use an AED in conjunction with CPR. This can be done by the use of videos or working with a training organizational program. Although it is not required for all employees to be trained on how to use the AED, it is recommended by the National Center for Early Defibrillation. After implementation, scheduled mock drills should be performed to keep staff updated on the company's AED program.

Training

Training usually assists the instruction of staff to properly recognize the signs of an individual experiencing SCA. This training is a vital tool for an AED operator. By understanding the signs of SCA, the respondent knows when to notify the local EMS

office and how to assist the performance of the AED with the use of CPR (AHA, 2006a). The operators of AEDs should also be familiar with the model of AED their facility is using to limit the potential for equipment use-based error and to assist the success of the AED. When a staff member is trained on the use and practices of an AED, he/she should be able to properly identify hazardous situations and be able to avoid potential dangers for themselves and the victim (AHA, 2006a).

A few sources mention the “chain of survival” when discussing training techniques for saving SCA victims. These four steps of victim saving are thoroughly spelled out by Starr (2001) and include “1) early recognition and call for emergency medical services; 2) initiation of basic life support CPR; 3) defibrillation; and 4) advanced cardiac life support (ACLS) drug intervention” (p. 2). These events are all time-related and a SCA victim’s survival could greatly depend on the availability of an AED. Knowing and using these steps while combining them with an AED will greatly enhance the chance of saving a SCA victim’s life, especially when implemented in those vital, first minutes (Constantine, 2005). It also may be beneficial to contact the local EMS system about local and state requirements as well as procedures regarding AED training in their specific locations.

Work Environment Exposures

Because it may be possible for certain commercial construction companies to expose staff to a variety of elements when working in an outdoor setting, especially in the mid-western part of the United States, it is necessary to take into consideration weather-related concerns and/or issues when purchasing an AED or implementing an AED program. For instance, AED use is not recommended during times of precipitation or in

wet environments (Jorgenson, Lyster, & Morgan, 2003). In a wet environment, individuals assisting in or using the AED could also experience different levels of shock exposure. The electrical shock given from the AED to a distressed individual may very possibly travel through the individual and through water, possibly making a ground out of the person who is assisting as well as on-lookers. The shock that may be received by the administrator and/or on-lookers is normally not life threatening. The AED administrator and/or an on-looker standing 15 cm from the victim has the potential to be exposed to a current of 14 mA (milliamps) peak in fresh water and a current of 30 mA peak in salt water. However, even with the maximum exposure of 30 volts, an administrator or bystander would only feel a slight sensation from the shock being administered; the exposure is under the limits of governing safety standards. Although Jorgenson et al. (2003) clarified that AEDs could be used in a wet environment, a risk is still present and people should always try to perform defibrillation in a dry environment.

After researching several different AED production companies, no statistical data could be located regarding the effects that humidity may have on the storage of equipment. A hard container that protects from moisture, such as a pelican case, is believed to protect an AED from most forms of precipitation. It is available for purchase and will protect an AED from the elements when it is not in use (personal communication, April 11, 2005, L. Swely).

AEDs should not be stored in temperatures that could cause the batteries to freeze. At this point, all manufactured AEDs are battery operated and therefore to prevent possible malfunctioning of such a device, it should be stored at standard room temperature, which is 25° Celsius. However, even when storing an AED at room

temperature and then using it in freezing weather, there is no guarantee as to how long the batteries will work properly before it malfunctions. This is a situation that manufacturers are trying to rectify, to-date have been unsuccessful at addressing (Zoll AED Plus, 2004).

Expenses

As a result of a company lacking AEDs, when they likely would have helped a situation, several costly lawsuits have occurred. One example is a case at a health club in Massachusetts where a man collapsed and remained in cardiac arrest for nine minutes (Constantine, 2005) because the club did not have an AED on the premises. Paramedics were able to restart his heart, but he most likely had already suffered permanent brain damage. His family settled with the health club for 1.8 million dollars. When comparing a cost such as this to the typical \$1,500 to \$2,000 spent for an AED, the decision to purchase an AED is obviously more financially sound. Any company should be willing to review past situations and make informed comparisons before coming to a decision on implementing AEDs (Latty, 2003).

In the article *On Guard Against a Major Killer*, Constantine indicated that AEDs can be more than a money saver to a company (Constantine, 2005). AEDs can assist in raising the morale of staff members, in addition to protecting such individuals from death or becoming disabled. Constantine states:

An AED defibrillation program not only saves lives, but also is good for company morale. It shows that an employer is doing all it can to protect its employees.

And such programs can positively affect a company's bottom line. When you weigh the average \$2,000 cost of an AED against the cost of lost productivity, a

potential lawsuit, or a disabled or deceased employee, it would seem to be a wise investment. (p. 38)

AEDs can offer a security to both a business's finance resources and make an employee feel protected in the event he/she should experience a SCA.

Summary

Even though it is not mandatory for an organization to implement an AED program, it is mostly likely an investment that will protect both the company and the well-being of the employees. Constantine (2005) stated that that if a company is seriously interested in doing what is best for their employees and wants to protect itself from costly lawsuits, a small investment in an AED might provide great savings to them.

Since AED usage is growing, more companies are looking into areas of precaution. This may be closely related to the number of lawsuits regarding health and well-being. Companies may need to look more closely into the cost-benefit aspect of AED use and the potential to safeguard themselves and their employees from possible serious injuries, death, or lawsuit, especially if they do not have a solid AED program. Because it may be in a company's best interest to be proactive rather than reactive, they should examine the benefits as well as the need for AEDs and the potential for such devices to heighten the safety and morale of the staff.

Chapter III: Methodology

The purpose of this study is to identify the needs and best practices for implementation of an AED program within Knutson Construction. The goals of the study are to review current techniques and procedures for assisting those experiencing cardiovascular distress, and assess the employee training practices and the first aid equipment placement approaches that are utilized by Knutson Construction. To evaluate the implementation of an AED program, a survey was developed to answer questions that arose from the literature review and the goals of the study.

Subject Selection and Description

The sample population will consist of project managers chosen by the Safety Director, Mike Neilson, of Knutson Construction in the Minneapolis/ St. Paul offices. Project managers were chosen because they will be in charge of directing the emergency response team in the event of an incident that requires an AED.

Instrumentation

A survey will be used to assist with the implementation of an AED program into Knutson Construction. The survey will be used by the organizations safety department to identify issues that need to be addressed during the training on equipment usage and placement of AEDs. The survey was made with the assistance of the safety department and from the information found in Chapter II for Knutson Construction. The survey was designed around issues that were identified during the literature review and was only designed for Knutson Construction. The survey addressed the feelings that individuals had towards the implementation of an AED program, estimation of populations on the job sites, and sizes of the job sites.

The questions below were used to identify working environments and the type of training needed for implementation of an AED program into Knutson Construction.

1.) With the proper training, would you feel comfortable using an AED?

Yes _____ No _____

2.) Please estimate below how many individuals are at your facility during typical work day.

Knutson Staff Members _____

Contractors _____

3.) Do you keep your trailers heated or air conditioned during non working hours?

Yes _____ No _____

4.) Please describe below any security system you currently have on the workers' trailers to assist in the misplacement of equipment.

5.) Are there any activities or duties on your job sites that would prevent an individual from receiving assistance within a three minute period in the event of cardiac arrest?

6.) Due to work schedules, is there a possibility all the trained CPR staff members could be off site at the same time?

Yes _____ No _____

Data Collection Procedures

The surveys were e-mailed to all of the project managers of Knutson Construction by the company's Human Resource Department to protect the identity of all participants. To assist in promoting an understanding of the individuals' rights, a human subject form was sent to the participants. It stressed that all individuals need to fully fill out the

permission form prior to taking the survey or their data would not be used. Participants will be given the opportunity to not participate in the study or to withdraw at anytime during the study.

Data Analysis

The questionnaire was used to identify areas of concern. The responses provided insight about needs to be identified during the training process and what has to be addressed when the organization introduces an AED to every site.

Limitations of the Study

- 1.) The majority of the information and data on implementation that is available is not focused on the construction industry.
- 2.) Staff may have additional concerns that were not addressed in the survey.

Chapter IV: Results

The purpose of this study was to identify the needs and best practices for implementation of an AED program within Knutson Construction. The goals of the study were to examine current techniques for assisting an SCA victim and to assess the employee training practices and equipment placement. A survey was given to Knutson project managers to assess these identified concerns.

Presentation of Collected Data

The first question stated “With the proper training, would you feel comfortable using an AED?” All seven respondents answered yes.

Question two asked the participants to estimate how many individuals are at their facility during typical work day, including both Knutson staff members and contractors. These responses varied greatly. Participants estimated the number of Knutson Construction staff members as ranging from 3 to 15 and jobsite contractors from 12 to 300.

The question stated “Do you keep your trailers heated or air conditioned during non-working hours?” was the next question. All participants answered yes.

In response to the question asking for descriptions of security systems on worker trailers to assist in misplacement of equipment, all participants indicated that there were no security systems. One response stated that at a university job site there had been a security system, but Knutson Construction did not have authority or responsibility over it.

The next question on the survey asked “Are there any activities or duties on your job sites that would prevent an individual from receiving assistance within a three minute period in the event of cardiac arrest?” Two responses indicated that all job site tasks

allow for any individual to receive assistance within a three-minute period. One respondent answered that assistance in three minutes could be a problem and multiple AEDs would be beneficial for this site. The last four stated there is no need for concern at their current job sites.

The final question asked if there was a possibility that all the trained CPR staff members could be offsite at the same time. Three participants answered yes and three answered no. One respondent answered no, but added that it could be possible in future contracting jobs.

Discussion

As indicated in the literature review portion of this study, a SCA victim must be reached within three minutes by a trained professional and an AED system must be used within a five-minute period once a person has collapsed. One survey respondent stated that not all of the employees could be reached in a three minute period while performing their designated job tasks due to the size of some construction sites. This means that more than one AED needs to be on that premises.

Four of the seven respondents from the survey addressed that it is possible for all of the project managers to be gone from a site at the same time. This means that the AED would not be able to be implemented in the event of SCA when project managers are absent. The literature review stressed that only trained staff members should use an AED. Having a non-trained individual using AED equipment potentially opens a company to high risk lawsuits because of possible endangerment placed upon a staff member who is experiencing SCA. Failure to properly respond to an initiated program is

not a violation of a law, as stated in the literature review, but still puts any company at risk ethically while allowing for the opportunity of a civil lawsuit.

After reviewing the surveys, it was shown that all of the employees surveyed believed they would feel comfortable with using an AED, once they were properly trained on the equipment. This is strongly stated in the literature. The literature review affirmed that a confident and knowledgeable individual should be operating the AED machine while being assisted by someone else who is observing the individual experiencing SCA for any symptoms and signs of reaction. All respondents stated that with the proper training that they too would feel comfortable performing CPR in conjunction with an AED.

According to participants, trailers where equipment is stored are either heated or air-conditioned during working and off hours. Storing AEDs in heated areas during cold periods is necessary since the cold may freeze the batteries, which may in turn cause the AED to malfunction. Air conditioning is also necessary for warm areas because heat could cause as AED's electrical pads to malfunction.

The survey also asked if work sites have any security systems to assist in the misplacement of equipment. All seven respondents stated that they did not have any kind of security system for equipment. The only current security being implemented at Knutson is locks on the storage containers and trailers when staff is away from the site.

Chapter V: Conclusions and Recommendations

The purpose of this study is to identify the needs and best practices for implementation of an AED program within Knutson Construction. The goals of the study were to examine current techniques for assisting a SCA victim, and assess the employee training practices and equipment placement. To strengthen the information attained during the literature review, a survey was given to seven project managers. The survey will be used by the organizations safety department to identify issues that need to be addressed during the training on equipment usage and placement of AEDs.

Conclusions

- The survey showed that surveyed participants would be comfortable using the AED with proper training.
- The literature review explained that all individuals experiencing a SCA need to be reached within three minutes of collapsing and delivered shocks, if needed, within five minutes. It was reported in the survey that all but one site is small enough for individuals to be reached in three minutes. Therefore, each job site needs to be assessed individually to determine how many AEDs need to be implemented.
- Due to weather stressors, AEDs may malfunction. All of the construction sites involved in this survey process heat and air-condition the trailers at all times. This will prevent batteries from freezing in the winter months and the electrical pads from malfunctioning in the summer months. AEDs need to be maintained during all types of working conditions for staff members at all times in the event of an SCA incident.

- Employee training practices currently in place at Knutson Construction include CPR training for the project managers. Training was performed by a certified organization and matched CPR guidelines. To strengthen the current procedure of assisting a SCA victim, the survey showed that more individuals will need to be trained due to the possibility of all project managers being off site at the same time. Having more individuals trained will only assist the company in the event of a SCA related event. A trained respondent to a SCA victim should be available at each location, at all times.

Recommendations

- A certified training organization should be used to train the staff members on how to use AEDs with annual refresher courses.
- AED methods, implementation, and practices should be established by the company prior to purchasing an AED.
- Each job site should be evaluated before construction begins to decide the best placement of AEDs to cover the three-minute minimum response period guidelines.
- A formal policy should be established and all employees should be aware of the guidelines on the best practices of the AED equipment.
- All Knutson Construction staff members should be trained on equipment handling and usage of an AED system.
- Methods of maintenance should be established and duties assigned to monitor that batteries are being changed and all parts of the AED are in a designated area.

- Mock drills and evaluations should be implemented to monitor the workers' skills and identify any concerns that have the potential to occur when Knutson staff members are using an AED on a staff member is experiencing cardiac arrest.

Areas of Further Research

- Information in the literature review was not specific to the construction industry. Activities performed by Knutson Construction staff that would be more strenuous to the employee's bodies were not identifiable in this study due to lack of information. Tasks need to be identified to assist in limiting strenuous activities that have the potential to place staff at a higher risk of experiencing SCA.
- Knutson Construction did not have detailed records on past losses or incidents. Staff indicated that one death had occurred from a SCA over 10 years ago, but detailed information was not available. Contact should be made and interviews held with other construction companies on methods of implementation to assist with defining the best practices.

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