



An examination of AED implementation and related risk management practices in high school athletic departments

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ABSTRACT

This study examined AED implementation, related risk management practices, and perceived constraints to AED implementation in high school athletic departments in one southern state in the United States. High school administrators ($N=269$) participated in this study. Descriptive statistics, chi-square analyses, tests of point-biserial correlation coefficients, and t -tests revealed that a majority of the respondents were athletic directors (75.5%), at public schools (75.0%), CPR certified (65.9%), had worked in their current position for 10 years or less (72.2%), and had no or limited knowledge of their state's AED immunity laws (79%). Significantly ($p < .05$) more of the respondents indicated that their high school athletic departments did not have an AED(s). Significantly ($p < .05$) more schools with an AED(s) were not following American Heart Association AED program implementation guidelines. Also, some schools were not fully complying with the state's AED legislative immunity provisions and therefore may not be afforded certain liability protections. The primary perceived constraints to AED implementation were (a) associated financial costs (purchase, maintenance, certifications, staff training), (b) concern that having an AED(s) was not a current standard industry practice, (c) lack of information about protection from liability, (d) lack of information regarding required AED training and certification, and (e) lack of information regarding related supervisory responsibilities. Given the importance of AEDs as lifesaving devices and the increased implementation of AEDs in schools and athletic departments, these findings may assist AED education and promotional efforts targeted toward school and athletic administrators.

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1. Introduction

Sudden cardiac arrest (SCA) is the leading cause of death in the United States and strikes more than 300,000 people each year (Rosamond et al., 2008). The occurrence of SCAs in sport and recreation venues is also well documented. Sport stadiums/arenas, golf courses, and health/fitness facilities are three of the top ten most likely places for SCAs to occur, and SCA is the leading cause of death in young exercising athletes (Maron, 2003; Maron, Doerer, Haas, Tierney, & Mueller, 2009). SCA results in the death of approximately 110 young competitive athletes each year, or about one death every 3 days in the U.S. (Maron, Doerer, Haas, Tierney, & Mueller, 2006). Furthermore, a majority of SCAs that occur at high schools and colleges strike non-

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athletes including athletic department and event staff, game officials, teachers, visitors, and spectators, which suggests that SCA is an overall public health concern at schools and highlights the importance of properly managing the risks associated with SCA (Drezner et al., 2007; Drezner, Rao, Heistand, Bloomingdale, & Harmon, 2009; Kyle, 1998; Rothmier, Drezner, & Harmon, 2007). Risk management guidelines for SCA should be focused on basic life support (i.e., delivery of cardiopulmonary resuscitation (CPR)) and the use of an automated external defibrillator (AED) that can be provided by bystanders, staff members (e.g., coaches, game officials), and health care professionals (e.g., athletic trainer, team physician, school nurse) prior to the arrival of emergency medical services (EMS) (Drezner et al., 2007).

The death of a young athlete due to a SCA is a devastating event with enormous impact on the family, school, local community, and athletic team. Such deaths, which are often highly publicized, frequently stimulate discussion on the sufficiency of medical emergency action plans (EAPs) at athletic events. Thus, in an effort to meet the emergency needs of both athletes and others who attend athletic events, many school, athletic, and event administrators have examined their EAPs for SCA response and installed AED programs (Drezner et al., 2009; Morgan & Ruble, 2010; Robinson, 2009). However, just installing an AED is only one step in properly managing and reducing the risk of deaths from SCAs. For example, previous studies suggest that high schools often implement AEDs without developing proper risk management and emergency action plans (Monroe, Rosenbaum, & Davis, 2009; Rothmier et al., 2007).

An initial step in reducing the risk of SCA in high school athletics is pre-participation cardiovascular screening as recommended by the American Heart Association (AHA, 1996) and other sports medicine organizations (e.g., American Academy of Family Physicians et al., 2005). However, even appropriate pre-participation screening, for the purposes of detecting potentially deadly cardiac abnormalities in young athletes, has limitations. Athletes appearing healthy may have unsuspected cardiovascular disease that could lead to SCA. For example, a study of sudden cardiac death in athletes noted that only about 3% of the athletes had potentially identifiable signs or symptoms of cardiovascular disease at the time of the pre-participation exam (Maron et al., 1996).

1.1. Automated external defibrillator purpose and rationale

A typical SCA victim collapses, is not responsive to gentle shaking, and soon ceases breathing. Shortly thereafter, the heart stops pumping blood effectively. Brain damage can occur within 4–6 min after the heart stops circulating blood (AHA, 2006). Many victims of SCA exhibit an irregular heart rhythm known as ventricular fibrillation (VF). VF is a rapid and chaotic rhythm that is often caused by inadequate blood flow to the heart muscle, which in turn does not allow the heart to pump blood effectively. Reversal of VF requires the administration of an electrical shock from a defibrillator (Aufdherheide et al., 2006). Delivering a shock to the heart with the intent of reversing VF and restoring a normal heart rhythm is called defibrillation. Many victims who experience VF SCA can survive if first responders perform immediate CPR followed by defibrillation within a few minutes after collapsing (Hazinski et al., 2005).

First responders can utilize a battery-operated, computerized device about the size of a laptop computer, known as an automated external defibrillator (AED), to deliver an electrical shock to SCA victims. The rescuer attaches the AED to the victim by placing adhesive pads (electrodes) on the victim's chest wall. The AED then analyzes the victim's heart rhythm, informs the rescuer if a shock is necessary, and provides audio prompts that direct the rescuer through all the steps of AED use and when to begin or resume CPR. AEDs will only prompt the rescuer to deliver a shock when VF or its precursor, rapid ventricular tachycardia, is present and will not direct or deliver a shock to someone with a normal heart rhythm (Hazinski et al., 2005).

SCA is fatal in people who do not receive immediate CPR and early defibrillation. The odds of surviving a SCA drop 7–10% for each minute from the time of collapse until defibrillation occurs. Survival rates of 41–74% have been reported in airport terminals, casinos, commercial airlines, and in police AED programs when SCA victims receive immediate bystander CPR and defibrillation within 3–5 min of collapse (Aufdherheide et al., 2006). These high survival rates, however, are only attained in programs that reduce time from the SCA victim's collapse to defibrillation (Aufdherheide et al., 2006; Hazinski et al., 2005). SCA survival rates, when early defibrillation is not provided, are only about 5% (AHA, 2006). In addition to improving SCA survival rates, developing and implementing proper risk management and emergency action plans may also reduce the potential for negligence claims and subsequent liability.

1.2. Risk management and negligence liability

Risk management is the process of reducing or eliminating the risk of harm to participants (e.g., athletes) and loss to an organization (e.g., schools, sport businesses) through injury/death and subsequent lawsuits (Spengler, Anderson, Connaughton, & Baker, 2009). Negligence is at the heart of risk management, as it represents a significant source of potential liability for schools and most sport businesses. Negligence can be understood as a failure to exercise the reasonable care expected of a prudent person for the protection of others against an unreasonable risk of harm. It is one of the foremost issues within the areas of sport, recreation, and physical activity as it represents a substantial source of liability for school and sport businesses. Negligence may occur through an act of omission (something a person failed to do that they should have) or commission (something a person did that they should not have done). Negligence law is based on the idea that when a person acts, he/she should do so in a reasonable manner and should anticipate the consequences of his/her actions. As such, one should be able to anticipate whether their actions, or inactions, represent a risk of harm to others and should therefore make decisions based upon that knowledge and should not expose others to unreasonable risks. Negligence could be alleged in a situation in which a school or sport business had

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