

# The Importance of Athletic Trainers in the High School Setting: Safety and Performance

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## Introduction

Athletic training encompasses the prevention, examination, diagnosis, treatment and rehabilitation of emergent, acute or chronic injuries and medical conditions. First recognized in 1990, Athletic training is recognized by the American Medical Association (AMA), Health Resources Services Administration (HRSA) and the Department of Health and Human Services (HHS) as an allied health care profession. Currently, the National Athletic Trainers' Association Board of Certification requires all students complete a CAAHEP-accredited athletic training education program. (1)

Athletic trainers (ATs) are highly qualified, multi-skilled health care professionals who render service or treatment, under the direction of or in collaboration with a physician, in accordance with their education, training and the state's statutes, rules and regulations. As a part of the health care team, services provided by athletic trainers include primary care, injury and illness prevention, wellness promotion and education, emergent care, examination and clinical diagnosis, therapeutic intervention and rehabilitation of injuries and medical conditions. ATs are licensed or otherwise regulated in 49 states and the District of Columbia. California does not require licensure of ATs. (2)

Athletic trainers are capable of working in numerous environments due to their unique educational skill set and flexibility. Some of these fields include: secondary schools, colleges, professional/Olympic sports, youth leagues, occupational health departments in commercial settings, police and fire departments, municipal departments, branches of the military, performing arts, and professional clinical settings; specializing in sports medicine, cardiac rehab, medical fitness, wellness and physical therapy. (Figure 1)

PERCENTAGE of ALL ATs	JOB SETTINGS
19%	College/University
18%	Secondary Schools
17%	Clinic and Hospital
27%	Students
2%	Professional Sports
2%	Emerging Settings
	Performing Arts
	Public Safety
	Military
	Occupational Health

Figure 1: Job Settings of ATCs. Source: <https://www.nata.org/about/athletic-training/job-settings>

## Athletic Trainers Impact on Safety

### Cervical Spine Injuries

New cervical spine injuries in the United States are estimated around 11,000 each year and severe injuries can have disastrous sequelae. Sports participation constitutes 7.4% of these injuries but for individuals less than 30 it is the second most common cause of cervical spine injury. (3) This emphasizes the importance of proper management and accurate diagnosis of any acute spinal injury. ATs aid in reducing the risk of neurologic deterioration during and after the injury by being educated with the appropriate acute management guidelines for cervical spine-injured athletes. ATs commonly work alongside other health care professionals such as physicians and EMS during sporting events to add efficiency to the processes involved, such as spine-boarding.

ATs collaborate with this team of health care professionals to create an emergency action plan (EAP) in advance in the event of a spinal injury and rehearse it until they all operate efficiently as one. There is no room for errors when it comes to the care of athletes who have suffered a possible spinal injury. The team leader, most commonly the

head AT or team physician, initiates commands of movement/transportation and has the very important responsibility of cervical spine stabilization. They convert manual stabilization to external devices like cervical collars or foam blocks on a spine board. ATs are also responsible for having equipment removal tools on site in the case that a helmet facemask needs removal for airway clearance. (3)

Immobilization of the neck in a neutral position is essential to restrict movement of the vertebral column to prevent damage to spinal cord and nerve roots. Even small amounts of motion have been noted to cause damage. (4)

ATs are trained to assess an athlete in the acute stage of possible spinal injury and diagnose the need to activate the EAP. In the updated NATA position statement EMS Changes to Pre-hospital Care of the Athlete with Acute Cervical Spine Injury (2014), it's stated that in some states EMS are suggesting a progressive method of athlete transportation with a cervical collar only and secured directly to the stretcher for transport. (5)

ATs serve a critical role in equipment removal in the setting of cervical spine injuries because they are the medical staff that are most comfortable with equipment. The helmet and shoulder pads can interfere with the proper positioning of a hard cervical collar. The helmet and the shoulder pads should be removed together to limit neck hyperextension. Removal of the football helmet and shoulder pads is quite difficult and requires training, practice, and qualified medical personnel. (4)

### Concussion Identification and Management

ATs are usually the first providers to identify and evaluate a possibly concussed athlete and are thoroughly involved throughout the pre and post injury management and return-to-play (RTP) decision-making process. ATs take responsibility in educating athletes, parents,

coaches, and other healthcare personnel who may encounter the athletes about concussions and their RTP process. Most importantly, ATs are the ones who make the diagnosis on the sideline as to whether an athlete has suffered a concussion and keep them from returning to play during the same game or match.

The National Athletic Trainers' Association recommends a multi-faceted approach towards the evaluation and assessment of concussion. This usually involves a combination of symptom scores, neuropsychological testing, postural stability or balance testing. If possible, it is recommended to perform these tests as baselines prior to start of the season. Repeat testing is then performed after injury. (6)

ATs have a huge responsibility in this diagnosis because this could ultimately save an athlete from suffering from a condition known as second impact syndrome. This condition is medically known as malignant cerebral edema, which occurs after an athlete has suffered a concussion and then receives another concussive impact while still affected by the first. True second impact syndrome involves rapid brain herniation and death within minutes. (7) In most cases this condition is fatal, which is why a skilled AT on the sidelines is vital for identifying concussion and removing athlete from play until complete recovery. They could possibly save the lives of a high school athlete.

### **Sudden Cardiac Death:**

Sudden cardiac arrest is the leading cause of death in young athletes. Vigorous exercise can trigger these events in athletes with pre-existing heart conditions. Previous athletic department reporting has demonstrated that twenty percent of AED use was for student athletes, 33% was for athletic department staff, and 47% for fans. Time to

shock was an average of 3.4 minutes while EMS response time was an average of 8.2 minutes if there was not EMS on site. (8)

The single greatest factor affecting survival after cardiac arrest, not occurring in the hospital, is the time interval from arrest to defibrillation. Studies of bystander rapid defibrillation using AEDs demonstrates 41-74% survival if defibrillation occurs within 3-5 minutes of collapse. (9) At high schools, the estimated annual probability of sudden cardiac arrest is 2.1% due to older school employees, spectators and visitors. (10) Previous review of timing of athlete resuscitation averaged 3.1 minutes to defibrillation when an athletic trainer was present. (9)

ATs are required to have active training in CPR and basic first aid that includes the education of AED use. With these skills ATs become a vital part of saving the life of an athlete who may be suffering from sudden cardiac arrest. The creation of an EAP in the event of sudden cardiac arrest is created by the schools AT and rehearsed annually in order to educate others of the location of the schools AEDs and use for efficiency. Schools who don't have an athletic trainer present would have to rely on non-medical personnel to deliver care. (9)

### **Prevention and treatment of heat illness and heat stroke**

Exertional heat stroke is the most severe form of heat illness which is defined by neuropsychiatric impairment and a high core body temperature greater than 40.5°C or 105°F. Exertional heat stroke is a medical emergency which can result in multi-organ failure if not identified and treated quickly. The risks of morbidity and mortality are directly related to the period of time that the core temperature is elevated above 105°F and

morbidity and mortality is reduced with prompt cooling. (11) (Figure 2)

The National Athletic Trainer Association recommends different strategies that Athletic Trainers can implement to decrease the risk of Exertional heat stroke. They recommend that athletes are acclimatized over 7-14 days. They also recommend maintaining euhydration and fluid replacement during practices and games. A cold-water ice tub or ice towels should be available to immerse the athlete if necessary. The athlete should be cooled continuously until the body temperature reaches 38.9°C (102°F). (11)

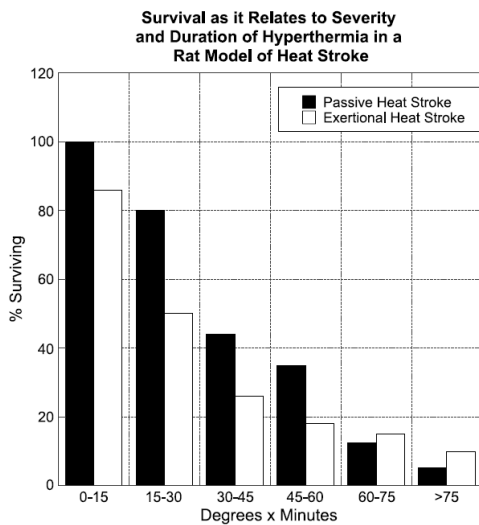


Figure 2: Relationship between severity of hyperthermia and rat survivability (12) (Source: Casa DJ, Kenny JP, Taylor NAS. Immersion treatment for exertional hyperthermia: cold or temperate water? *Med Sci Sports Exerc.* 2010; 42(7):1246-1252. (\*\*Permissions: [lwwjournalpermissions@wolterskluwer.com](mailto:lwwjournalpermissions@wolterskluwer.com)\*\*))

## Athletic Trainers and Performance:

### Nutrition:

Well-balanced and healthy nutrition sources are important for the health and performance of an adolescent athlete. Previous studies have demonstrated that adolescent athletes that meet the recommended intake of

fruits, vegetables, and fish were 64% less likely to sustain an injury. (13)

Previous survey data indicates that athletic trainers are the most frequent source of nutrition information. Even if nutritional services or informational services are available, athletes primarily direct their questions to athletic training staff. (14) Jacobson and colleagues found that 19% of male college varsity athletes received their nutrition information from athletic trainers. Their main reason was enhanced performance, supplement use, and weight management. (15) This stresses the importance in a well-trained athletic trainer in providing accurate information.

### Dehydration and Heat

Intense exercise in heat causes increased demand on the cardiovascular system in order to compensate with thermal losses from the skin and muscle. Elevated lactate increases muscle temperature and decreases muscle vasoconstriction which subsequently influences waste removal, oxygen delivery, and buffering capacity. These changes can increase the rate at which the athlete experiences fatigue. (16)

When maximum exercise occurs in the heat, it can be difficult for the heart to compensate for larger changes in stroke volume. Thus, VO<sub>2</sub> max and performance capacity can decrease. (16) Sawka et al reported a 7% decrease in maximal aerobic power in the heat as compared to euhydrated subjects in cool temperatures. (17) Febbraio et al found that subjects could exercise for 95 minutes at 37°F, 75 minutes at 68°F, and only minutes at 104°F, indicating an inverse linear relationship between ambient temperature and performance capacity. (18)

In terms of dehydration, there has been some discrepancy in the amount of dehydration and its effects on performance. Some studies indicate that as little as 3-4% body volume loss can contribute to decreased muscle endurance where others indicate that

it is more likely to occur when dehydration is greater than 5% of total body weight. (16)

Athletic trainers work with coaching and strength and conditioning staff to determine safe work-outs and practices based on heat exposure. They also are in charge of hydration for the team. They can play a pivotal role in decreasing dehydration and heat exposure for an athlete.

### **CONCLUSION**

Athletic trainers improve safety, performance, and functional outcomes and specialize in patient education to prevent injury and re-injury. Preventative care and safety provided by an athletic trainer has a positive return on investment for high schools. ATs are able to reduce injury and shorten rehabilitation time for their patients, which translates to lower absenteeism from work or school and reduced health care costs.

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