



# Heat Can Kill

## Guidelines to Prevent Heat Illness in Athletics and Physical Education

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In the wake of several publicized, tragic events that occurred during preseason training in both college and professional football, administrators, coaches, and physical educators must take time to re-evaluate how conditioning activities, daily practices, and classes are conducted during extreme heat. Administrators, coaches, and physical educators need to think in terms of legal liability and risk management when addressing this issue and to ask themselves how they can prevent such tragedies.

In football alone, 100 high school and college athletes have died from heat stroke since 1960 (Mueller & Diehl, 2001). Even worse, the per-year average is increasing, with 20 deaths in the past seven years and three deaths in 2001 (Mueller and Diehl, 2001). The issue was brought to the public's attention by the death of Corey Stringer, from the Minnesota Vikings; freshman football player Eraste Autin, at the University of Florida; and, in a less publicized case, Travis Stowers of Clinton High School in Indiana (DiRocco, 2001; Pucin, 2001). Could any of these tragedies have been pre-

vented? This is a question the administrators at each of these institutions will be asking themselves for years to come. Is it possible that in this age of modern medicine we are still unable to prevent such catastrophic incidents in our elite athletes and our physical education classes? Could this same type of catastrophe happen in physical education classes that take place in extreme heat where we are teaching activities such as football and softball or doing fitness testing? Can administrators, coaches, and physical educators be held responsible for such deaths?

The answer to these questions is an overwhelming yes. The courts have held that coaches and administrators have been negligent in their duty to protect athletes from such incidents. In *Roventini v. Pasadena School* (1997), a court found coaches, athletic trainers, and administrators were all liable for the death of a student athlete. In this case, a 16-year-old football player died from heat exhaustion and dehydration after the first day of football practice. The legal question in this case was whether the coaches, athletic

trainers, and administration were negligent in depriving the athlete of bodily integrity by denying him water and running him excessively in conditioning drills. Institutions have questioned whether they have a duty to student athletes in voluntary practices. In *Kleinknecht v. Gettysburg College, et al.* (1993), the courts established that an institution has a duty to respond quickly and provide adequate medical services to student athletes even if the activity performed by the athlete is voluntary. In the Kleinknecht case, a student athlete was participating in a voluntary preseason practice and collapsed from heat exhaustion. The absence of medical personnel (i.e., athletic trainers) on the field was deemed negligent. In Phoenix, Arizona, as well, coaches and administrators have been held negligent in their actions and decisions concerning student athletes and conditioning workouts (Cobb, 1992). Based on these cases and numerous others, there should be a demand for administrative policies and procedures that address the predisposition of an athlete or student to potentially life-threaten-

ing conditions related to heat exposure. Even though these legal examples pertain to athletics, the same conditions are evident in physical education classes.

In physical education classes, where participation is mandatory, teachers have a special legal duty to protect students from harm (Keeton, Dobbs, Keeton, & Owen, 1984). This is what is called a "special relationship," and with this special relationship it is the duty of the physical education teacher (as well as any other school employee) to take reasonable precautions to exercise control over the conduct of the student. (Keeton et al, 1984). This was evident in *Brahatcek v. Millard School* (1979), where a child died from an injury suffered when a golf club hit him in the head during a physical education class. The teacher and the school were found liable because inadequate supervision was provided during the activity. Even though this case and others did not involve heat illness, they all led to a judgment for the plaintiff based on the special relationship of supervising the student in all activities. In physical education that involves intense exercise, the heat produced by the body is 15 to 20 times above normal; the instructor should also consider the effect of the heat index on the body (Clark, 1998). With this in mind, physical educators should exercise control over what activities are performed in extreme heat.

What protocols should administrators, coaches, and physical educators consider when looking to create administrative policies and procedures to prevent death related to heat illness? Five guidelines come to mind when considering athletics. First, require that practice times be scheduled based upon recorded heat indexes (early morning or late evening). Second, provide strict monitoring of pre- and post-practice weight charts, and give complete and total responsibility to athletic trainers or team physicians for making the decision on when to return to, or continue with, practices. Third, ensure that if a student athlete demonstrates any symp-

toms of heat illness, they are not required to practice or continue practicing. Fourth, require coaches to permit water at all times during practice or provide frequent water breaks. Finally, require a limit on practice or on any intense drilling/conditioning segment of practice during times of extreme heat.

Most of these guidelines for athletics can be adapted for use with physical education classes. For example, physical educators could perhaps schedule less strenuous sport activities during early fall or late spring when the weather is warmer. Second, monitor the students closely as they participate in activities on warm weather days. Third, require that participation be restricted if a physical education student demonstrates any symptoms of heat illness. Fourth, require physical educators to permit water at all times during class and provide frequent water breaks. In fact, the physical educator may want to encourage students to bring water bottles to class. Finally, require a limit on the intense exercise segment of class during times of extreme heat. Table 1 summarizes these guidelines.

In addition to these guidelines, appropriate medical staff (i.e., athletic trainers) should be on site for all athletic practices and workouts, whether they are mandatory or voluntary. For physical education classes, the instructor should hold current CPR and first-aid certifications. These are not new ideas; in fact, some of

these suggestions have been a part of the training programs established by the American College for Sport Medicine for years.

There is legal support for these guidelines, as well—first, it will protect the participant from undue risk, thus protecting the coaches, administrators, and physical educators from liability; second, it places risk decisions in the hands of qualified professionals, not in the hands of teachers, coaches, and athletes; third, it will absolve from liability those individuals who are not qualified to make such decisions.

One thing is clear, workouts and classes during extreme heat need to be modified and closely monitored. Personnel who are going to be supervising training sessions or physical education classes need to check the heat index before the activity begins, to see whether adjustments need to be made to workout schedules or class activities. Staff can measure the heat index in a variety of ways, one of which is to get a wet-bulb temperature—a measurement of the water vapor in the air ("Understanding Humidity," 2001). To get this measurement, you could use a thermometer and wrap the bulb in wet cotton, then sweep the bulb of the thermometer back and forth until the temperature stops dropping (Space, Telecommunications, and Radioscience Laboratory, 2002). A wet bulb temperature higher than 75 degrees Fahrenheit, warm-weather humidity above 90 percent, and temperatures

**Table 1. Suggestions for Preventing Heat Illness**

<i>Physical Education</i>	<i>Athletics</i>
1. Consider scheduling intense activities for late fall through early spring.	1. Schedule practice according to the heat index.
2. Monitor students closely for signs of heat illness.	2. Monitor pre- and post-practice weight of participants.
3. If signs of heat illness appear, restrict activity.	3. If signs of heat illness appear, restrict activity.
4. Permit water at all times.	4. Permit water at all times.
5. Limit intense exercise segments during warm weather.	5. Limit intense drilling/conditioning during extreme heat.

above 82 degrees Fahrenheit all suggest that extreme caution should be undertaken (National Collegiate Athletic Association, 2001). Table 2 shows the approximate degree of hazard for various temperature ranges.

Adjustments to workouts or classes could include changing the time or content of the class or practice. Changing the time of a class may be impossible, but changing the activity is always possible. In extreme heat, coaches and teachers should also encourage acclimation to the weather conditions, monitor pre- and post-weight for athletes, and ensure good hydration. To acclimate an athlete or student, the coach or physical educator should start by exposing the participant to the condition for 10 minutes on the first day, and increase exposure daily. In addition, athletes should weigh-in before and after each practice, and players should be no less than two percent below the starting weight of their previous day's practice. Finally, practice or class should stop every 15 minutes for hydration.

Other procedural steps that could be taken include an education program for the staff and the participants. Participants, teachers, and all coaches need to know that water is life and that thirst is not an accurate measure of a body's need for water. Participants should drink water before and after practice or class as well as during activity. What a participant wears to a workout should also be discussed when educating staff and participants. Wearing light-colored clothing decreases the body's absorption of solar radiation. Protective gear and excessive tape restrict the sweat evaporation and

other pathways for heat loss. Rubberized suits should *never* be worn to a workout. In addition to these simple lessons, staff need to be able to identify students and athletes who might have a predisposition to heatstroke. Some cues to this are body size and fat, aerobic status, acclimatization, and the individual's level of fitness (ACSM, 1985). Staff should also look for those students and athletes who inadequately rehydrate themselves during activity, those who regularly push themselves to capacity and beyond, and those who might be taking substances that are a diuretic or a stimulant (these could be over-the-counter drugs or nutritional supplements).

Coaches, physical educators, and participants also need to learn to recognize the symptoms of heat illness (table 3) and not dismiss them as signs of a bad day in class or on the practice field. If one or more of these symptoms is noticed, the student or athlete should cease activity and undertake cooling (e.g., by hydrating or getting out of the sun).

Prevention of heat illness or death from heat stroke requires administrators, coaches, and physical educators to take proactive measures to ensure that participants are protected. Administrative planning, such as having the appropriate staff on hand to monitor the heat index and practice sessions, is a good start. It is also extremely important to educate the coaches, physical educators, and student athletes on the causes and the prevention of heat illness and heat

stroke. Implementing an education program and administrative procedures to ensure that all precautions are being taken is just the beginning. Once the process is in place, it is still up to the administrator to monitor the process and adjust it, if necessary, as well as to document any problems that occur. By following these simple guidelines, physical educators, coaches, and administrators might be able to protect themselves from a serious liability issue and, more important, prevent the loss of life.

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**Table 2. Heat Illness Range Chart**

Degrees in Fahrenheit	Hazard
Less than 64	Low
64-73	Moderate
73-82	High
Greater than 82	Hazardous

**Table 3. Symptoms of Heat Illness**

- Reduced perspiration
- Cramping
- Weakness
- Flushed skin
- Throbbing head
- Nausea
- Blurred vision
- Unsteadiness
- Incoherency