

One Institution's Application of Heat Illness Protocols

By Rod Walters, DA, ATC, and Thomas Armsey, MD

athletic training and sports medicine conferences have been abuzz with discussions about heat-related illness. Recent deaths have heightened awareness to this condition. It is well accepted that prior to any activity, institutions must develop well-thought-out emergency plans of venue-specific design. The importance of the emergency plan is thoroughly presented in the NATA Position Statement: Emergency Planning in Athletics.¹

Persons engaged in physical activity, especially those exposed to environmental stress, should follow guidelines relevant to these concerns. The NATA Position Statement: Fluid Replacement for Athletes² specifically addresses the need for access to fluids, pre-hydration, hydration during practice, and replacement of fluids lost during activity; monitoring environment stresses; identifying signs of heat illness; acknowledgement that acclimatization may take 10-14 days; and monitoring weight class sports with hydration checks to prevent dehydration.

Further, the NATA Position Statement: Exertional Heat Illnesses³ identifies the specific components of heat illness and reports a Wet-Bulb Globe Temperature Risk Chart. This is just one of the tools health care providers can utilize to analyze environmental heat stress and make prudent recommendations for work-to-rest intervals when exercising in the heat. This Position Statement was published in 2002.

In August 2002, the NATA Board of Directors voted to support the formation of the Inter-association Task Force on Exertional Heat Illness. In February 2003, the group began work on a proposed consensus statement that was presented to the NATA board in May 2003. Following approval from the NATA Board of Directors, the consensus statement was published in the June 2003 edition of the *NATA News*.⁴ The professionals presented ideas to identify intrinsic and extrinsic factors related to heat illness and presented steps for risk reduction. The Task Force on Exertional Heat Illness embraced the Wet Bulb Globe Temperature Risk Chart presented by Brown (Table 1).⁵

WBGT	Flag Color	Level of Risk	Comments
<65°F (<18°C)	Green	Low Risk	low but still exists on the basis of risk factors
65°-73°F (18°-23°C)	Yellow	Moderate Risk	level increases as event progresses through the day
73°-82°F (23°-28°C)	Red	High	Everyone should be aware of injury potential; individuals at risk should not compete
>82°F (>28°C)	Black	Extreme or hazardous	Consider rescheduling or delaying the event until safer conditions prevail; if the event must take place, be on high alert. Take steps to reduce risk factors (e.g., more and longer rest breaks, reduced practice time, reduced exercise intensity, access to shade, minimal clothing and equipment, cold tubs at practice site, etc.). The WBGT can be measured with a WBGT meter.

table 1. wet bulb globe temperature risk chart⁵

The consensus statement brought about concerns from athletic trainers and physicians in the South, Southeast and Southwest, all with environments featuring extremes of environmental stress. From the concerns and upon further review, the NATA Board of Directors added a disclaimer to the Exertional Heat Illnesses Consensus Statement. The board had concern that the document recommended potentially indemnifying statements of activity conducted beyond the prescribed norms. Specifically, many institutions utilize protocols that allowed more activity than the standards identified in Brown's data⁵ referenced in the NATA Position Statement: Exertional Heat Illnesses.³ In July 2003, the disclaimer was published in the *NATA News* and was intended to give latitude to the health care providers regarding care of heat-related illness.⁵

Athletic trainers should recognize that temperature ranges might vary widely based upon geographic regions. Athletic trainers may practice in regions, such as the Southeastern United States, where the WBGT is routinely in the high or extreme or hazardous level of risk throughout a significant part of the year. In these regions, while it may not be practical to reschedule or delay events, the athletic trainer must recognize that the level of risk is high and take appropriate steps to reduce risk.

specific application

In review of the application of criteria to practice situations, we utilize the guidelines presented by the United States Marine Corps.⁷ This standard has been used for many years to adjust practice in times of environmental stress. As aggressive as the index may be, it does require the addition of 10 degrees for activity in full gear. This guide was used for athletes who were in good physical condition, who were acclimatized and were exercising in situations with adequate medical supervision, including primary care physicians, certified athletic trainers and athletic training students.

Based on this information, it is recommended the existing Table 1 be used for those situations with less supervision and where athletes have lower levels of conditioning or lack acclimatization.

Weather information for the 29 practice sessions in the 2003 season is presented below in Figure 1. This data was recorded at the beginning, midpoint and end of each practice session, with the highest score being used for this purpose. Based on the data, only one practice would be allowed according to the guidelines identified in Brown's data⁵ referenced in the NATA Position Statement: Exertional Heat Illnesses.³ However, by adapting the Marine Corps standards to our locale, we have been able to alter practice time and duration while increasing breaks to facilitate the conditioning of our athletes. This is possible due to the increased levels of conditioning of our athletes, the increased supervision they have, and their level of acclimatization.

The success of this program is attributed to the conditioning of our athletes. Also, by working out in the local climate over the summer of 2003, athletes were able to achieve levels of acclimatization. Prior to the 2003 football season, NCAA ByLaw 17.11.2.3⁸ identified an

Acclimatization Period for Divisions I-A and I-AA. These rules were implemented in direct response to the medical community's concern about the increased incidence of heat-related illnesses and deaths. Rest intervals and limits on practice have helped address these concerns, but aggressive monitoring of student-athletes exercising in warm temperatures is still necessary.

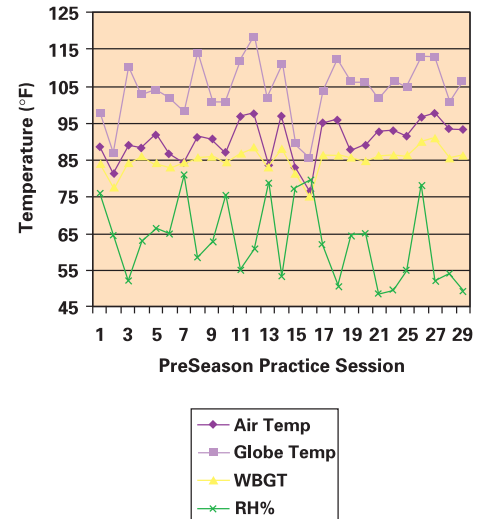


figure 1

table 2. heat index and physical exercise (marine corps)⁷

WBGT Index (F)	Flag Color	Heat Condition Flag Warning System
80-84.9	Green	Heavy exercises, for unacclimatized personnel will be conducted with caution and under constant supervision.
85-87.9	Yellow	Strenuous exercises, such as marching at standard cadence, will be suspended for unacclimatized troops in their first 2 or 3 weeks. Outdoor classes in the sun are to be avoided.
88-89.9	Red	All physical training will be halted for those troops who have not become thoroughly acclimatized by at least 12 weeks of living and working in the area. Those troops who are thoroughly acclimatized may carry on limited activity not to exceed 6 hours per day.
90 and Above	Black	All strenuous, non-essential outdoor physical activity will be halted for all units. Essential activities are defined as those activities associated with scheduled exercises or other major training evolutions where the disruption would cause undue burden on personnel or resources, be excessively expensive, or significantly reduce a unit's combat readiness. Essential outdoor physical activity will be conducted at a level that is commensurate with personnel acclimatization as determined by the unit's commanding officer in coordination with the unit's medical officer or medical personnel. All efforts should be made to reschedule activities during cooler periods of the day.

In reviewing Figure 1, if the guidelines written by Brown and referenced in the Inter-Association Task Force on Exertional Heat Illnesses Consensus Statement were followed, only one practice would have been conducted without black flag considerations. The traditional classification of heat illness includes three categories: heat cramps, heat exhaustion and heat stroke.⁹ Our athletes experienced 20 cases of heat cramps, 2 cases of heat syncope and 6 cases of heat exhaustion, among 2,858 practice exposures.

The data from the initial week of football practice is presented in Table 4. A retrospective analysis was performed of the incidence of heat illness and is presented in Table 3. Three certified athletic trainers and a physician were on-site for practice, and eight athletic training students assisting with hydration of athletes. We saw a total of seven cases of heat illness among

Wearing of body armor or NBC warfare protective uniforms in effect adds 10 degrees F to the measured WBGT. Heat conditions will be adjusted appropriately.



table 3.

	Institution A
Level of Participation	NCAA Division I
Staff-Certified Athletic Trainers	5
Athletic Training students	9
Staff – Physician	1 – on-site
Student-Athletes Exposures	1048
Heat Illness	7

1,048 exposures (.67 incidence/1000).

Based on our experience, and the data from the 2003 season, we continue to recommend those athletes in supervised situations with physicians and/or certified athletic trainers, trained by strength and conditioning staffs, and acclimatized to the environment be allowed to train and practice according to the protocol in Table 2. However, those athletes of lower levels of conditioning or who are not acclimatized should adhere to the protocol in Table 1 from the exertional heat illnesses position statement. That position statement also should be followed when a staff is not large enough to provide adequate coverage according to the Recommendations and Guidelines for Appropriate Medical Coverage of Intercollegiate Athletics.

table 4

	Practice Number	1	2	3	4	5	6	7	8	9	10	
Division I Institution	Athlete Exposures	105	104	104	105	105	105	105	105	105	105	1048
	Number of Heat Illnesses	0	0	2	0	3	0	0	0	0	2	7
												0.67%

In closing, this report provides an option for medical staffs to consider when identifying a protocol to establish guidelines to monitor heat stress. While all protocols must be reviewed for specific adaptations, this model allows for the application of level of conditioning, level of acclimatization, and level of supervision by the medical staff. ■■■

references

1. Andersen JC, Courson RW, Kleiner DM, McLoda TA. National Athletic Trainers’ Association Position Statement: Emergency Planning in Athletics. *J Athl Train.* 2002;37(1):99-104.
2. Casa DJ, Armstrong LE, Hillman SK, Montain SJ, Reiff RV, Rich B, Roberts WO, Stone JA. National Athletic Trainers’ Association Position Statement: Fluid Replacement for Athletes. *J Athl Train.* 2000;35(2):212-224.
3. Binkley HM, Beckett J, Casa DJ, Kleiner DM, Plummer PE. National Athletic Trainers’ Association Position Statement: Exertional Heat Illnesses. *J Athl Train.* 2002;37(3):329-343.
4. Inter-association task force on exertional heat illnesses consensus statement. *NATA News.* June 2003: 24-29.
5. Brown CH, Gudjonsson B, eds. *IAAF Medical Manual for Athletics and Road Racing Competitions: a Practical Guide.* Monaco: International Association of Athletics Federations;1998:39-75.
6. Message from the NATA Board of Directors; Disclaimer for Exertional Heat Illnesses Consensus Statement. *NATA News.* July 2003: p 38.
7. United States Marine Corps Heat Index and Physical Exercise Chart, as identified at <http://www.safetycenter.navy.mil/ashore/articles/recreation/heatindexmarine.htm>.
8. *NCAA Rules Manual*, The National Collegiate Athletic Association, July 2003.
9. Rich, B. Sallis, E.R. & Massimino, F., eds. (1997). *Essentials of Sports Medicine* (Mosby Year Book, St Louis, MO)

Thomas Armsey and Rod Walters are the physician and head athletic trainer respectively, at the University of South Carolina. Walters can be reached at rwalters@gwm.sc.edu.