

ATHLETICS HEAT ILLNESS PREVENTION

Synthetic Turf-Heat Illness Prevention Best Practices

Source: Keenan & Associates

Synthetic turf is growing in popularity as a sports field, landscape, and recreation alternative to natural grass because it:

- Allows for virtually unlimited hours of safe practice and play time
- Remains resilient, well-draining, and grass-like even in adverse climactic conditions
- Significantly reduces cost of regular maintenance
- Eliminates need for pesticides and fertilizers

However, in direct sunlight during the hottest part of the day in the summer months, the upper layer of the synthetic turf that is exposed to the sun's rays will get significantly hotter than grass. So on a hot, sunny day, in addition to taking proper precautions to minimize their risk of heat exhaustion, heat stroke or other heat-related health complications regardless of the playing surface, those who play on synthetic turf should consider the practical risk avoidance strategies recommended below in Best Practices.

Synthetic turf (aka synthetic grass and artificial grass/turf) becomes hot when it is exposed to direct sunlight. A study published in *The Journal of Turf Grass and Sports Surface Science* Vol. 83 (2007) explains that “the intensity of solar radiation striking the artificial turf grass and the solar zenith angle were primarily responsible for elevating the artificial turf grass temperature.” Therefore, synthetic turf does not get hot on hazy or overcast days. Even on a sunny day, during the early morning and evening when the sun's rays are not overhead, the synthetic turf will feel cool to the touch. Also, the fibers and infill that are below the surface of the synthetic turf system are much cooler than those on the surface, which is why playing on synthetic turf that registers 170^o at the surface with proper footwear is tolerable, and won't burn the hand of a football lineman in his stance. The air temperature above the hot synthetic turf will dissipate quickly, and will approximate the ambient air temperature at 2' feet above the surface. The Journal pointed out another important characteristic of synthetic turf – “because of a low apparent specific heat, the artificial turf grass demonstrated a rapid rise and fall in temperature based on time of day and cloud cover.” As an example, when a cloud passes overhead, the surface temperature of the synthetic turf will plummet quickly.

BEST PRACTICES

To reduce the risk of heat stroke, heat exhaustion, and other heat-related illnesses during the summer, regardless of the playing surface, but particularly on synthetic turf on a hot, sunny day, be aware of and follow the NCAA and NATA guidelines <https://www.ncaapublications.com/productdownloads/MD15.pdf#page=41>, Preseason Heat-Acclimatization Guidelines for Secondary School Athletics <http://natajournals.org/doi/pdf/10.4085/1062-6050->

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50.9.07?code=nata-site, Exertional Heat Illnesses <http://natajournals.org/doi/pdf/10.4085/1062-6050-44.3.332>, and follow these best practices:

- Schedule activity during the cooler parts of the day (early morning or evening)
- Limit the duration and intensity of activity early in the season and in hot weather
- Keep athletes well-hydrated and periodically rested to avoid becoming overheated
- If possible, have the athletes who are not on the field stand in the shade
- If there is no shade, cover synthetic turf sideline areas where athletes stand with a cover recommended for that purpose
- Install on demand misting stations near the sidelines to allow for players to cool themselves. Large, portable misting fans may also be used to cool the players on the bench
- Water the turf to keep the temperature down
- Consider the level of sunlight when scheduling activities

If you think an athlete is suffering from heat exhaustion, elevate legs and cool person with fans, rotating ice towels, ice bags or ice bath. Notify medical personnel. See the Heat Illness for Athletes document on Risk Advisor.

CASE STUDIES

High school athletes are sidelined more than 9,000 days per year because of heat-related illnesses, according to a new CDC analysis.

The analysis, published in this week's Morbidity and Mortality Weekly Report, looked at 2005-2009 data from the National High School Sports-Related Injury Surveillance Study. The data covered nine sports and estimated national numbers based on a sample of 100 high schools.

Football was the sport associated with the most heat related illnesses and August was the most common month for them to occur, according to CDC's analysis. The report also found illnesses were most likely to occur during practice, not game time, and more likely to occur among overweight athletes.

The study looked at the incidence of "time-loss heat illness," defined as illness where a player needed at least one day to recover and missed time on the game field.

Heat-related illnesses included heat cramps, heat exhaustion, and heat stroke – a medical emergency that in the absence of prompt intervention can lead to loss of consciousness, or more permanent serious medical conditions such as neurologic, cardiac, renal, gastrointestinal, hematologic, or muscle dysfunction and subsequently, death.

During the most recent five-year period from 2013-2017, there was an average of 1.6 heat stroke deaths per year compared to 4.4 per year during the previous five-year period 2008-2012, this overall decline is encouraging and supports continued efforts to educate coaches, school administrators, medical providers, players, and parents concerning the proper procedures and precautions when practicing or playing in the heat. It is important to note that in addition to the three heat stroke deaths this year, there were two heat stroke deaths in 2014 and 2015 and there were two deaths in 2015 that were a result of athletes over-hydrating in order to prevent heat-related issues. Prevention messages must go beyond hydrating but emphasize how to properly hydrate, how to acclimate to the environment,

how to acclimate to the addition of equipment, and achieve the appropriate fitness baseline for the intended rigors of practice according to the National Center for Catastrophic Sports Injury Research.

"One death due to heat-related illness is too many," said Michael McGeehin, director of CDC's Division of Environmental Hazards and Health Effects. "Heat related illness is preventable; the more we know about how and when it happens, the better we can prepare people who maybe most at risk.

ARTICLES

The first evidence of a "heat island" effect came a few years ago, when Columbia University climate researcher Stuart Gaffin analyzed thermal images generated from NASA satellite maps of New York City. He wanted to figure out how urban trees may help cool down neighborhoods. When Gaffin noticed a bunch of hot spots on the maps, he assumed they were rooftops. But he wanted to know for certain.

"So he picked five or six really hot locations in the Bronx and went to visit them, and two turned out to be turf fields" says Gaffin. In retrospect, he says he should have realized that, because they're a perfect sunlight-absorbing system. According to the Dallas Morning News, Coach Tom Westerberg said melting shoes in the Texas heat doesn't happen often, but he's seen it before. He also noted Taylor's shoe could have already been worn down.

Still, this shoe is unwearable. The team plays on synthetic turf, which can get significantly hotter than natural grass — sometimes a 35-55 degree difference. That would mean where it was 106 in the Dallas-Fort Worth area, the field could have been about 141-161 degrees.

The artificial turf at The Women's World Cup was reportedly 120 degrees at kick off. That's almost unsafe to play on, according to a study cited by the Las Vegas Sun in 2009. The research, partly funded by the city of Las Vegas, found artificial turf above 122 degrees is considered unsafe for sustained athletic use and that, depending on the air temperature, turf can get as hot as 180 degrees.

"This was a temperature where if you put your hand down on it, you could only hold it for five seconds or so before it would burn," Dale Devitt, director of the Center for Urban Water Conservation at the University of Nevada Las Vegas told the Sun.

Remember follow the above best practices and ensure coaches and staff are aware of the proper procedures to prevent heat stroke and heat illness in athletes.