Beat the Heat: Managing Heat and Hydration in Marching Band

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BEAT THE HEAT: MANAGING HEAT AND HYDRATION IN MARCHING BAND

ABSTRACT

Marching Band students are athletes who practice outdoors under conditions that expose them to dehydration, heat exhaustion, and sunstroke. They suffer these heat-related injuries because breaking formation frequently to adequately hydrate is impractical. This project developed educational materials alerting both the students and director to heat-related illnesses and tested a simple method of fluid replacement that could be used during practice. A Heat Index chart was adapted to identify hazardous conditions; fluid intake recommendations were made based on the heat index. Students purchased a water bottle housed in an insulated belt that was worn during all outdoor rehearsals. Because water was readily available, the students were able to drink the necessary fluids without interrupting the rehearsal. These bottles have been used successfully for 3 years. Based on limited subjective data, the students reported feeling better, their mental acuity improved, and rehearsals were more productive. This article examines the effects of heat on the body and reports on a practical solution that has been found to protect marching band members from heat-related stress.

KEY WORDS: dehydration, fluid replacement, Heat Index, heat-related illness, marching band students

INTRODUCTION

High school coaches are encouraged to watch their student athletes closely for signs of heat fatigue and dehydration. Because it is administered through the Arts Departments at many schools rather than athletics, Marching Band is often overlooked as an activity that is athletic in nature. Most music directors receive little or no training in health-related issues. They do not fully understand the importance of adequately hydrating their students who practice for hours at a time in high heat-index conditions "in formation," which is military-style marching on the field while carrying heavy instruments. Consequently, the students may soon exhibit nausea, muscle cramping, headache and lack of concentration. The director encourages them to continue because

once students get out of formation for water breaks, practice time is lost. Most directors and students do not understand that performance would improve if the students were adequately hydrated.

Nurses who subscribe to the School Nurse Listserv were asked in June 1999 about how they dealt with and solved this problem. Fifteen responses from all over the United States were received; no one had any suggestions, but all requested the solution be forwarded to them as they had also encountered this same problem but could not come up with a practical solution.

THE EFFECTS OF HEAT AND DEHYDRATION ON THE BODY

Nutrients are chemicals that are essential to keep the body healthy with water being the primary one. It aids in all body processes including digestion, absorption, circulation, and transportation (Brzycki, 1999). It regulates body temperature, prevents dehydration, flushes toxins, supplies the body with oxygen and nutrients, and aids muscles in producing energy (Null, 1999). Sixty to seventy percent of body weight is water; losing approximately 20% of body weight to dehydration can be fatal.

Body temperature is maintained by moving heat from the exercising muscles to the surface of the skin via the blood (Bailey, 1994). As the body's core temperature rises with strenuous exercise, the circulatory system responds by having the heart pump faster to move blood to the organs more quickly and to absorb heat. The capillaries directly under the skin open up to allow heat to get to the surface, resulting in the face having a flushed appearance. Water from the blood vessels is also brought to the skin surface as perspiration, which cools the body as it evaporates (Miller & Levine, 1995). Seventy percent of the heat released through exercise is lost through the head and hands (Kashiwa & Rippe, 1987). This system works best when the outside air temperature is less than 75 degrees F, when there is low humidity, no direct sunlight or strong, hot, dry winds, and when cool and loose clothing is worn.

Humidity hinders the body's cooling mechanism more than high air temperature (Evans, 1997). When the air's moisture content is high, perspiration does not evaporate from the skin and this cooling mechanism is lost. With 100% humidity, the sweat simply pours off the skin as liquid water and no cooling of the body occurs.

Summers in the United States are generally hot. The National Weather Service estimates that 175 Americans die from heat-related illnesses each year (National Oceanic and Atmospheric Administration [NOAA], 1999). Professional athletes are not immune; Korey Stringer of the Minnesota Vikings died in August 2001 from apparent heat stroke during football practice. The National Weather Service of NOAA (1999) has devised the Heat Index or Apparent Temperature Scale that predicts the body's ability to dissipate heat and indicates how safe it is to participate in activities on a given day. The Heat Index charts take into account both the temperature and humidity. NOAA Heat Index calculations can be found under Heat Index and Wind Chill Algorithms (1999). The higher the heat index, the more difficult it is for the body to adapt and cool itself through normal mechanisms. The National Weather Service does not take into account full exposure to the sun or strong, hot, dry winds that can raise the heat index value up to 15 degrees F. (NOAA, 1999). These charts are found on the Internet and are quoted in weather reports throughout the country.

If the body's cooling system is taxed by lack of fluid replenishment, dehydration occurs. The blood itself heats and thickens. In this state, despite the heart pumping harder, blood flows slower, and the blood/oxygen exchange is impaired in the lung (Loeb, 1991). Ultimately, oxygen delivery to vital body organs and muscles is limited by increased circulatory demands and the disruption of the ability of the blood to transport sodium and potassium, which are essential to maintain optimum muscle contraction and relaxation. The muscles are not able to produce energy without a constant oxygen supply. This manifests itself in clumsiness, vertigo, disorientation, and poor judgement (Bailey, 1994).

Mild dehydration occurs when only 1% of body weight is lost (1.5 pounds in a 150-pound student). If fluid loss continues without replacement, there is a gradual decline in athletic performance and an increase in symptoms (Grandjean & Rund, 1994). By the time 4% of body weight is lost (6 pounds in the 150-pound student), there is a 20 to 30% decline in athletic performance. It is estimated that collapse is likely when 7% of body weight is lost (Sizer & Whitney, 1997). Pulse rises eight beats for every 2.2 pounds of fluid lost, which decreases endurance and hinders strength and mental alertness

(Tamborlane & Weiswasser, 1997). Performance declines are marked when the body is dehydrated.

People in higher risk categories, such as small children, the elderly, those with alcohol or weight problems, and those taking tranquilizers and anticholinergic medications, are more sensitive to the effects of high heat index then the rest of the population (NOAA, 1999). Heat-related illnesses are possible when the Heat Index rises to 90 to 105 degrees F. The intensity of activities that last 15 minutes or more should be reduced whenever the humidity, solar radiation and air temperature are above critical levels (American Academy of Pediatrics, 1999-2000).

Heat stroke occurs when the body's core temperature has increased to the point that the natural cooling system shuts down completely (Bailey, 1994; Handal, 1992). Blood flow to the skin and perspiration decreases to conserve water to the major organs. The brain, which can only function in a very narrow temperature range, begins to overheat and fail. When perspiring stops, the body temperature rises quickly to a fatal level. By this point, the victim may become disoriented, combative, and argumentative and experiences hallucinations, confusion, seizures, and loss of consciousness. Body temperature may be as high as 106 degrees F.

Evans (1997) found that dehydration resulted in decreased endurance, increased heart rate, increased lactic acid in the muscles, increased body temperature, decreased strength, eventually leading to heat-induced disorders of heat cramps, heat exhaustion, and heat stroke. Treatment of all involves moving the victim to a cool, shady area; application of cool, wet compresses to the neck, wrists, and underarms; loosening clothing; and oral fluid replacement if the victim is alert and oriented (Loeb, 1991; NOAA, 1999; Table 1). If symptoms of abdominal or lower extremity cramping are present, firm massage to the cramp is advised. Heat stroke is a life-threatening condition. Emergency personnel should be called and the victim put into the shock position.

Water must be replaced in the body as it is lost through perspiration, or dehydration will be inevitable (Neilitz, 2002). Thirst is an imprecise signal of dehydration because it is generally believed that when thirst is experienced, the body is already dehydrated (Wellesley, 2000). Activity may actually impair the thirst mechanism causing thirst to become detectable only after fluid stores are depleted (Sizer & Whitney,

1997). A normal, sedentary adult should drink 6 to 8 (8-ounce) glasses of water daily to replenish the 1 gallon of fluid lost through normal bodily processes (respiration, perspiration, urination, defecation). Fluid needs increase during exercise in hot and humid climates, high altitudes, taking of some prescription medications, and while dieting (Rabkin, 2000). With exercise, the need to replace fluids increases depending on the heat, humidity, sunlight, wind conditions, and the type of clothing worn. It is common to dehydrate from 2% to 6% of body weight during exercise in the heat (Wellesley, 2000).

As a general rule, it is recommended that athletes hydrate prior to exercise, every 15 minutes during exercise and up to 2 hours afterward (American Academy of Pediatrics, 1999-2000). The amount of fluid replacement needed will depend on the size of the student and the amount of fluid lost to perspiration; sources vary in their recommendations (Table 2). Water should be 40-50 degrees F, with cooler temperatures being acceptable (Bishop, 1995). Drinking 4 to 8 ounces (two to three mouthfuls) every 10 to 15 minutes provides optimum re-hydration. At this rate (16 to 30 ounces per hour) the stomach can efficiently absorb the fluid and excrete it into the intestines, where it is reabsorbed into the bloodstream and delivered to the working muscles. This system is more efficient with cooler temperatures than warmer temperatures (Evans, 1997).

Tap water is the optimal fluid replacement for exercise of up to 2 hours. It is not necessary to replace nutrients and electrolytes beyond the water replacement in that length of time. If exercise lasts longer than 2 hours, some sources recommend liquid carbohydrate (sports drinks) (Bishop, 1995; Evans, 1997). Sports drinks are excellent sources of carbohydrates and electrolytes (sodium, potassium, chloride, phosphorus, calcium, and magnesium.) They enhance fluid absorption from the small intestine. Small amounts of sodium also increase the thirst mechanism. Salt tablets are not advised; they concentrate a large percentage of sodium in the stomach, drawing fluid from the blood, when it would be better utilized on the skin surface. After exercise, the carbohydrates in sports drinks are readily absorbed, and the body is more responsive to restoring the glycogen in the muscles, liver and blood.

HEAT INDEX RECOMMENDATIONS

To prevent heat stress in Marching Band students, hazardous weather conditions must be identified. The National Weather Service Heat Index chart was adapted utilizing only three colors rather than the usual four found in other sources. The colors chosen were red, yellow and green as these are easily identifiable as representing a state of alertness to the general population (Figure 1). The combination of the three-color format and easily remembered parameters make this chart relevant for the band director. The band director was encouraged to check the weather report daily either through the morning newspaper or via Internet (http://www.noaa.gov/wx.html) for the predicted Heat Index for the day to plan the length and location of rehearsal.

WATER BOTTLE BELTS

Band members must drink water while they practice on the field. A practical solution was found with the discovery of water bottles that are worn as a nylon belt that has an insulated pouch to hold the bottle and keep the fluid cool. These belts resemble fanny packs. (Figure 2). Each student and the director were required to purchase and use these during each outdoor rehearsals. They can be positioned on the front, side or back of the body, depending on which instrument is being played, and are adjustable to the size of the student. The standard bottles hold 22 ounces of fluid. The belts have zippered pouches on each side of the water bottle pouch, which are ideal for carrying inhalers, change, keys, and earplugs for the percussionists. The student's names were written on the belts with whiteout pen; permanent markers were used on the bottles.

A parent volunteer obtained estimates of the cost from different sources and purchased the bottles belts in bulk. Quotes were obtained from chain stores as well as local athletic stores. Quotes ranged from $11 for a belt without the side zippered pockets to $20 for those with the pockets. One hundred bottle belts with pockets were purchased from a local sporting goods store at a reduced price of $15, which included the water bottles. This purchase of 100 bottle belts will last several years. Obtaining the belts alone and having the students provide their own bottle would have saved only $1. The cost of the belt was added to the fee for participation in marching band. Attempts were made to acquire donations of the belts and bottles from local merchants, but because of the cost, no merchant expressed an interest in this proposal.

The bottles were stored in large plastic tubs at school. Students did not take them home on a regular basis to prevent their being lost or forgotten. Every 1 to 2 weeks, the bottles were taken home by a parent for cleaning and run through the dishwasher. Names were touched up as needed. It was necessary to wash the belts only after band camp and once in fall after they had been worn in extreme heat. Belts were put through the gentle cycle of the wash machine and air-dried.

Bottles were filled with a combination of water and ice by parent volunteers or students before practice and at breaks. Tubs of ice and water coolers were placed in several locations to expedite this process. The insulated pouches on the belts kept the water cold for 2 to 3 hours. Care was taken not to fill the bottles too full with ice, because it often did not melt despite the outdoor heat. Breaks were taken every hour for rest and to refill bottles. During rehearsals, the drum major or director would remind students to "drink!" every 15 minutes to keep within the required fluid replacement recommendations.

EDUCATION

The school nurse presented a 30-minute educational program on the first day of band camp. It will be repeated annually with students and band director required to attend. The program is divided into three sections: (a) the physiology of hydration and the effect of heat in causing dehydration; (b) the signs, symptoms and treatment of dehydration and heat-related illness; and (c) how to manage the heat and dehydration during marching band practices. The nurse used charts (Table 1 and 2, Figure 1) for visual learners. These were later posted in the band room.

The physiology section contained a simple overview of the body and the effect of heat and exercise. This section included a summary of the research cited at the beginning of this article with emphasis on the role dehydration plays in diminished performance. It was pointed out that the human body is 60 to 70% water. Normally, adults lose about 4 gallons of fluid per day in normal sedentary activities, but an active athlete can lose from 1 to 3 gallons per hour. If not replaced, the body enters a state of dehydration. The Heat Index is a reflection of the temperature the body feels, taking into account both air temperature and humidity. Sweating is one of the mechanisms the body uses to cool itself and works best in temperatures up to 80 degrees with low humidity. The higher the Heat

Index, the more difficult it is for the body to rid itself of heat and the easier it is to become dehydrated. When the body is fully hydrated, all body functions are working at maximum capacity. When dehydrated, body performance declines. There is a marked decline in performance when only 4% of body weight is lost (6 pounds in a 150-pound student.) Students were reminded that when dehydrated, they would not be able to concentrate on the music or drill and they would feel ill, and thus practice time would be less efficient.

Section 2 concentrated on the signs and symptoms of heat illness and appropriate treatment. Table 1 was enlarged and reviewed verbally. Students were encouraged to note these symptoms both in themselves and their classmates and to treat them immediately. It was pointed out that even when dehydration is mild, affected persons will experience decreased coordination, mental irritation and depression, and impairment of judgement. Students and the director need to become familiar with and follow the recommended fluid replacement guidelines (Table 2).

Section 3 emphasized the practical aspects of dealing with heat, dehydration and prevention of heat-induced illness during marching band practice. The nurse pointed out that marching band is an athletic activity that requires students to be outdoors for long periods of time. Students were encouraged to use sunscreen liberally and to wear hats and light, loose clothing. Because valuable practice time is lost when they break formation for water breaks the director and students were required to wear a water bottle and belt when outdoors. Students were told that the drum major or director would remind everyone to drink about 4 ounces of fluid every 15 minutes and students were encouraged to drink water whenever standing at ease. The students were reminded that thirst is a poor indicator of hydration status and despite best intentions, students may feel ill on the field. It was stressed that students who become dehydrated were not to continue practicing but to leave the field immediately for assistance at the sidelines, where parents would assist them with water and cool towels.

RESULTS

The 75-member band tested these belts during the 1999-2000, 2000-2001, and 2001-2002 seasons. Students were encouraged to drink 8 to 16 ounces of water before practice and 16 to 32 ounces of water after practice, in addition to frequent drinking (4 to

8 ounces every 15 minutes) while on the field. The director or drum major reminded them to “drink!” or “chug!” every 15 minutes. Subjectively, the number of students exhibiting symptoms of heat-induced illness decreased from previous years. Parent volunteers noted that fewer symptomatic students left the field. The drum major stated that the students were better able to concentrate on the rehearsals and the director felt the rehearsals were more productive. He was happy to have found a solution that pleased the parents and solved a health-related problem. No calls were made to summon emergency services, which had been done twice in the previous year.

The students and director generally drank more than the recommended amount of water because it was readily available. It was noted that extra bathroom breaks were not necessary. At times, each instrumental section practices separately; thus, waiting sections were able to drink while another section was practicing, yet all were in formation ready to go when the entire group practiced a drill together

As a result of the educational materials, students were more aware of the symptoms of heat-related illness and were better able to recognize problems early in themselves or their classmates. This allowed them to leave the practice field on their own for treatment, if necessary, rather than fainting on the field, which had occurred weekly in previous years. The director was more understanding of problems and encouraged students to leave at the first sign of illness. The adapted Heat Index chart gave the director an objective system to use to determine if outdoor rehearsals should be shortened or canceled due to the heat index being unsafe for students’ health. The red-yellow-green format with simple parameters was easy to remember, thus improving compliance.

Parent or student volunteers are vital components of the system. These individuals obtained the ice and water and monitored problems on the field. If the cafeteria ice machine was unavailable, ice was purchased and carried to rehearsal. A parent volunteer took the bottles home for washing every 1 to 2 weeks. This could be improved, however, it is a logistically difficult task to carry home and wash 75 bottles and belts. Consideration should be given to the idea of asking the school cafeteria staff to wash the bottles or having each student take his or her own bottle home on a weekly basis. Clean, used bottles and belts from graduating seniors could be kept on hand for short-term use for students who forget to bring theirs to practice.

Adaptations to this system have been made (Janet Gray RN, NCSN, personal communication, Whiteville City Schools, Whiteville, NC.) In Whiteville, North Carolina, the band purchased individual belts for the 180-member band. Students provided their own water bottles and kept them clean. The belts were purchased by the band program and issued to the students with their uniforms. They found the pockets on the provided a place for valuables, eliminating the need for purses (one of which was stolen the previous year). Their band plans to use the belts when they march in a parade during the warm months of late spring.

IMPLICATIONS FOR SCHOOL NURSING

Promoting student health during the entire school day is an important aspect of the school nurse's role. The nurse is a bridge between health care and educational professionals. The challenge is to present the medical information factually and assertively, in a manner that ensures educators will understand the importance of recommended changes. Dealing with heat, humidity and the resulting dehydration in students is something many educators have difficulty comprehending. The band director is an example of a teacher in charge of an arts-based group; however, because of the nature of marching band, the students are exposed to the potential heat-related illnesses normally seen only in athletes. The marching band director and students may have difficulty understanding the pathophysiology and implementing the changes necessary to prevent heat illness.

As a health educator, the school nurse must take the initiative to observe the marching band in practice to see if proper procedures are in place because the director, students or parents may not realize a problem exists. Of ten the school nurse will find that rehydration of the band members at recommended levels is difficult because of the nature of the practices. Once a need has been identified, the nurse should approach the director with suggestions for change. Some initial resistance may be expected as the band directors are under deadlines, work with large groups of students and are used to full autonomy and control of the practice situation. They may have "done it this way" for many years, and do not have the background knowledge to realize the potential health risks. In fairness, health is not their focus.

The nurse needs to discuss the implications of long practices in the heat and the need for frequent fluid replacement. Pointing out how frequent fluid replacement and reduced practices in the heat will benefit the director and band program is an excellent approach. The nurse could cite information regarding dehydration and the subsequent effects on the body especially decreased endurance and strength, decreased level of concentration, physical manifestations of the heat, and the possibility of medical emergencies. The nurse should also discuss the Heat Index, pointing out the physiology of heat dissipation in the body and the need for reduced time outdoors when the heat index is high. Suggesting a way to replace fluids without the students needing to break formation frequently meets the director's need for control yet addresses the needs of the students.

Coordinating procedures with the parent group is vital because they are an important component of many band programs. It is a rare parent who is not concerned about the health implications of students practicing in the heat. Consequently, parents need to be given the same information. Finding and implementing a solution to the lack of fluid replacement is usually an easy sell with parents. They often purchase the equipment and assist in maintaining it; their enthusiasm will be invaluable in implementation.

An educational program should be arranged. The program will inform students, parents, and the director about the potential for medical problems and a solution that has been tested. The nurse must emphasize that no one is exempt from the requirements. Periodic visits to practices should be implemented to check compliance, answer questions, and give recognition to those following the instructions.

CONCLUSIONS

Heat-induced illness is common during Marching Band rehearsals. Students generally do not want to call attention to themselves by leaving the field during rehearsal, so they tend to continue rehearsing, hoping the symptoms they feel will disappear. Students and directors need instruction on how heat and dehydration affect the body and its performance. The educational program should increase their understanding of the importance of constant fluid replacement especially when the Heat Index is high. Water must be readily available for students to use, or they will go without it, risking serious

health consequences. Wearing bottle belts during rehearsals should be required for all marching band students and the director. Initially, the students feared "looking like nerds," but that issue was resolved when everyone was required to wear them.

Lack of adequate fluid replacement was a problem recognized by parents, students and staff before 1999 but at the time, no one could come up with a solution that did not involve the band breaking formation every 10 to 15 minutes or having multiple students sharing one water container on the practice field. The band has used these water bottles and belts for 3 years. Their use is not questioned because their value has been demonstrated. Before their use, students were physically exhausted and had frequent complaints of nausea, headache, and muscle cramping. Students passed out on the field as they did not recognize symptoms or respond to them. One was admitted to the emergency room suffering hallucinations. The band director and parents were in conflict, with the parents demanding frequent water breaks and the director reluctant to allow this because of the resulting loss of valuable practice time.

Today, the students ask to wear the bottle belts. Many no longer remember a time when water was not constantly available to them. They remind each other to "drink" and have been overheard telling a classmate complaining of a headache to "drink a big glass of water." They recognize the symptoms of heat-induced illness and dehydration and will come off the field voluntarily for assistance when symptoms first occur. The amount and quality of the practice time has increased. Use of these bottles has provided a cost-effective means of addressing a major health and safety concern while balancing the needs of the group.

Table 1 Heat Related Illness: Symptoms and Treatment

Heat Disorder	**Symptoms**	**Treatment**
Heat Cramps	♦ Painful cramping usually in the legs or abdomen ♦ Heavy perspiration ♦ Nausea	♦ Move to a cool, shady area ♦ Firm, gentle massage to cramp ♦ Drink at least 4ounces of fluid every 15 minutes
Heat Exhaustion	♦ Dizziness, headache ♦ Normal temperature possible ♦ Weakness & fatigue ♦ Heavy perspiration ♦ Nausea ♦ Cold, pale, clammy skin	♦ Move to a cool, shady area ♦ Loosen clothing, fan student ♦ Drink at least 4 ounces of fluid every 15 minutes ♦ Apply cool, wet cloths to the neck, forehead and underarms
Heat Stroke	♦ Hot, red and dry skin ♦ Absence of sweating ♦ Rapid, strong pulse ♦ Nausea/vomiting ♦ Confusion, incoherent speech ♦ Possible seizures ♦ Possible loss of consciousness ♦ Body temperature ranges from 102 to106	♦ Call 911, medical emergency ♦ Move to a cool or air conditioned area; fan student ♦ Loosen clothing ♦ Cool with cool bath or sponging ♦ Take temperature if possible ♦ Lie on the back with feet elevated ♦ If vomiting, turn on the side Do not give fluids if unconscious, confused or seizing. Use caution.

Table 2 Fluid Replacement Guidelines

Time	**Amount Advised**
30 minutes to 2 hours *prior* to exercise	8 to 16 ounces
Every 15 to 20 minutes *during* exercise	6 to 12 ounces
After exercise	16 to 32 ounces or 16 ounces for every pound lost

Avoid caffeinated or carbonated drinks. They will cause a feeling of fullness and dehydration. Water or sports drinks are best.

Figure 1 Heat Index Chart

Temp (F)	Relative Humidity (%) 90.0	80.0	70.0	60.0	50.0	40.0	30.0	20.0	10.0	
75	**79.7**	**76.7**	**75.8**	**74.8**	**73.9**	**72.9**	**72.0**	**71.1**	**70.1**	**Green Zone**
80	**88.2**	**85.9**	**84.2**	**82.8**	**81.6**	**80.4**	**79.0**	**77.4**	**76.1**	***Below 80***
85	**101.4**	**97.0**	**93.3**	**90.3**	**87.7**	**85.5**	**83.5**	**81.6**	**79.6**	
90	**119.3**	**112.0**	**105.8**	**100.5**	**96.1**	**92.3**	**89.2**	**86.5**	**84.2**	**Yellow Zone**
95	**141.8**	**131.1**	**121.7**	**113.6**	**106.7**	**100.9**	**96.1**	**92.2**	**89.2**	***80 to 100***
100	**168.7**	**154.0**	**140.9**	**129.5**	**119.6**	**111.2**	**104.2**	**98.7**	**94.4**	
105	**200.0**	**180.7**	**163.4**	**148.1**	**134.7**	**123.2**	**113.6**	**105.8**	**100.0**	**Red Zone**
110	**235.6**	**211.2**	**189.1**	**169.4**	**151.9**	**136.8**	**124.1**	**113.7**	**105.8**	***Above 100***

Green Zone: ***Outdoor conditions ideal.***

Yellow Zone: ***Heat exhaustion possible with prolonged exposure & activity.***

Red Zone: ***Heat cramps & exhaustion likely with prolonged exposure. Heatstroke possible. Limit or cancel outdoor rehearsals.***

Figure 2. Water Bottle Belt

Captions:

Table 1 Heat Related Illness: Symptoms and Treatment

Table 2 Fluid Replacement Guidelines

Figure 1 Heat Index Chart

Figure 2 Water Bottle Belt

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