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# Prevalence of Inadequate Hydration Levels in Aquatic Safety Personnel: A Pilot Study

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Lifeguards play an important role in the security and safety of those they are hired to protect. A performance issue may arise if they succumb to circumstances that cause them to become physically or psychologically compromised. Dehydration is one issue that can result in decreased levels of workplace performance and pose personal health risks. Certified lifeguards 15 years old and older were tested for urine specific gravity (USG) to determine their place within the dehydration spectrum. Participants ($N = 55$) were recruited from seven test sites offering a variety of designs (indoor/outdoor, traditional/waterpark) and classifications (private, semipublic, public). Testing involved the collection of a urine specimen from participants and immediate recording of specific gravity using a reagent test strip by researchers. A brief survey to collect demographic information from subjects was also administered. The majority of participants were found to reside along the dehydration spectrum (USG $\geq$ 1.015), several showing results toward the severe end of the scale. The sample provided adequate demographic variability among males and females and facility classification types. No statistically significant differences were found between the demographic variables and USG scores of subjects. Since the majority of lifeguards in the sample showed some level of dehydration, this indicated a need for more information concerning lifeguards and dehydration. Despite the lack of statistically significant differences among the demographic factors within this sample, future studies should incorporate other behavioral factors and dehydration testing methods to investigate the mechanisms for preventing dehydration as well as its impact on lifeguarding performance.

*Keywords:* lifeguards, dehydration, aquatic safety, behavior, education

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The important role lifeguards play in aquatic safety has been understood since the advent of the profession by the British Lifesaving Society in 1891. With at least 359,000 drowning deaths occurring annually worldwide (World Health Organization [WHO], 2014), there is little doubt that this number would be substantially higher without professionally trained lifeguards on duty. It has been estimated that trained lifeguards execute about 100,000 actual rescues per year nationwide (Branche & Stewart, 2001) and perform more than 6.5 million preventative actions at beaches alone that assist in helping patrons avoid potential aquatic injuries (United States Lifesaving Association, 2013).

Considering lifeguards to be among a class of safety and accident/incident prevention personnel such as EMTs, police, firefighters, and air traffic controllers, it would make sense that maintaining peak physical and psychological condition could be essential in performing required duties with optimal efficacy. One criterion to consider when making a readiness assessment for these first-responder occupations, including lifeguards, might include maintenance of acceptable levels of hydration to avoid the behavioral impact of being in a state of dehydration in the workplace.

## Dehydration/Lack of Hydration

Dehydration is a condition that occurs when an individual experiences a loss of water and/or salts necessary to maintain normal function at a rate greater than the body can replace it (Thomas et al., 2008). Dehydration is often associated with exposure to extended periods of heat and humidity, use of diuretics, and illnesses resulting from prolonged diarrhea and vomiting (Armstrong, 2005). Within the research literature, the condition is described as either "dehydration" or "inadequate hydration." Either term is viewed in the literature as an acceptable one by which to describe the condition. We will use them interchangeably within this article. In addition, it is important to define the term "voluntary dehydration," which describes persons who become dehydrated from exposure to thermal stressors while having readily available access to palatable water (Brake & Bates, 2003). Work by Adolf (1947) pointed to voluntary dehydration occurring as the result of a delayed thirst response that can be brought on at varying levels of exposure and also vary per individual characteristics of workers. The important component of voluntary dehydration is that possible behavioral characteristics influence the fact that resources are available to prevent the condition from occurring although persons appear to choose not to partake in them. "Voluntary dehydration" most likely occurs with lifeguards in the workplace.

Side effects for those who find themselves somewhere along the spectrum of dehydration include both physiological and psychological deficiencies such as (a) increased risk of heat-related illnesses, (b) fatigue, and (c) cognitive impairments (Gopinathan, Pichan, & Sharma, 1988). Ramsey, Burford, Beshir, and Jensen (1983) suggested that fatigue and impaired judgment account for a large portion of dehydration-related occupational work behaviors. As noted by Bates, Miller, and Joubert (2010), adequate levels of hydration are crucial in mitigating health-related illness in workers by controlling losses in plasma volumes that regulate human beings' heat dissipation systems and are essential in avoiding excessive fatigue. Work by Miller and Bates (2007) showed that the vast majority of outdoor workers were inadequately hydrated regardless of occupational demands and despite best efforts by employers to provide programs to prevent dehydration. Early research by Sharma, Sridharan, Pichan, and Panwar (1986) also concluded that the combination of dehydration and psychological stress resulted in decreased scores on tests for concentration and psychomotor function as levels of dehydration increased. This situation was confounded when humidity coexisted with high temperatures. The combination of hot and humid environments resulted in significantly decreased performance scores over those in hot, dry environments.

Although the aforementioned research was not performed directly on lifeguards, it seems likely that if performing their primary duty of patron surveillance in a state of dehydration, guards may exhibit similar negative physiological and psychological reactions, making them less attentive and effective. The final result could be catastrophic injury or loss of life for patrons at guarded aquatic facilities.

Existing research on dehydration and occupations tangentially related to lifeguarding confirms that the issue is important. Work by Payne and Mitra (2008) looked at the impact of heat on workers in the Mount Isa mines of Australia. It was noted that an important reason for conducting the study was not only negative effects heat could impose on workers' health but also negative effects that can impact safety, morale, and cost-effectiveness for the company. Results from the study indicated that the addition of a cooling source to lessen the effect of work-site heat aided in reducing heat illnesses. A similar study that also examined working conditions for miners in the northwest region of Australia confirmed that levels of dehydration existed and created a situation in which workers were more vulnerable to detrimental physical and cognitive functioning (Miller & Bates, 2007). Studies involving workers in construction-type jobs in the Middle East found them to be in varying states of dehydration that produced fatigue and impaired judgment, resulting in a belief that dehydration was most likely a leading cause of increased unsafe work behaviors (Bates et al., 2010). Similarly, Wästerlund, Chaseling, and Burström (2004) found that forest workers in Zimbabwe assigned to a low-fluid-consumption regimen throughout a workday took longer to complete the same work as when assigned to a high-fluid-consumption regimen. Researchers recommended keeping an adequate fluid supply at hand and training workers on the need for and benefits of regularly consuming a sufficient amount of fluids; similar advice could be applied to firefighter training in the state of Illinois in the United States. Horn, DeBlois, Shalmyeva, and Smith (2012) used a test for urine specific gravity (USG) and recorded that firefighters suffered from dehydration in both pre- and postroutine training sessions. Results revealed that 32% of the participants were considered seriously dehydrated before training and only 9% were considered well hydrated. These classifications were based on athletic standards set forth by the National Athletic Trainers' Association and highlight the possibility that, much like firefighters, a number of lifeguards may be arriving at work in a state of dehydration before their work shift. Together, these studies suggested that proper hydration and education could help improve work productivity and safe behaviors.

## Existing Education and Training on Issues Related to Hydration for Lifeguards

We surveyed the manuals from five nationally recognized lifeguard training programs, including (a) the American Red Cross (ARC), (b) Ellis & Associates (EA), (c) National Aquatic Safety Company (NASCO), (d) Starfish Aquatics Institute (SAI), and (e) Young Men's Christian Association (YMCA), to gain a better sense of how the industry views the importance of regular hydration within the lifeguarding profession (refer to the Appendix at end of article). We were surprised to discover that, although each agency mentioned the issue of dehydration and noted practices to keep hydrated, only the NASCO program directly linked dehydration with reduced vigilance and identified potential dehydration symptoms of which lifeguards should be aware (National Aquatic Safety Company [NASCO], 2014). Furthermore, the NASCO program was alone in describing a quick self-test to be used by the lifeguard. EA and YMCA programs were unique in their inference of hydration by referencing that a guard's equipment should include a water bottle. They further inferred that staying hydrated was a means of staving off fatigue that could interfere with a lifeguard's ability to effectively scan his or her zone. In addition, EA listed hydration as something they look for during facility audits.

The ARC, EA, and YMCA programs recognize staying hydrated or avoiding dehydration as a characteristic of being a professional lifeguard. The ARC represented hydration both as a means of remaining healthy and fit, EA considered hydration as a means of being prepared, and the YMCA stressed hydration as a means to be fit for duty and prepared. In addition to suggested hydration practices, EA, NASCO, and SAI also listed dehydration as a potential occupational health risk (see the Appendix).

The purpose of this study was to conduct an initial pilot investigation regarding the prevalence of inadequate hydration among trained lifeguards while on duty. Depending upon the results, additional research examining the mechanisms related to hydration and dehydration as well as its behavioral impact on lifeguards may be warranted.

# Method

## Participation Recruitment/Selection

Volunteer participants were chosen using a convenience sampling method from seven aquatic venues in the southern region of Indiana. The study was open to certified lifeguards at least 15 years of age or older. For those under the age of 18, a parental consent was required as well as participant assent. Approval to recruit participants and perform on-site sample collection was obtained through the appropriate administrative channels for each facility as well as gaining approval from the primary investigator's Institutional Review Board. Participants in the study received a facility-approved whistle and lanyard as an incentive.

Fifty-five volunteer participants were individually recruited by several means including: (a) promotion from aquatic facility management personnel, (b) posted announcements, (c) e-mail announcements, and (d) recruitment presentations

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given by the research team at staff trainings and regularly scheduled meetings. Participants were eligible to participate if they held a current certification in lifeguarding and could self-identify one of the chosen test sites as their primary place of employment as a lifeguard. On the day of testing, participants signed the necessary consent forms before submitting to the sampling process. Participants were never asked to leave their duties at any time to participate, and sampling only occurred before, after, or while on break during work shifts. Primary data for the study were derived from urine collection sampling along with answers to questions on a brief demographic survey. Urine samples were tested to determine levels of specific gravity. This method for determining markers related to dehydration was chosen for the exploratory study because of its accepted use in the medical field and its relative ease of administration.

## Testing Site Selection/Approval

Selection of seven test sites was based on the following criteria: (a) nature of the structural aquatic environment (indoor or outdoor; traditional or waterpark design), (b) use of a nationally recognized lifeguard certification for staff (ARC, EA), and (c) representative of either a private, semipublic, or public operation model as defined by the Indiana State Department of Health (Indiana State Department of Health Environmental Public Health Division, 2010). The majority of sites used ARC lifeguard certifications with one site having adopted EA certification.

For the purpose of this study, a traditional pool was defined as one whose design was primarily for lap swimming and may include competitive style diving springboards. A waterpark was designated by a design that primarily promoted guided informal activity and contained play features. See Table 1 for test site characteristics and associated descriptors.

## Testing Protocol, Procedures, and Instrument

Testing was performed during the summer months of June and July. Neither management nor test participants were aware of the actual date or time that testing would take place within the overall study time frame. Researchers prepared a schedule

**Table 1 Study Test Site and Variable Descriptors**

| Test Site | Built environment | Indoor or outdoor | Primary certification | ISDH |
|---|---|---|---|---|
| 1 | Waterpark | Outdoor | Red Cross | Public |
| 2 | Waterpark | Outdoor | Red Cross | Public |
| 3 | Traditional | Outdoor | Red Cross | Semipublic |
| 4 | Traditional | Indoor | Red Cross | Semipublic |
| 5 | Traditional | Indoor | Red Cross | Private |
| 6 | Traditional | Indoor | Red Cross | Private |
| 7 | Waterpark | Outdoor | Ellis & Associates | Private |

*Note.* ISDH = Indiana State Department of Health.

for data collection to include two bouts of testing at each site with the exception of Test Site 7, where only one bout of testing was performed because of the greater distance of travel required to access that test site. Sampling occurred at each of the sites for 2 to 3 hr on each occasion with the exception of Test Site 7, where a single 6-hr sampling period occurred.

Sampling involved urine collection and was performed by asking participants to: (a) take a prepackaged and numbered testing kit (brown paper bag containing a sterile medical-grade collection cup) into a restroom area for specimen deposit, (b) wash their hands with soap and rinse well before handling the contents of the test kit, (c) immediately seal the collection cup once done delivering the sample, (d) return the collection cup to the paper bag and fold over the top, and (e) return sample directly to a member of the research team. Immediately after receiving samples from participants, researchers (wearing latex medical-grade gloves to avoid possible contamination) inserted a urine reagent test strip to measure USG. It is important to note that no other available measures on the reagent strip were examined or recorded in the testing process outside of the USG reading. The urine reagent strips have the capability of estimating a 7-point USG range between 1.00 and 1.030 with 1.015 recognized to be the "point of neutrality" above which participants could be considered in a state of dehydration (Armstrong, 2005). To enhance reliability and accuracy, dual confirmation on the interpreting of the test strip was used before recording results. Specimens were disposed of immediately after testing at each site using approved Indiana University biosafety/biohazard protocol.

In addition to the urine collection process, each study participant completed a brief demographic survey to identify several key variables to be used in analysis. Those variables included: (a) years of lifeguarding experience, (b) current certification agency, (c) age, and (d) sex. No specific identifying markers were given on the demographic survey or urine sample. Each sample and survey was given corresponding identification numbers to track completion and match variables for data analysis while maintaining participant confidentiality.

# Results

## Descriptive Reporting

The sample size for the study was $n = 55$. Frequency data based on information collected from participant surveys revealed that there was a nearly even split on sex with 28 (51%) females and 27 (49%) males participating. Thirty-two (58%) participants reported having 4 years or fewer of lifeguarding experience while another 23 (42%) indicated having 5 years or more experience. For "facility type," 44 (80%) of the lifeguards worked at outdoor aquatic facilities with the remaining 11 (20%) employed at indoor aquatic sites. Fourteen (25%) participants worked at public facilities, 18 (33%) at semipublic, and 23 (42%) at private designated facilities, according to state code guidelines. The majority of lifeguards were over the age of 18 (96%) with only 2 (4%) reporting being younger. For certification type, 37 (67%) indicated an affiliation through ARC, with 18 (33%) certified through EA. None of the lifeguards reported certifications from any other national agencies (e.g., StarGuard, NASCO, YMCA of USA).

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Test results for specific gravity revealed that 29 (53%) of the guards reported scores over the point of neutrality (1.015). Breakdowns on dehydration according to other variables revealed that (a) 13 males (24%) and 16 females (29%) were dehydrated; (b) no lifeguards under the age of 18 (0%) and 29 lifeguards 18 years or older (55%) were dehydrated; (c) 22 of the guards certified through ARC (59%) and 7 of those certified through EA (39%) tested as dehydrated; (d) 7 of the guards working at indoor facilities (64%) and 22 of the guards working outdoors (50%) were dehydrated; and (e) 14 working at public facilities (25%), 18 working at semipublic facilities (33%), and 23 working in private facilities (42%) tested as dehydrated.

## Statistical Analysis

One-way analyses of variance (ANOVAs) were performed using specific gravity as the dependent variable. The following factors served as independent variables for the six ANOVAs: (a) age, (b) sex, (c) years of experience, (d) certification agency, (e) facility type, and (f) facility classification. No comparisons between levels of the independent variables were significantly different using a traditional $\alpha < .05$ as a threshold to avoid Type 1 errors. Even expanding $\alpha = .20$ to adjust for increased experimentwise error rate due to the calculation of six simultaneous ANOVAs would not have produced significant differences, partially because of the relatively small sample size and presumed low level of statistical power. Table 2 reports the statistical results.

The lack of statistically significant differences suggests that the six descriptive variables did not seem to influence differences in hydration levels in this pilot study. The most important information arising from our study was the fact that, regardless of sex, age, or other employment variables, more than half of the lifeguards tested were dehydrated, based on the USG tests. These initial observations derived from the descriptive reporting provide important information for aquatic facility managers as outlined in the following discussion.

# Discussion

As an initial investigation, the study indicated the need for more information from future research concerning lifeguards and their hydration levels. Since the majority of lifeguards in the sample showed some level of dehydration, this indicated a potential area of concern for facility managers, users, and the guards themselves. Aquatic facility professionals may take particular interest in the management and

**Table 2 Analysis of Variance: Specific Gravity Scores and Factors**

| | Age | Sex | YOE | CA | FT | FC |
|---|---|---|---|---|---|---|
| *p*-value | .247 | .800 | .332 | .271 | .477 | .253 |

*Note:* YOE = years of experience; CA = certification agency; FT = facility type; FC = facility classification.

policy ramifications that can arise from increased knowledge about the levels of hydration among their safety personnel.

Research has indicated that low levels of hydration can impact a person's ability to function at optimal levels, both cognitively and physically (Gopinathan et al., 1988). Lifeguards, as vital members of the aquatic safety and emergency management team, must react quickly and efficiently to a variety of situations that can be both physically and psychologically challenging. If a significant number of on-duty lifeguards are experiencing low levels of dehydration, it serves as a troubling indicator that they may not be able to perform their life-saving duties at peak ability. This initial study serves as an indication that dehydration levels are relatively prevalent during summer months, with the majority of study participants showing significant levels of dehydration. The degree to which the observed levels of dehydration affect the ability of lifeguards to perform at the highest levels of physical and mental performance in the workplace is unknown because we did not measure that in this study.

Important to note from the results is that there was no significant difference in levels of dehydration between participants lifeguarding in indoor versus outdoor settings. Although this may seem somewhat unintuitive since we generally connect characteristics of the outdoors with promoting conditions related to dehydration, those familiar with indoor aquatic venues may be able to better relate. Often we find indoor aquatic venues have high levels of heat and humidity, which are factors related to dehydration. In addition, there may be a possibility that while lifeguarding indoors, because of a misperception about susceptibility, individuals may not feel the need to focus on hydration. At a basic level these result inform us that education and awareness of dehydration should not be forgotten with indoor lifeguards.

A great deal of additional information is needed to address possible issues around hydration of a lifeguarding staff as a whole. Future studies obviously should employ a larger and more diverse sample, including the use of a wider range of aquatic facilities (both in type and classification), participant selection, and months of the year. An additional intervention study with a control group should be undertaken to determine how easily hydration levels may be able to be modified. While the use of a specific gravity test is a valid and reliable way to indicate general levels of hydration in humans requiring minimally invasive procedures and investigator training, other more precise measures of hydration also could be considered. Future studies may benefit from more precise measures of hydration levels than were provided by the method employed in this study. Because degree of dehydration can be tied directly to the behavior of participants, future studies should attempt to integrate an investigation of how hydration levels may impact behavioral factors in addition to understanding how physiological factors may influence hydration. To convince facility managers of the seriousness of dehydration among lifeguards, the association between dehydration levels and decrements in lifeguard attention and other physical performance behaviors needs to be studied. A more complete understanding of the extent and causes of lifeguard hydration levels is necessary so facility managers can create educational and policy-based initiatives to control for severe levels of dehydration among lifeguard staff members.

Another piece to consider when discussing the impact of dehydration in the workplace is that the condition is not workplace specific in regard to its onset or remedy. As previously mentioned, dehydration can result from several factors, including heat and humidity, certain medications and diuretic beverages and alcohol, and dehydrating illness related to high fever, diarrhea, or vomiting. It is important for facility managers and all lifeguards to appreciate characteristics related to dehydration, influence on lifeguarding behaviors, and interventions to effectively control dehydration. For example, the time needed for dehydrated individuals to return to acceptable levels of hydration reportedly may be anywhere from 24 to 48 hr, depending on the severity of the condition. The implications of this lengthy time means that lifeguards who have become seriously dehydrated could remain in a deficit recovery situation for at least 1–2 days. Although the physical nature of the workplace environment (e.g., air temperature, humidity) can certainly contribute to dehydration, it is important to note that remediating dehydration to return to normal levels is neither a short-term process nor something that can happen only on the job.

### Limitations

Several factors limited the scope and generalizability of results from this initial investigation. The sample size was small and most likely influenced the statistical power of our analyses. Unfortunately, we did not do a power analysis to know how large a sample would have been needed to have sufficient statistical power to avoid Type IV errors. Despite examining six demographic variables that might have influenced levels of hydration, the study was conducted testing lifeguards during only two summer months when temperatures and humidity are high. Our pilot study was descriptive and did not employ any control groups against which to compare dehydration among lifeguards. We also did not study lifeguards trained by three of the major lifeguard certification agencies (i.e., NASCO, StarGuard, and YMCA of the USA) whom we had included in our literature review. On the other hand, no significant differences were found between Red Cross and EA certified lifeguards, and there was no logical reason to think that the lifeguard training agency itself would alter a physical parameter such as hydration levels, especially when actual work-site variables indicated no differences.

## Conclusions and Implications

It seems intuitive that both outdoor and indoor workplaces often favor conditions promoting water loss that could cause dehydration. Conditions for these facilities can include incidents of high temperatures, high humidity, a lack of adequate ventilation for indoor aquatic facilities, and, of course, exposure to direct sun at outdoor aquatic facilities. Better et al. (1980) noted that lifeguards working outdoors are exposed to intense heat from the sun on their entire body for a good part of the calendar year. Although we tend to think lifeguards working in external environments are at greater risk when it comes to heat-related issues such as dehydration, our study did not reveal significant differences in dehydration between indoor and outdoor aquatic facilities. Lifeguards in both types of environment were equally dehydrated. Professionals in the aquatics industry are well aware that similar hydration-related issues exist indoors as well as outdoors. Issues related to extreme heat levels indoors for aquatic venues are often caused by attempts to keep built environments pleasant for participants, who are generally in swimming attire, by assisting in water temperature regulation and preventing condensation from forming on interior surfaces.

As recommended in the *Pool & Spa Operator Handbook* created by the National Swimming Pool Foundation (2014), air temperature for an indoor facility should be in the range of 15–16.6 °C above water temperature. The ARC recommends water temperatures of 25.6 °C for competitive swimming, 26.7 °C or higher for young children and elderly, 28 °C for recreational swimming, 30° to 34.4 °C for infants, 29° to 32.2 °C for children's instructional classes, 25.5° to 27 °C for competitive and fitness training, and 40 °C for spas. Based on these recommendations, it appears that, depending on a user group's needs, water temperatures for an indoor facility can be well within a range of 26° to 32 °C, leaving recommended indoor pool air temperatures between 28 °C and 48 °C, which are even higher than those of many outdoor pools.

These temperature recommendations can create an environment in which sedentary lifeguards may find it more difficult to adjust their body temperatures and hydration levels than their roaming counterparts. Chad and Brown (1995) determined that sedentary, female workers who performed a light metabolic task (typing) had more difficulty acclimatizing to a simulated hot and humid climate compared with female workers performing a heavy metabolic task (lifting). They presumed the greater sweat and evaporation by those performing the heavy tasks allowed those individuals to cool more efficiently. Although the typists did not expend much energy, they did not sweat and adapt to the heat as well as the lifters. For their study researchers created an environment with 75% humidity and a dry-bulb/wet-bulb temperature of 33°/29 °C. Indoor swimming facilities typically have similar air temperature and relative humidity levels. The typical sedentary nature of an indoor lifeguard's job could result in similar heightened risk of heat-related issues. We propose that air temperature and relative humidity act as a primary job-related mechanism for causing dehydration among lifeguards at both indoor and outdoor venues.

We recommend those interested in the overall safety of aquatic facilities and improved lifeguard performance in the workplace will be well served by increasing attention to, and education about, the hydration levels among lifeguarding staff. Specifically, we believe this area of study can improve management policies and practices aimed at decreasing staff dehydration. For example, decreasing lifeguard rotation times and patterns, adding water bottles as required lifeguard equipment, and educating lifeguards about the importance of adequate hydration for optimized performance in the workplace may be important changes to the lifeguarding workplace. Like the standards used by EA within their lifeguarding audits, best practices and policies encourage and even mandate increasing intake of appropriate fluids before, during, and after lifeguarding shifts. The development of staff-based initiatives to encourage positive behaviors outside of work and to ensure that all aquatic facilities have adequate hydration options on-site for staff would be recommended interventions.

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# Appendix

## Mention of Dehydration/Hydration in Certification Agency Materials

***Agency*: American Red Cross (ARC)** ***Category*: Professional Characteristic**

"Eat and hydrate properly. Good nutrition and a balanced diet help to provide the energy needed to stay alert and active. Drink plenty of water to prevent dehydration." (ARC, 2012, p. 4)

"Protect yourself from sun exposure. Overexposure to the sun's ultraviolet (UV) rays can cause many problems, such as fatigue, sunburn, skin cancer, dehydration, heat exhaustion and heat stroke." (p. 4) "Drink plenty of water." (p. 4)

***Agency*: ARC** ***Category*: Surveillance Challenges**

Fatigue: "Keep hydrated, cool off and get out of the sun when on break." (ARC, 2012, p. 43)

High air temperature: "Stay hydrated by drinking plenty of water." (p. 43)

***Agency*: Jeff Ellis & Associates (EA)** ***Category*: Dehydration/Heat-Related Illness**

"Drink plenty of water. Sit or Stand in the shade whenever possible. Cool down often. Eat small, light meals." (EA, 2007, p. 90)

***Agency*: EA** ***Category*: Professional Image**

"Have the items you need to do the job (whistle, hydration, sun protection, etc.)." (EA, 2007, p. 4)

***Agency*: EA** ***Category*: Audit Performance**

Sun Protection: "Sunglasses, hydration, and shade." (EA, 2007, p. 6)

***Agency*: National Aquatic Safety Company (NASCO)** ***Category*: Health Hazard**

"If you are working hard, you will sweat even if you are in the water. Common symptoms of dehydration include headaches, dry mucous membranes and difficulty going to the bathroom. A simple self-test is to pinch a fold of skin on your forearm and see if it stands up after pinching. If so, your fluid level is too low. If you are not urinating when going to the bathroom every couple of hours, you may be dehydrated. More fluids are better than less. Some of the commercial sports drinks seem to work well with dehydration. Another sign is if you have a headache every day when you leave work; it may possibly be the result of dehydration. Try increasing your fluid intake, it may eliminate this problem. Proper nutrition and rest are also helpful in the prevention of dehydration." (NASCO, 2014, p. 16)

***Agency*: NASCO** ***Category*: Vigilance**

"If the body needs water, the eye may not see as well. This is one of the reasons that guards should drink plenty of fluids." (NASCO, 2014, p. 47)

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| ***Agency*: StarGuard** | ***Category*: Workplace Health** |
| "Minimize your risk of dehydration, heat exhaustion, or heatstroke by drinking lots of water. Keep a water bottle on the stand, and make sure you have protection from the sun." (White, 2012, p. 186) | |
| ***Agency*: YMCA** | ***Category*: Professional Responsibility** |
| "Be well rested and hydrated. Get plenty of sleep and drink sugar-free fluids before your shift. Be prepared by ensuring you are well hydrated." (YMCA, 2011, p. 205) | |
| ***Agency*: YMCA** | ***Category*: Personal Equipment** |
| "Stay hydrated by keeping a water bottle nearby at all times." (YMCA, 2011, p. 116) | |
| ***Agency*: YMCA** | ***Category*: Fatigue Busters** |
| "Many conditions contribute to lifeguarding fatigue, including dehydration, lack of sleep, eye-strain, hunger, and exposure to sun and wind." "Be prepared for work: be well rested, be well hydrated, and eat a nutritious meal. Drink plenty of water." (YMCA, 2011, p. 72) | |