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Burnett, Tiffany R. ***Best Practices for Hydration: Proper Adolescent Hydration during Training***

Abstract

Participants and adult volunteers of the nonprofit organization Power of Divas and Dudes through Shaping and Conditioning (PODS) do not understand the need for proper hydration/water stops while during their 16 week training program to run a half marathon. These adolescents may take too much fluid or not enough which, depending on the weather, can result in either hypotramenia, dehydration, heat stroke, or heat exhaustion. Adult Volunteers who monitor and supplies water/hydration at the designated mile markers do not have the sufficient understanding the importance of proper hydration. They also may be lacking the skills to motivate the runners to drink the designated fluids.

Coaches of the PODS, coaches of youth sports and health care professionals were interviewed to obtain the best practices of hydration during intense physical activates. The data were used to create a training manual for the nonprofit organization PODS which instructs runners why hydration is important. In addition, a manual was developed for the adult volunteers which includes a section on how to administer the hydration, how to spot specific health conditions associated with too much or too little hydration, and the overall importance of proper hydration.

Acknowledgements

I would like to thank Deanne Halwas, my best friend and the Head Coach of the nonprofit organization PODS (Power of Divas and Dudes through Shaping and conditioning) who I met in the summer of 2012 while attending a fun run in Bayview, Wisconsin. The fun run was to raise donations for the participants who were running a half marathon in Seattle, Washington. At that fun run I won a silent auction basket that included training for a half marathon with the head coach of the PODS. During the summer and fall of 2012 we trained daily to prepare for the upcoming race. Her program is based on the book *The Non-Runner's Marathon Trainer,* Whitsett, Dolgener, Kole (1998). This resource was the result of the success of a course taught at the university level commonly called the "marathon class" and suggestions from former students, one being her aunt, to put something together for anyone wanting to train and run a marathon.

Over the course of four months I learned about her passion for the PODS. I also convinced her to change the half marathon to a full marathon which we completed on November 3, 2012 in Savanah, Georgia. Her dedication and enthusiasm can be seen in all the generations that have participated in the PODS program since 2007.

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Chapter I: Power of Divas and Dudes

In 2007 Deanne Halwas, a spirited athlete and mother of two girls (ages 11 and 15), created a nonprofit organization called Power of Divas through Shaping and Conditioning (PODS). The purpose of this nonprofit organization was to get young girls (7th and 8th grade) off the streets and get them involved with physical activity which would inspire them to condition both their minds and body. The mission statement for the PODS is:

> To give young people the skills and tools to shape and condition their mind, body, and soul through exercise. In turn, with this ability they will be able to set goals, make decisions in life and not have life make decisions for them. They will be empowered in their life's journey.

For the next several years each group of the PODS trained for 16 weeks with their final goal running a half marathon. In 2010 Deanne made the decision to include boys into the endurance program and expanding her impact on youth. In January of 2013, the word "Dudes" was added into the organization's name PODS (Power of Divas & Dudes through Shaping and Conditioning).

During the 2013 spring training season it was realized that the participants and adult volunteers (mostly parents) did not understand the need for proper hydration. During several of the long runs the seventh and eighth graders questioned the need to ingest water during the scheduled stops. The volunteers who offered the water or electrolytes were not seriously encouraging the PODS participants to drink the fluids; because they did not have an understanding of why fluids had to be administered. The need to educate both the participants and volunteers is important to achieve control of one's body; hence, the inclusion of specific information regarding proper hydration became important. Because of the importance of proper

hydration, it is important that PODS enforces these values during their 16 week training program.

Statement of the Problem

Seventh and eighth grade members of the PODS do not understand the need for correct levels of hydration during their 16 week training program. In addition the adult volunteers who help distribute the hydration during long runs, do not know how to effectively communicate to the runners why hydration is critical. Without proper levels of hydration the runners can become dehydrated or overhydrated.

Purpose of the Study

The purpose of the research was to gather data regarding the best practices of hydration during intense physical activities and to create a training program about proper hydration utilization; the best methods for teaching adults and young adolescents was also considered. In order to collect the data coaches of the PODS, coaches of youth sporting events and healthcare professionals were chosen for interviewing.

Assumptions of the Study

In regards to this study, the following assumptions exist:

1. Hydration is essential for a healthy body.
2. Extended strenuous exercise requires additional hydration.
3. Knowledge of proper hydration during strenuous exercise should be required in training programs

Definition of Terms

The following defined terms are words not used necessarily in everyday language. The definitions reflect their denotation as displayed in the research.

Caffeine. Caffeine is a bitter alkaloid found especially in coffee, tea, cacao, and kola nuts and used medicinally as a stimulant diuretic.

Carbohydrate. Carbohydrates are compounds of carbon, hydrogen, and oxygen (e.g. sugars, starches and celluloses) most of which are formed by green plants.

Dehydration. The process of dehydrating (to lose water or bodily fluids), especially; an abnormal depletion of body fluids.

Electrolyte. Electrolytes are any of the ions (as of sodium or calcium) that in a biological fluid regulate or affect most metabolic processes (as the flow of nutrients into and waste products out of cells).

Glucose. An active sugar; the sweet colorless soluble dextrorotatory form that occurs widely in nature and is the usual form in which carbohydrate is assimilated by animals.

Glycogen. A white, amorphous, tasteless substance resembling starch that is form in which glucose is stored in animal tissues and especially muscle and liver tissue.

Homeostasis. A relatively stable state of equilibrium or a tendency toward such a state between the different but interdependent elements.

Hydration. (2) The quality or state of being hydrated; the condition of having adequate fluid in the body tissues.

Hyponatremia. Hyponatremia is a deficiency of sodium in the blood (cause by over-hydration).

Hypohydration. Dehydration of the human body

Limitations of the Study

The limitations of this research on the best practices of hydration for participants of the PODS and adult volunteers are:

1. The amount and availability of literature or published surveys on this topic is limited, especially in the United States.
2. Literature on adult learning and learners was consistent, but not varied.
3. Interviews and responses from coaches and health care professionals were limited to a regional area as opposed to a statewide or national process.

Methodology

The best practices on hydration are covered in Chapter 2. The literature review reinforces the need for general knowledge of hydration with young adolescents participating in intense physical activity. The articles also introduce the best methods for teaching young adolescent and adults.

Data was collected by interviewing healthcare professionals, coaches of youth sporting activities, and coaches of the PODS. The results and analysis are included in Chapter 4.

Chapter five (Discussion/Recommendations) explains the relationship of the articles in the literature review and the data collected in chapter four. After a lengthy process the end result was the creation of two additional section in the current PODS Training Manual; best practices of hydration for participants of the PODS and adult volunteers. These two sections can be found in the appendences A, B and C.

Chapter II: Literature Review

Hydration is an important factor when training for an intense physical activity. In the nonprofit organization PODS; seventh and eighth grade participants do not understand the importance of hydration during their 16 week training program. Without proper levels of hydration the participants can become dehydrated or overhydrated. The following literature review supports the four key factors when creating the training manual; general knowledge of hydration, proper fluid intake during specified long runs for young adolescents, effective learning methods for middle school children ages 13 and 14, and effective learning for adult volunteers.

General Knowledge of Hydration

The human body is made up of two-thirds water which helps transport elements like hormones and nutrients to vital organs which in turn helps increase oxygen to our cells. Water also helps regulate body temperature, remove waste, convert food to energy, fight diseases and makes us look younger by increasing cell replication. Carson-Phillips (2009) states that over time the connective tissue that surrounds our muscles can tend to dry up from lack of water, inactivity or trauma that is associated with day to day activities. Drinking water can help cushion the joints and offer flexibility. The brain is made up of approximately 85% water (Owen, 2005) and because of this, adequate amounts of water are needed to function properly. When the brain is sufficiently hydrated the effects result in clarity, creativity, and the ability to think faster and become more focused. In order to keep the brain at optimal health water needs to be consumed throughout the day; this is because the brain cannot store water (Clare & Clare, n.d.). If the brain does not get the proper levels of water, it will start to shut down and dehydration can occur.

The best indicator to know if the body is hydrated is to check the color of urine, it should be almost clear. If urine is dark and cloudy, it is a sign of severe dehydration and a person should seek medical attention immediately (Carlson-Phillips, 2009). There are three factors to consider when determining the proper consumption levels of water; body weight, weather, and activity level. It is advised that adults should consume a gallon (128 ounces) of water to ensure proper hydration and 64 ounces to maintain homeostasis (Carson-Phillips, 2009). Thirst is not a reliable indicator of dehydration (Lutheran Hospital, n.d.). Thirst becomes an issue when 2% of the body's weight is lost (WMS Cross Country, 2015). Thirst actually indicates that the body is in mild stages of dehydration (Lutheran Hospital, n.d.).

Some of the signs of dehydration include; dry lips and tongue, sunken eyes, lack of energy, electrolyte abnormalities, depression, headaches, sudden decline in performance, stress and impaired physical activities (Family Doctor Editorial Staff, 2015). Dehydration is a serious condition. When the body is dehydrated and can't cool itself; heat illness can occur. There are three stages of heat illness to be concerned about: heat cramps, heat exhaustion and heatstroke (Family Doctor Editorial Staff, 2015). When heat cramps occur the body experiences muscles spasms in multiple parts of the body (e.g., legs, stomach, arms, and back). The next stage of heat illness is heat exhaustion, symptoms include; nausea, headache, feeling week, fast heartbeat and low blood pressure. The most serious condition is heat stroke which can cause the body to experience loss of consciousness, seizures, flushed skin, and fast breathing. If heatstroke is not treated it can lead to death. Therefore if you experience any of the symptoms listed above, seek immediate medical attention (Family Doctor Editorial Staff, 2015).

In order to avoid dehydration and keep the body hydrated there are many factors to consider; gender, age, weight, and environment/weather. Different people have different

percentages of water in their bodies (Perlman, 2015). A person that is overweight will have less water in their body because fat is almost water free and a person who is thin will have more water in their body because they will have more lean tissue (Redmon, 2005). In general, women have less water than men due to their physical make up (typically more body fat) and babies and kids have more water (percentage) in their bodies than adults men (Perlman, 2015). In order to avoid dehydration, the body needs to consume water throughout the day, not in one sitting.

Too much water and not enough electrolytes (sodium and chloride) can cause hyponatremia (also known as over hydration or water intoxication). Another way to look at hyponatremia is when excess fluid cannot be excreted by the kidneys, water that is retained in the body dilutes the sodium in the blood (Weschler, 2005). As a safeguard people who engage in endurance activities longer than one to two hours should include a sports drink that contains sodium to avoid hyponatremia (Guest, n.d.). Weschler (2005) explains: "However, sports drinks will not keep you from developing hyponatremia if you overdrink" (p.58). Symptoms of hyponatremia include fainting, bloating, muscle cramps, confusion, fuzzy thinking, nausea, seizures, and apathy. It is similar to what alcohol intoxication looks like (Redman, 2005). Hew-Butler (as cited by Weschler, 2005) says that it should be clear that a sports drink should absolutely not be consumed if hyponatremia already exists. Instead seek medical help immediately.

Proper Fluid Intake during Intense Physical Activity for Young Adolescents

There are numerous studies evaluating hydration status in adults yet there is limited data concerning hydration levels in youth athletes. Nevertheless most of the studies agree that dehydration is a problem with children exercising in the heat (Arnaoutis & Kravouras, 2012). While dehydration is important, there is also a concern about over hydration (hyponatremia). In

a study about junior athletes' knowledge and attitudes toward voluntary drinking was explored (Gard, & Marino, n.d.). Both authors found that there were no studies in place in regards to the athletes' knowledge and the misuse of hydration for exercise.

Young adolescents are not equipped with the knowledge to incorporate hydration into their daily lives or physical activities; especially when the climate changes. In cold weather, the body suppresses the thirst sensation and loses water just by exhaling (Minton, 2015). When intense physical activity is added (in cold weather), both water and electrolytes are lost through sweating and even a slight change in body mass (as little as 1%) can cause the body to become dehydrated which can effect both performance and health (Minton, n.d.). Young adolescents produce more heat than adults; because their surface area is relatively larger with fewer sweat glands than adults (Stevens as cited by Elder, 2011). When it engaging in intense physical activity, like running, it's imperative that the body stays hydrated to regulate temperature. Stevens (as cited by Elder, 2011) advises that "Over one hundred research papers show that the more sweat lost during a race, the more drastically the body's performance declines. Therefore the key to maximizing teenage distance running, performance and avoiding heat injury is by proper hydration" (para. 9). Hence it is crucial that participants of intense physical activities continue to drink water before, during and after practice; no matter what the temperature is.

Kavouras (2013) and five of his colleagues, investigated the hydration status of 107 boys between the ages of ages 11 to 16 during a summer soccer camp at the University of Arkansas. On the second day of training; only 72 participants (out of a total of 107) agreed to be monitored for an additional two days of training. The emphasis was to determine how dehydration was calculated through change in body weight and assessed by urine color. The boys were allowed to drink water whenever they wanted. The volunteer researchers did not encourage the boys to

drink. The study found out that 95 out of 107 players were “hypohydrated”; a condition caused by chronic dehydration before practice. Kavouras (2013) states “These kids start training hypohydrated, and they do not drink enough during training, inducing even greater hypohydration” (para. 6).

Several articles agree that hydration is needed for all ages, not just those who perform in intense physical activities. Benjamin & Schneider (2011) says; “Children and young adolescents should be taught to drink water routinely as an initial beverage of choice as long as daily dietary caloric and other nutrients (e.g., calcium, vitamins) needs are being met” (para. 8). In order to have proper hydration levels and avoid dehydration, coaches need to monitor water intake for youth athletes who engage in training (intense physical activities) or sport competitions and in order to be an effective tool; education programs on hydration needs to be implemented (Anonymous, 2013). Spungin (as cited by Higgins, 2012) mentions;

> Although it can sometimes be tricky to get children to drink water, the key is to encourage drinking little and often. Make sure they have a glass of water before going to school and perhaps pack a bottle of water in their school bag. (para. 15).

Family Doctor Editorial Staff (2015) suggest that for every pound lost during physical activity the body needs to replenish by drinking 16 to 24 ounces of water. Redmon (2005) mentions another guideline to gage water consumption is to take your body weight and divide it in half; this is the amount of water (in ounces) that should be consumed throughout the day. The best way to maintain proper hydration levels and to regulate the body’s temperature (avoid overheating) is to drink water before and during physical activity.

When strenuous activity lasts longer than 60 minutes, an electrolyte is needed to replenish the potassium and chloride that is lost through sweat (Powerade, 2015). Electrolytes

can minimize stress on the body (such as running or endurance events), keeping muscles performing efficiently and provides better recovery so that you can perform again the next day (DHS Boys Lacrosse, 2011). When physical activity lasts longer than one to two hours, not only is hydration needed, so is a carbohydrate; to support muscle fuel and to boost performance (DHS Boys Lacrosse, 2011). For runners these carbohydrates can be consumed while running and during practices most easily in the form of granola bars, fruit, bread (like a bagel), sports drinks and/or energy gel packets (e.g., Gatorade or Powerade), chocolate milk, and protein bars (e.g., Power Bar). The body converts sugars and starches into carbohydrates for immediate energy (glucose) or stores it in the liver and muscle tissue (glycogen) for later use (especially good for intense physical activity). If the body runs out of fuel (carbohydrates), the body will start burning fat and protein which can cause performance levels to drop (DHS Boys Lacrosse, 2011).

Sales advertisements for energy drinks (such as Red Bull or Monster) lead young adolescents, to believe that this type of product is needed to increase energy levels before intense physical activities. These products are not regulated, the amounts of extra stimulants like caffeine and sugar can overwhelm a young adolescent's body (Brown, 2011). In addition, regarding the use of caffeine in children, the effects include developing neurologic and cardiovascular issues along with the risk of physical dependences and/or addiction (Benjamin & Schneider, 2011). Sport drinks and energy drinks are two separate products as stated by the Benjamin & Schneider (2011);

> Sports drinks are a flavored beverage that often contain carbohydrates, minerals, electrolytes (e.g. sodium, potassium, calcium, magnesium) and sometimes vitamins or other nutrients. Energy drinks contain stimulants, such as caffeine and guarana, with

> varying amounts of carbohydrates, protein, amino acids, vitamins, sodium and other minerals. (p. 1182).

Energy drinks, containing stimulants should not be offered to children or youth adolescents whether they engage in intense physical activity or not (Benjamin & Schneider, 2011). Most coaches do not allow these stimulants during training. Versaw (cited in Brown, 2011) states;

> Caffeine is a bigger issue than a lot of people realize. In the 10 years of coaching, I've had two kids' drop--not drop out, but drop--in races, one in the state cross country meet. In both cases, the doctor described it as a condition produced by consuming caffeine before a race. As a result, I'm very cautious about kids thinking even a little caffeine buzz before a race is a good thing. (para. 7)

Epinephrine is a natural stimulant that the body produces in response to anticipation (of an event) and/or intense physical activity; therefore caffeine and other stimulants are not needed for physical activity (Brown, 2011).

The bottom line is that in order to have proper hydration levels and avoid dehydration, coaches need to monitor water intake for youth athletes who engage in training (intense physical activities) or sport competitions (Anonymous, 2013). In order to be an effective tool; education programs on hydration needs to be implemented (Anonymous, 2013). Benjamin and Schneider (2011) agree that; "Children and young adolescents should be taught to drink water routinely as an initial beverage of choice as long as daily dietary caloric and other nutrients (e.g., calcium, vitamins) needs are being met." (para. 8). In a study of high school athletic coaches in Illinois, it was recommended further education related to fluid replacement and hydration knowledge and additional research should take place (Brandenburg, Geijer, & Pitney, 2009). They went on to say that it would be important to examine the extent on which educational interventions

(workshops) would improve the knowledge of coaches in regards to fluid replacement and heat illness.

Effective Learning Methods for Young Adolescents

This topic was researched to gather information on best practices for teaching adolescents. In order to be successful, middle school students (ages 10-14) need to have instruction, curriculum, and assessment aligned to their psychological and physical development. This age group is rapidly developing; more so now than in any other point in their lives. Teachers or coaches of middle school students need to be well versed in human development and know how to respond to their students while they are continually shifting and changing lives. Erickson's Stage Theory of Development (Anonymous, n.d.) points out that young adolescents describe themselves as what they can and cannot do. Stevenson (as cited by Anonymous, n.d.) mentions that young adolescents compare themselves to students and question, "Who am I", and the result of which can be critical to their self-concept. Teachers who use team competitions to boost their student's self-image should avoid the one winner approach.

When students are engaged intellectually they explore alternative strategies, explain their reason, defend their conclusion, and become confident in themselves (Bottoms & Timberlake, 2012). Emotional engagement allows the student to choose projects in which they are interested, while social engagement allows the students to work in teams and belong to extra-curricular actives (Bottoms & Timberlake, 2012). Students that are prepared for class, actively participate, and seek help when needed are known to be engaged behaviorally; they also strive for success and take challenging courses (Bottoms & Timberlake, 2012).

Students who actively engage in the classroom develop specific skills like problem solving, self-questioning, and deeper thinking (Lorain, n.d.). These skills are created and

polished though repetition, trial and error, and posing questions. Disengagement is one of the most common reasons why students drop out of school. Students who are engaged intellectually, emotionally, socially, and behaviorally through project base learning, cooperative learning and by making the greater use of authentic problems are better prepared for high school and have significantly higher achievement rates (Bottoms & Timberlake, 2012),

> Squirrels. That is what they remind me of. We were all that age once and we were all just like squirrels. Have you ever watched a squirrel? Zoom, freeze for two seconds, flick tail, and repeat. The trick for having a successful middle school teacher is holding their attention for more than just those few seconds. Believing that it is possible requires a huge leap of faith and trust. (Johnson, 2013, para. 1).

Johnson (2013) states that relationships and distractions are commonly used when teaching middle school students. Teachers found that students respond to praise and look forward to creating a relationships with their surroundings, including the teacher. In order to gain a student's trust, you need to learn about them, who they are, what they like, get involved, be supportive and in return the student will be more open to strive for the best because they know you care (Johnson, 2013).

Distraction is the secret weapon that will keep these students engaged in the classroom. Keep it simple and fun. Students can often get flustered and frightened (Johnson, 2013). Teachers can easily direct the student back to learning with solid expectations, behavioral boundaries, and crazy, fun active learning experiences. Daily Teaching Tools (as cited by Johnson, 2013) advises that routine and structure are important for middle school students. Having a high interest event involving students to be engaged more thoroughly in the classroom; is also a way for students to work together and learn through each other. Diversity needs to be

recognized and empowered as a whole and individually (Anonymous n.d.). By staying current with the diversity practices, teachers can effectively work with parents, the community and other teachers to support and develop the self-image of their students, through self-identity and self-efficacy (Stevenson, as cited by Anonymous, n.d.). Allison & Rehm (2007) advises that teachers can use visual presentations to overcome language barriers that are often associated with diversity of students.

Peer tutoring is an effective learning tool. Biehler, Garcia, Saravia-Shore & Snowman (as cited by Allison & Rehm 2007) explain that this strategy pairs students together with differing abilities and background, has been found to be extremely productive in multicultural classrooms. They go on to say that peer tutoring promotes communication, motivates students, and helps learners obtain high levels of achievement while forming long lasting relationships with other students (Biehler, Garcia, Saravia-Shore & Snowman as cited by Allison & Rehm 2007). Kline, Johnson, Slavin, & Willis (as cited by Allison & Rhem, 2007) mention that cooperative learning is an instructional approach that benefits all students especially ones with diverse backgrounds. Utilizing this learning style with diverse classrooms help promote inter-ethic friendships and build teamwork while also enhancing literacy and language acquisitions among linguistically diverse students (Crandal et al. as cited by Allison & Rhem, 2007). One method of cooperative learning that teachers used in a diverse classroom is the method; think, pair, share (Allison, & Rhem, 2007). Students first identify a topic they want to discuss, then they are paired up with a classmate and finally they share the information with each other and also with the entire class.

Effective Learning Methods for Adults

Zmeyov & Fidishun (as cited by Queensland Occupational Therapy Fieldwork Collaborative, 2012) comments that in Europe during the 1950's, andragogy was originated and then pioneered by Malcom Knowles as a theory and model of adult learnings. Knowles (2012) defines it as "The art and science of helping adults learn" (para. 2). Andragogy emphasizes the values of learning through problem solving and collaboration (Zmeyov & Fidishun as cited by Queensland Occupational Therapy Fieldwork Collaborative, 2012). There are six principles of adult learning that Knowles identified: adults are internally motivated and self-directed, they bring life experiences and knowledge of their learning experiences, adults are goal-orientated and relevancy orientated, and adults are practical and want to be respected (Queensland Occupational Therapy Fieldwork Collaborative, 2012). Adult learners will resist learning because they fear rejection of their ideas and action from the class (Fidishun as cited by Queensland Occupational Therapy Fieldwork Collaborative, 2012). It is the instructor's goal is to make the entire class feel comfortable

Finn (2011) reported a study by Houle that included 22 learners who were considered active and engaged. When the study was complete, Houle determined that these learners fell into one of these subgroups: goal-orientated, activity-orientated or learning-oriented. English language learners (ELLs) see education as an opportunity for self-improvement (Orem as cited by Finn, 2011).

Adults lead complex lives and with time constraints, commitments, training and learning can be limited. Petty & Thomas (2014) explains that adults have obstacles of learning which include; situational, institutional, and dispositional. Situational obstacles refer to an event that cannot be avoided such as child care, financial problems, or a health crisis. Institutional barriers

revolve around the location of the class, attendance, and the subject being taught. Dispositional barriers include self-efficacy, concerns about failure, and educational attitudes. Trainers need to keep in mind or be sensitive to the adult students' barriers.

Northwest Center for Public Health Practice (2012) advises that a good strategy for adult learning is to know your audience and have a general knowledge of how adults like to be taught. A "needs assessment" can be distributed to potential adult students prior to the training and the assessment will help identify the gaps in the learning styles, language barriers, knowledge of current topics, and targets for further training (Northwest Center for Public Health Practice, 2012). When preparing the course and/or classroom for adult learning the instructor should make sure the information presented is engaging and the materials (handouts) have immediate usefulness. The environment where the training takes place should be welcoming, ensure safety, and offer an opportunity for the adult to share their experiences in a respectful manner. Northwest Center for Public Health Practice (2012) advises that there are three types of learning; knowledge, skill, and attitude (KSA). Knowledge relates to facts, patterns, and concepts. Skills are practical abilities measured in speed and precision. Attitudes dig deep into realizing feelings, values and motivation.

Northwest Center for Public Health Practice (2012) mentions that there are several models created to assist instructors who teach adults to design appropriate learning objectives. For developing practical objectives the model to use is called SMART (specific, measurable, achievable, relevant, time bound) and to build behavioral objects, one might use the A-B-C-D Model (audience, behavior, condition, and degree) Northwest Center for Public Health Practice, 2012). When delivering training for adults it is critical to choose the appropriate method to increase retention. The cone of learning, created by Edgar Dale, states that after two weeks

adults tend to remember: 10 % of what is read, 20% of what is heard, 30% of what is sees, 50% of what is seen and heart, 70% of what the individual says, and 90% of what is done (Northwest Center for Public Health Practice, 2012).

The Alabama State Department of Postsecondary Education (as cited by Petty & Thomas, n.d.) state that adult students who attend educational programs are diverse because they come from a variety of cultures, backgrounds, socioeconomic statuses, levels of English proficiency, life experiences, and prior knowledge bases. When it comes to adult training, most adults will ask themselves "what's in it for me?" (Post, n.d.). Adults will attend training because they want to develop a new skill, acquire new information, fulfill an inner desire, or improve professional competencies. Therefore, it is imperative for the trainer to motivate their adult students to learn (Post, n.d.). One way to put the theory of motivating adult students is to plan events that will take advantage of the participants' social and cultural resources.

In order to design and deliver the best training, there six factor that come into play; topic familiarity, resistance to learning, expectation levels, commitments outside the classroom, motivation to learn, and ability to use the training immediately after the class is over (Post, n.d.). Tagg (as cited by Petty & Thomas, 2014) states that "Learning occurs when challenge and support are in balance" (p. 475). Adult learners want to know details about the training program's purpose, goals, and schedule (Wonacott, as cited by Petty & Thomas, 2014). It is noted that instructors, during the first three weeks of training, have an impact on their adult learners (Quigley as cited by as cited by Petty & Thomas, 2014).

Chapter III: Methodology

Seventh and eighth grade members of the PODS do not understand the need for correct levels of hydration during endurance training or long runs. In addition the adult volunteers do not know how to effectively communicate why hydration is critical. Without proper levels of hydration the members can become dehydrated or over hydrated.

Subject Selection and Descriptions

The participants of the research were the coaches of the PODS, coaches of youth sports, and healthcare professionals. Within each category, three individuals were interviewed; totaling nine interviewees.

Instrumentation

The instrument of the research was a series of questions for three sets of individuals; coaches of the PODS nonprofit organization, coaches of youth athletes and health care professionals. The questions are original and were developed to provide data to address the problem. The interview questions are in Appendix A.

Data Collection Procedures

A total of 28 open-ended questions were administered to three groups. The coaches of PODS were asked 11 questions, the coaches of youth athletes were asked 11 questions, and healthcare professionals were asked 6 questions. In each group, three individuals were interviewed. The responses for each question were recorded.

Data Analysis

After the interviews were completed the data was analyzed through qualitative methods. Each question was described in detail along with the answers from all three interviewees within each set of interviews; coaches of PODS, coaches of youth athletes and healthcare professionals.

Common responses were noted and used to create the training for the PODS participants and the adult volunteers.

Limitations

There are limitations to the data collected.

1. The number of participants was small and limited to the area in Wisconsin where the PODS participants live.
2. Some interviews were conducted face-to-face, by telephone, and email. With email the opportunity to clarify and ask additional information was difficult.
3. The responses may have responses that may not be pertinent to the creation of the training manual for hydration.

Chapter IV: Results

The purpose of the research was to gather data regarding the best practices of hydration during intense physical activities and the best methods for teaching adults and young adolescents. In order to obtain the appropriate data, interviews were conducted for each group; healthcare professionals, coaches of youth sporting events and coaches of the PODS program. Within each group there were three individuals interviewed; totaling nine interviewees. Both the coaches of youth sporting events and coaches of the PODS program interviews consisted of eleven open-ended questions while the healthcare interview had six open-ended questions; totaling 28 questions all together. All the data collected was analyzed through qualitative statistics.

Data Analysis from Healthcare Professionals

Interview questions were asked of three healthcare professionals; paramedic, first responder and a clinical neuromuscular advisor. Even though the responses varied, they were relativity consistent with the literature review. Table 1 summarizes their responses.

Table 1

Responses for Healthcare Professionals

Question	Response
1: Experience with youth & physical Activity	• Paramedic - Emergency situations and "On the job I deal with athletes during the summer and in my off time I have coached youth soccer." • First responder - One-time encounters and "I work with mostly kids who are swimming and/or playing around the pool." • Neuromuscular advisor Clinical visitations and "I work with them clinically for neuromuscular issues along with program, perform, design, and skills."
2: What age groups do you service	• Paramedic: "I am a paramedic in the City of Milwaukee, I see everything." • First responder: "zero to one-hundred"

Question	Response
	• Neuromuscular advisor: "Overall a few weeks old to 80 and up. But in regards to youth; junior high to college athletes."
3: How important is hydration for young people?	• Paramedic: "Extremely important. Fluids are the key to keep your brain working and muscles operating properly" • First responder: "Extremely. We wake up dehydrated kids. These kids do not know this." • Clinical neuromuscular advisor: "It is one of the most important, keeps macronutrients in the body."
4a: What form of hydration are best for young people?	• Paramedic: "Any fluid is good. That being said I highly encourage athletes to stay away from cola and energy drinks. Anything high in sugar…." • First responder: "Well I work with inner city kids so it tends to be water. Water is better than soda…." • Clinical neuromuscular advisor: "H2O before, during and after making sure the urine is clear and/or body weight before extended activities is the same as post activity."
4b: Does the type of hydration change when the activity becomes intense for longer than 60 minutes?	• Paramedic: "…. Water is the ideal option. Even the big names like Gatorade and PowerAde have salt added which actually dehydrate you." • First responder: "….Yes, should be increased in the sun or long periods of activity." • Clinical neuromuscular advisor: "….if extended activity takes place increase water."
5a: Have you ever treated a young athlete for dehydration or hyponatremia?	• Paramedic: "I work in a fast paced environment. I have had a few calls to where we responded because an athlete passed out or started having seizures from heat stroke…." • First responder: "Young child, not athlete...." • Clinical neuromuscular advisor: "Yes, dehydration…."
5b: If yes, what information did you discuss with them or the parent, on how to prevent this from happening in the future?"	• "…. But we get there, treat the person and transport. There is not a lot of time spent encouraging them to make a better choice." • First responder: "….Just drink water more frequently and carry around H2O bottle." • Clinical neuromuscular advisor: …."Regarding immediate dehydration find a cool place, drink a lot of fluids including some sport drinks (diluted)."

Question	Response
6a: "In your professional experience, what is the best way to communicate and inform the young people about hydration?	• Paramedic: "Again, in my environment there isn't much time for any of this…." • First responder: "Talking to their parents. Parents are generally concerned about their kids and will take the necessary steps to help them…." • Clinical neuromuscular advisor: "We do verbal discussion with the person…."
6b: Do you have any material regarding hydration that you would recommend for informing young people on the importance of proper hydration while they are involved with intense physical activities?	• Paramedic: "….We do not carry any information along with us, but I'm sure that the hospitals are good resources." • First responder: "….No, we don't have any material." • Clinical neuromuscular advisor: "….We do not have any material to hand out."

Looking at the responses of all three interviewees for question three (Table 1); their answer was unanimous, hydration was extremely important. For questions five and six (Table 1) the paramedic's response stood out They did not having time to discuss the benefits of hydration and had no material available which was surprising. The responses to question six for both the first responder and neuromuscular advisor also agreed with the paramedic, they had no material available about the benefits of hydration or warnings about the dangers of dehydration. These responses supported the need for a hydration training manual and/or handout; not just for young adolescents who engage in physical activity but for all individuals.

Data Analysis from Coaches of Youth Sports

Interview questions were asked of three coaches of youth sporting events. Each coach was involved with either a single sport or multiple sports. The answers confirmed how important hydration is to adolescents athletes. Table 2 summarizes their responses.

Table 2

Responses for Coaches for Youth Sports

Question	Response
1: Experience with coaching youth & physical activity	• Youth Coach A: "Track Coach" • Youth Coach B: "Boys High School Track, Cross County and Girls Basketball" • Youth Coach C: "Completive Swim Coach for boys and girls"
2: What age groups do you service	• Youth Coach A: "Third grade to fifth grade" • Youth Coach B: "Seventh to twelfth grade" • Youth Coach C: "This is a variety of ages that I coach, ranging from five years old to twelve years old"
3: What is the longest physical activity time?	• Youth Coach A: "One hour" • Youth Coach B: "30 minutes of continues exertion" • Youth Coach C: "The longest practice times would last about an hour and a half."
4a: On a scale of 1-10 how important is hydration during physical activity (1 is not important and 10 is very important)?	• Youth Coach A: "10…" • Youth Coach B: "10…" • Youth Coach C: "I believe that hydration during physical activities in extremely important, rating it a 10…."
4b: Share why you chose that rating.	• Youth Coach A: "...Hydration keeps the body moving and working. Just a 10% decrease in hydration results in performance loss. Once you feel you are thirsty, you are already dehydrated. It is important to stay hydrated before, during and after activity." • Youth Coach B: "…Because it can effect performance or cause serious side effect. The benefits are better health and performance." • Youth Coach C: "….I rated it a 10 because without water, the body begins to shut down and the muscles that depend on the oxygen and hydration cannot work at their best capacity when the body is dehydrated. Being hydrated is especially important when swimming because one cannot tell when they are sweating or how much due to the water. Thus, drinking water before, during and after the practice helps keep the body moving and allows for better recovery after an intense workout. The benefits are as such; stronger workouts, greater endurance, and faster recovery times."

Question	Response
5: In the training program when is hydration, dehydration or hyponatremia discussed?	• Youth Coach A: "At the beginning before you start and throughout training." • Youth Coach B: "Didn't. Back in the late 1980's it wasn't as issue to discuss or focus on." • Youth Coach C: "Hydration is discussed on a daily basis with my athletes. Being a competitive swimmer myself, my coach also stresses the importance of hydration on a daily basis and is gladly able to fill our water bottles if we run out of water. Also, when bigger meets are approaching myself, and my coach, thoroughly express to the athletes the importance of regularly drinking water throughout the day and not just drinking some energy drinks, such as Gatorade, PowerAde, etc."
6: What form of hydration is used during intense physical activities?	• Youth Coach A: "Water." • Youth Coach B: "Water and electrolytes." • Youth Coach C: "While swimming, it is expressed and encouraged to bring your own water bottle to be refilled as needed throughout practice. For swimmers this is best way to stay hydrated throughout practice. Sugary energy drinks, such as Gatorade, are not highly encouraged due to the sugar in the drinks and they do not quench thirst as wells as water does when hydrated."
7a: How do you monitor the intake of water for each participant?	• Youth Coach A: "Ask every 15 minutes and give them a break…." • Youth Coach B: "I didn't…." • Youth Coach C: "I make sure that my swimmers are continuously drinking their water and staying hydrated…."
7b: How do you manage the sweat loss ration with recovery for training?	• Youth Coach A: "….I don't." • Youth Coach B: "….But I would suggest weighing before a long run and again after." • Youth Coach C: "….However, we do not regularly manage the sweat loss ratio with recovery."
8a: Have you had a participant experience dehydration or hyponatremia?	• Youth Coach A: "No…" • Youth Coach B: "No. Not that I know of..." • Youth Coach C: "Yes…"

Question	Response
8b: Is so, how did you respond to the situation?	• Youth Coach A: "….Personally, I have become dehydrated and have experienced sun stroke. Therefore these two topics are important to discuss with athletes." • Youth Coach B: : N/A • Youth Coach C: "….I made this individual get out of the pool and sat on a chair on the pool deck. I grabbed a water bottle and had them take sops of the water and continued to monitor their conditions. If it continued to decline, then I would have had to take further action."
9: How important is hydration for young people?	• Youth Coach A: "Just talking to them and stressing the importance because of their age." • Youth Coach B: "Talk to them when you have their attention and talk to them often. Have water readily available." • Youth Coach C: "I believe the best way to communicate about hydration is to just keep talking to them and encouraging them to drink regularly throughout the day. When they are working out, I would highly encourage them to drink water and constantly remind them to do so. I also think some visuals would help in the learning process; by seeing what muscles do during intense activities when hydrated and when dehydrated. It may leave a lasting impact."
10: What format is best for adult volunteers who inform participants the importance of hydration, during intense physical activity?	• Youth Coach A: "Talking to them." • Youth Coach B: "Work with the coach to get an introduction, creditability and again, have samples available." • Youth Coach C: "I believe constant reminders and pressure to stay hydrated would work during intense physically activity because the will get annoyed by how much you are reminding them. Plus, the only way to stop the constant reminders is to continuously drink.
11: Length of time coaching?	• Youth Coach A: "3 to 5 years." • Youth Coach B: "0 to 3 years" • Youth Coach C: "0 to 3 years"

After reviewing the responses of the coaches of youth sports there were key topics that strengthened the need for hydration training manual for young adolescents who engage in intense activity. All three coaches agreed that hydration is extremely important during physical activity.

Each one identified the benefits of hydration; "…It affects performance…", "Hydration keeps the body moving…Once you feel thirsty, you are already dehydrated…", and "…Without water the body begins to shut down and the muscles that depend on the oxygen…" and hydration cannot work at their best capacity when the body is dehydrated…"

Some of the topics noted in the questions are not common (e.g. hyponatremia and sweat loss ratio). Most coaches do not take the time to discuss these topics with their athletes. Therefore it is crucial that a hydration training manual/handout be created.

Data Analysis from Coaches in the PODS

Interview questions were asked of three coaches of the PODS nonprofit organization. All the responses presented developed new ideas for implementation in the Best Practices of Hydration section of the Training Manual. Table 3 summarizes their responses.

Table 3

Responses for Coaches of the PODS

Question	Response
1: Experience with coaching youth & physical activity	• PODS Coach A: "Going in I was both excited and nervous. I love working with kids because I feed of their energy and passion. However, I was still very curious to see if the kids were actually that into running long distances. I speak from experience when I say that running can be a mundane activity without a big reward. It is hard to say motivated. I was pleasantly surprised to see the enthusiasm the PODS' runners had." • PODS Coach B: "I was a youth coach during college. So my time spent with these kids is limited but I did run with them and do other physical exercises while coaching them." • PODS Coach C: "I started working with seventh grade girls in the summer/fall of 2007. The intension was to have the girls prepare to take on middle school athletic teams and be in shape so when they compete they would not get injured."

Question	Response
2: What age groups do you service	• PODS Coach A: "Seventh grade to eleventh grade." • PODS Coach B: "12 to 13 years old." • PODS Coach C: "12 to 16 years of age."
3: What is the longest physical activity for participants?	• PODS Coach A: "The half marathon itself is the longest event they do. Each runner has their own pace so times are dependent on the person." • PODS Coach B: "I think it could go up to 4 hours." • PODS Coach C: "Two and half hours to three hours."
4a: On a scale of 1-10 how important is hydration during physical activity (1 is not important and 10 is very important)?	• PODS Coach A: "I would say 9…." • PODS Coach B: "9…." • PODS Coach C: "5…."
4b: Share why you chose that rating.	• PODS Coach A: "….Because oxygen is number 10! Hydrations is extremely important in endurance events. Fluids are your fuel. It is one of the three crucial things your brain needs to function properly next to sugar and oxygen." • PODS Coach B:"….Because I think that being prepared to do the activity is a 10. If you aren't prepared everything else is minimal. But if you are prepared then yes, hydration is most important. The benefits are stronger workouts and a better feeling during the post workout." • PODS Coach C: "….Hydration is most important before and after physical activities. Especially if it is the less than 92 minutes. The 5 moves to an 8 or 9 if the physical activity is longer than 90 minutes."
5: In the training program when is hydration, dehydration or hyponatremia discussed?	• PODS Coach A: They are all brought up very early. This allows us to get a good framework to builds upon as the season goes on." • PODS Coach B: "I honestly don't know. I assume the information is discussed in the first week of training." • PODS Coach C: "During the whole sixteen weeks."

Question	Response
6: What form of hydration is used during intense physical activities?	• PODS Coach A: "Water, Gatorade, vitamin water and PowerAde." • PODS Coach B: "Water, Gatorade and fruit." • PODS Coach C: "Drinking water and eating or drinking items with electrolytes and organic sugar."
7a: How do you monitor the intake of water for each participant?	• PODS Coach A: "Each person is different in the amount of fluids they need and fluids they lose throughout training" • PODS Coach B:"We use small dixie cups of fluid every two miles…." • PODS Coach C: "It is too hard to monitor each participant's water intake…."
7b: How do you manage the sweat loss ration with recovery for training?	• PODS Coach A: "….We try to identify who needs what amounts and encourage them to rehydrate accordingly." • PODS Coach B: "….Not sure." • PODS Coach C: "….Instead we have hydration stations so that the participants can take in water or electrolytes…."
8a: Have you had a participant experience dehydration or hyponatremia?	• PODS Coach A: "Everybody experiences dehydration at some point, even if at a very mild level. That being said, I have never had any emergences while coaching." • PODS Coach B: "No." • PODS Coach C: "Yes…."
8b: Is so, how did you respond to the situation?	• PODS Coach A: N/A • PODS Coach B: N/A • PODS Coach C: "….Physical activity stops and fluid intake and relaxation should start immediately."
9: How important is hydration for young people?	• PODS Coach A: "I tend to use honesty. I like explaining the problems and dangers that stem from not getting enough fluids. Especially at this high level." • PODS Coach B: "Real life simulations, how they could help each other in classes." • PODS Coach C: "Have discussion topics about hydration before and after the physical activity. Having them journal about their individual hydration."

Question	Response
10: What format is best for adult volunteers who inform participants the importance of hydration, during intense physical activity?	• PODS Coach A: "I would tend to avoid things like PowerPoints or lectures. These kids spend their whole day in school. I am sure the last thing they want is to deal with more. Just encourage them to drink fluids as needed and build good habits**."** • PODS Coach B: "Use real life scenarios and also telling the negative outcomes of dehydration." • PODS Coach C: "Discussion in groups."
11: Length of time coaching?	• PODS Coach A: "0 to 3 years." • PODS Coach B: "0 to 3 years." • PODS Coach C: "More than 10 years"

After reviewing the responses of the PODS coaches the answers supported what the literature review indicated should be in a hydration training manual. Even though these coaches take time to discuss the need of hydration to the participants, there is still a need to create the hydration training manual/handout. This manual/handout will be presented to not only the participants of the PODS but also the adult volunteers who help distribute the hydration. The information learned by both parties supports each other. The participants will get a clear understanding as to why they need hydration and the adult volunteers will be able to instruct the participants to drink the hydration at specific spots along the route. Adult volunteers will also able to identify symptoms of dehydration and hyponatremia which can become a serious condition if not treated.

Chapter V: Discussion, Conclusion and Recommendations

In this research paper, the problem statement identified that participants of the PODS (seventh and eighth graders) do not understand the need for correct levels of hydration during their 16 week training program. In addition adult volunteers who distribute the hydration, during long runs, do not know how to effectively communicate to the runners why hydration is critical. Without proper levels of hydration the runners can become dehydrated or overhydrated.

During the course of this research data was collected from answers to open-ended questions. The individuals interviewed were grouped into three categories; healthcare professionals, coaches of youth sports activities, and coaches of the PODS. Within each category of interviews, three individuals were interviewed, totaling nine interviewees all together. The data was presented in chapter four and the interview questions are in Appendix A. This data supports the need for proper hydration during intense physical activity, and the best practices for teaching both the young adolescents and adults.

Discussion

In regards to the data presented in the literature review and the responses of the interview questions; there is a strong correlation between healthcare professionals and coaches regarding hydration for young adolescents who perform in intense physical activities. The relationships were divided into four categories; benefits of hydration including educational needs, types of hydration during intense physical activities for young adolescents, factors of weather as it pertains to intense physical activities and the identification of dehydration and hyponatremia (over hydration).

The benefits and importance of hydration. The body is made up of two-thirds water which helps transport elements; like hormones and nutrients to vital organs which in turn helps

increase oxygen to our cells. Several interviewees agreed to this statement. Here are the statements to support this agreement. Paramedics advised that "Fluids are the key to keeping your brain working and muscles operating properly." The clinical neuromuscular advisor agrees that, "It [fluids] keeps macronutrients in the body". Youth coach C mentioned "…Because without water the body begins to shut down and muscles that depend on the oxygen and hydration, cannot work at their best capacity when the body is dehydrated…"

Hydration education for both young adolescents and adults. There was an overwhelming response from both coaches (youth sports and PODS) regarding how to educate (teach) young adolescents and adult (volunteers) about hydration. Youth coach B mentioned, "Talk to them and make sure you have their attention". Youth coach C said, "Use visuals, by them (kids) seeing what the muscles do during intense physical activities when hydrated and when dehydrated may have a lasting impression". PODS coach C said, "Have discussion topics about hydration before and after physical activity, also have them journal about their hydration".

As for adult (volunteers) who are learning about hydration, in order to advise the participants on the importance of hydration, these statements were made. Youth coach C explained, "Adults need to use constant reminders, soon the participants will get annoyed of the reminders and just do what they are told". Youth coach B stated, "Have the volunteer work with the coach to get introduced and gain creditability". PODS coach A mentioned, "Avoid using lecture material, just encourage them to drink fluids as needed and build good habits…"

Types of hydration for intense physical activities. Most of the responses agreed that when physical activity is longer than 60-90 minutes (depending on the type of activity) it's important to include electrolytes into the regimen, not just water. Several responses supported this. Youth coach B stated "Water and electrolytes are needed for intense physical activities."

PODS coach B stated “Water, Gatorade and fruit.” PODS coach C stated “Drinking water and eating/drinking items with electrolytes and organic sugar”.

Electrolytes can minimize stress on the body (such as running or endurance events), keep muscles performing efficiently, and provides better recovery so that you can perform again the next day (DHS Boys Lacrosse, 2011). If physical activity lasts longer than two hours (e.g. half marathon, marathon) a carbohydrate needs to be added. The carbohydrate is there to boost performance by supporting muscles with fuel. Sports drinks and energy packets (e.g. Gatorade, Powerade) are one form of electrolytes, chocolate mild, and protein bars (e.g. PowerBar) are also good sources (DHS Boys Lacrosse, 2011).

Weather as it pertains to intense physical activities. Both hot and cold weather affect participants differently when engaging in intense physical activities. Youth coach C stated, “Being hydrated is especially important when swimming because one cannot tell when and how much, they (swimmers) are sweating, due to the water. Thus, drinking water before, during and after the practice helps keep the body moving and allows for better recovery after an intense workout. The benefits are: stronger workouts, greater endurance, and faster recovery times.”

Young adolescents, do not have the ability to incorporate hydration into intense physical activities; especially when the climate changes (Kravouras, 2012). When the seasons change and the weather becomes cold, the body will suppress the “thirst sensation”, therefore it is crucial that participants of intense physical activities continues to drink water before, during and after practice (Minton, n.d.).

The identification of dehydration and hyponatremia. The responses from all nine interviewees agreed with the articles reviewed that the identification of dehydration is important. Youth coach A stated, “Hydration keeps the body moving and working. Just a 10% decrease in

hydration results in performance loss. Once you feel thirsty, you are already dehydrated. It is important to stay hydrated before, during and after activity." Performance can be affected if hydration levels are not replenished; the brain will shut down causing a sudden loss in performance, dry lips and tongue, headaches, sunken eyes and impaired physical activities. When the body experiences dehydration, the result is the body cannot cool itself and it is imperative to seek medical help immediately.

When too much water is ingested and no electrolytes are present the end result is hyponatremia; a form of water intoxication. Hyponatremia is a serious condition that can lead to a coma or death. It is advised that in order to safeguard against hyponatremia it is important to include a sport drink which contains sodium (Guest, n.d.). Though Weschler (2005) explains "However, sports drinks will not keep you from developing hyponatremia if you overdrink" (p.58). It should also be understood that if hyponatremia currently exists in the body, drinking electrolytes will not stop the process. Seek medical attention immediately. Unfortunately none of the responses obtained resulted in treatment for hyponatremia. Typically this condition is rarely seen in young adolescents.

Conclusion

Seventh and eighth grade members of the PODS do not understand the need for correct levels of hydration during their 16 week training program and adult volunteers who help distribute the hydration, do not know how to effectively communicate to the runners why hydration is critical. Without proper levels of hydration the runners can become dehydrated or overhydrated. The relationship between the articles gathered in chapter two and the problem statement support the need for additional education on the best practices of hydration for both participants and adult volunteers. In reviewing the articles it was determined that there is very

little research on this topic completed in the United States, on young adolescents who engage in intense physical activity.

Recommendations

After comparing the literature review with the results of the research the there are three recommendations that developed. They include:

1. Incorporating some of the training into the community and school system. Not only do young adolescents need to learn about hydration and how it affects the body but adults need to learn, too, in order to provide a support system for these young athletes. This could be a course offered for the entire family (e.g., YMCA, local library, etc.)
2. Completing additional research in the United States on hydration and how it relates to young adolescents who engage in intense physical activities. The goal would be to determine how best to infuse that knowledge properly to the young adolescents they coach. This topic has no drawbacks. It is knowledge that everyone can benefit from.
3. Researching the effects of hyponatremia (over hydration) for young adolescents who engage in physical activities (normal or intense). From this research, the warning signs of this condition could be made available to coaches of all ages.

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Appendix A: Interview Questions

Health Care Professionals

1. Tell me about your experiences with the youth and physical activity.
2. What age groups do you service?
3. How important is hydration for young people?
4. What forms of hydration are best for young people? Does the type of hydration change when the activity become intense or longer than 60 minutes?
5. Have you ever treated a young athlete for dehydration or hyponatremia? If yes, what information did you discuss with them or the parent on how to prevent this happening in the future?
6. In your professional experience, what is the best way to communicate and inform the young people about hydration? Do you have any material regarding hydration that you would recommend for informing young people of the importance of proper hydration while they are involved with intense physical activities?

Interview Questions for Coaches of Youth Sporting Events

1. Tell me about your experiences with coaching young athletes in intense physical activities.
2. What are the age groups of your participants?
3. At a given time what is the longest period of physical activity do the participant's experience?
4. On a scale of 1 to 10 (with 1 being not very important and 10 being very important) how important is hydration during physical activity? Please share why you rated the question

as you did and what do you believe are the benefits of appropriate hydration during physical activity?

5. At what point in the training program is hydration, dehydration or hyponatremia discussed with the participants in your activity?
6. What forms of hydration are used during intense physical activities?
7. How do you monitor the intake of water for each participant? How do you manage the sweat loss ratio with recovery for training?
8. Have you ever been coaching a participant when that person experienced dehydration or hyponatremia? If yes, how did you respond to the situation?
9. What do you believe is the best way to communicate with young people as you attempt to teach about the importance of hydration?
10. What format would work best for an adult volunteer who is attempting to inform young people of the importance of proper hydration during intense physical activity?
11. How long have you been coaching? ( ) 0-3 years ( ) 4-6 years ( ) 7-10 years ( ) more than 10 years.

Interview Questions for Coaches of the PODS

1. Tell me about your experiences with coaching young athletes in intense physical activities.
2. What are the age groups of your participants?
3. At a given time what is the longest period of physical activity do the participant's experience?

4. On a scale of 1 to 10 (with 1 being not very important and 10 being very important) how important is hydration during physical activity? Please share why you rated the question as you did and what do you believe are the benefits of appropriate hydration during physical activity?
5. At what point in the 16 week training program is hydration, dehydration or hyponatremia discussed with the participants?
6. What forms of hydration are used during intense physical activities?
7. How do you monitor the intake of water for each participant? How do you manage the sweat loss ratio with recovery for training?
8. Have you ever been coaching a participant when that person experienced dehydration or hyponatremia? If yes, how did you respond to the situation?
9. What do you believe is the best way to communicate with young people as you attempt to teach about the importance of hydration? What format do you think would work best with the 7^{th} and 8^{th} graders?
10. What format would work best for an adult volunteer who is attempting to inform young people of the importance of proper hydration during intense physical activity?
11. How long have you been coaching? ( ) 0-3 years ( ) 4-6 years ( ) 7-10 years ( ) more than 10 years?

Appendix B: Best Practices of Hydration for Participants of the PODS

Research has shown that young adolescents learn best when fully engaged and when fully vested as an individual. For these reasons, the personal journal approach, small group discussion, and role playing will be used for learning about hydration.

Content regarding hydration will focus on the following topics:

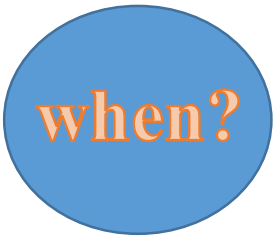
1. General knowledge of hydration: what kind is best; benefits of water (what? in the manual)
2. Dangers of dehydration: what is it; types of; signs of (why? in the manual)
3. What are electrolytes and why are they needed? : define; explain benefits
4. Hydration etiquette during long runs: how much water, electrolyte start (when? In the manual)

The following pages are an example of the section dealing solely with hydration from the PODS training manual.

BEST PRACTICES of HYDRATION

for

PODS PARTICIPANTS



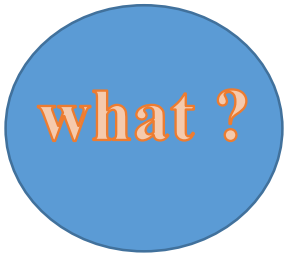
of hydration……

Hydration is_____ as stated by the dictionary.

1. What does this mean to you? Write for one minute.

2. Find a partner to discuss your writings. What can you add to what you wrote?

This will be information from the coach referring to what form of hydration is best and why as well as the benefits of water compared to other forms of hydration.



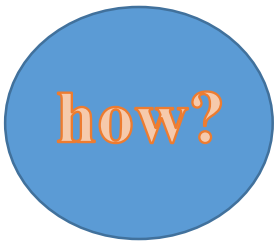
of hydration…..

1. Think about getting ready to exercise (practice or event). Remember to consider ALL types of exercise. How do you hydrate your body and when do you hydrate? List what you do here:

2. After a discussion with the PODS group, how many other participants do what you do? What did you learn from the group discussion? Write it here.

3. Notes: Summarize what was learned in this session.

This is where the coach will discuss dehydration, frequency of hydrating during extended period of intense physical activity. The coach will discuss over hydration (also known as hyponatremia). The coach will introduce information on the need for electrolytes.



of hydration….

List three ways to hydrate prior to, during, and following exercise:

1.

2.

3.

4. Notes: Summarize what was learned in this session.

(*The coach will access the progress of learning and reteach as necessary).*

of hydration…

What are the better/best kinds of hydration sources you learned about in your group discussions and why are they considered to be better/best for you? (*This is similar to the 'how?' of hydration).*

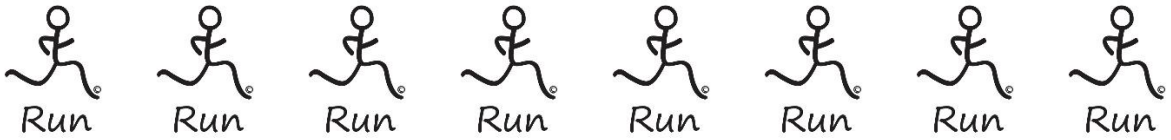
A.

B.

C.

of hydration…..

1. List all the places where hydration stations will be located in your extended runs?



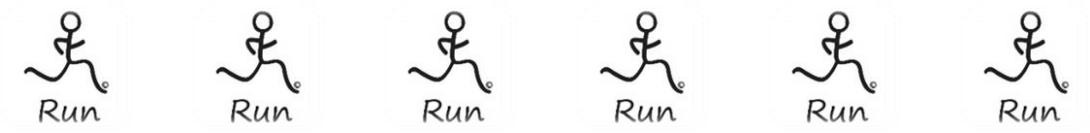
Your Turn…Tell Me More…

Your best friend has decided to begin long distance running, they do not have any experience running. What will you tell them about hydration?

Appendix C: Best Practices of Hydration for Adult Volunteers of the PODS

During the first meeting of the PODS a self-assessment, with five questions, will be given to parents and/or guardians in regards their knowledge of hydration during the 16 week training for the PODS participants. Depending on responses from the self-assessment the format for teaching will be a hand out. If the adult volunteer is not available the handout can be sent via email. Most adults find that they do not have time to sit in a class room and learn this information, especially when it does not typically correlate to what the currently do. Most adults, like to implement the information they learned immediately after the class is over. After the handout is received, additional training in regards to the "hydration station" will be held one hour prior to the schedule date and time of a long run.

The pages are an example of the self-assessment and the section dealing solely with hydration from the PODS training manual.



Self-Assessment for Volunteers

1. Do you know the benefits of proper hydration? Yes or No
2. Do you know the signs of dehydration? Yes or No
3. During a race, is the amount of fluid given to a runner 1 Cup? True or False
4. Is it okay to let a runner not drink at a hydration station? True or False
5. What is the most effective learning method when a new topic is introduced?
    a. Group Discussion
    b. Handout
    c. Electronic Format (e.g. email, online course)
    d. Face to Face

VOLUNTEERS for PODS

Thank you all for volunteering to help the PODS with our training this season. Even though many of you are parents, we value the time and commitment to our program. The purpose of this training is to establish knowledge of proper hydration during practices and events involving intense physical activity.

I. Hydration as it relates to PODS participants and intense physical activity

A. Define hydration and the benefits.

B. Define dehydration and hyponatremia.

C. Define electrolytes

II. Specifics of hydration to PODS members

A. Regiment

B. Warning signs (dehydration and hyponatremia)

III. Your role as a PODS volunteer

Distribution of hydration; how much and when electrolytes are introduced

Encourage runners to consume fluids as they pass your hydration station

Be on time when it's your turn to volunteer (arrive one hour prior to the long run to review the route and answer questions).

**A minimum of one face-to-face meeting is required prior to the first volunteer session with PODS.*