

Fall 2017

Pertinacity Volume 3 Issue 2

Yuri Hosokawa

University of Connecticut - Storrs, yuri.hosokawa@uconn.edu

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PERTINACITY

PALOS VERDES PENINSULA NEWS

SATURDAY, MARCH 11, 2006

HEALTH & SAFETY

THE PEW CHARITABLE TRUSTS

THE DENVER POST

do ranks last in high school sports
te survey showed North Carolina with the most compre

By BARRY WILNER | The Associate
PUBLISHED: August 8, 2017 at 11:4



Exertional Heat Stroke: A Case Report

AV-ACHA, MD; ERAN HADAD, MD; YORAM ERSTEIN, PHD;
LED, PHD; DANIEL S. MORAN, PHD

North Carolina, Kentucky and Massachusetts Rank Top 3 in the Nation

Two years ago, U.S. Navy personnel and their families assigned to the Orange County (Virginia) and Mid-Texas, Texas, a computer engineer. The band has been playing the length and breadth of California for the past 25 years. They have played at pubs, weddings, birthdays and on occasions where there was little chance for throwing a party.

Planning was in its infancy when the band got the opportunity to travel to Japan. Another band was unable to travel at the last minute and so he and his band were offered the opportunity to go in their place.

With some trepidation they made their first trip and with the overwhelming support of the Japanese people, they returned to the United States with a new appreciation for the Japanese people and their music.

Planning for the band's next trip to Japan was underway. The band was to play at a variety of venues, including a large outdoor arena. The band was to play at a variety of venues, including a large outdoor arena.

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National Sun Journal

Sports study: High school athletes not being fully protected

The Stories of KSI
2017, volume 3, issue 2

Sports study: High school athletes not being fully protected

KOREY STRINGER INSTITUTE

HEALTH & SAFETY POLICY RANKING

FOR

HIGH SCHOOL ATHLETICS

1. NORTH CAROLINA
2. KENTUCKY
3. MASSACHUSETTS
4. NEW JERSEY
5. SOUTH DAKOTA

Maine ranks middle-of-the-road in high school athletes

A national survey judges states in the implementation

Report: R.I. ranks No. 27 in high school sports safety



Health and Safety Ranking for High School Athletics



Grand opening of MISSION Heat Lab at UCONN's Korey Stringer Institute



2017 New Balance Falmouth Road Race

UCONN

UNIVERSITY OF CONNECTICUT

KSI

Korey Stringer Institute

UNIVERSITY OF CONNECTICUT

KOREY STRINGER INSTITUTE- Providing research, education, advocacy and consultation to maximize performance, optimize safety and prevent sudden death for the athlete, warfighter and laborer.

03. MASSACHUSETTS
04. New Jersey
05. South Dakota
06. Michigan
07. Washington
08. Hawaii
09. Wisconsin
10. Georgia

THE JOURNEY'S END

DOUGLAS CASA, PHD, ATC, FNAK, FASCM, FNATA
CEO, KOREY STRINGER INSTITUTE

I knew we needed to do it. The environmental chamber in Gampel Pavilion that we have used for the last 25 years was just a 100 square foot room with no automatic humidity controls and low ceilings. Do not get me wrong, it served us very well. The research led by Drs. Carl Maresh and Lawrence Armstrong contributed more than 100 peer-reviewed publications to the scientific literature from this facility alone. However, we knew the growth of Korey Stringer Institute (KSI) needed to coincide with a facility that could handle the massive increase in demand for athlete testing, clinical evaluations, research projects, and corporate partnerships. Hence, two and a half years ago, I began the journey to establish a world-class heat laboratory on the UConn-Storrs campus.

I visited newly constructed heat laboratories at the Nike Campus in Beaverton, Oregon where UCONN alumni Drs. Judelson and Spiering work, Glen Kenny's laboratory at the University of Ottawa, and at the University of Arkansas where four of our UCONN alumni and KSI-connected friends currently work (Drs. Ganio, Kavouras, McDermott, and Vandermark). After visiting these facilities, I started to understand the scope of the effort and cost that would be necessary to pull this off. We received initial estimates that made us think \$250,000 for the facility would be reasonable, with another \$150,000 for the equipment necessary to run the laboratory testing— a grand total of about \$400,000.

Two key things happened in Fall 2015 that set the whole plan in motion. First, Dr. Jeff Seeman, the Vice President for Research at UCONN agreed to match funding if we could find a company to give \$100,000 for the naming rights to the facility. Second, the very first company I met with, MISSION, and their CEO, Josh Shaw, agreed to give \$100,000 for the naming rights for the new facility, which lead us to name our laboratory the "MISSION HEAT LAB AT UCONN's KOREY STRINGER INSTITUTE." Between UCONN and MISSION, we were \$200,000 toward our goal. Next, the College of Agriculture Health and Natural Resources, the Department of Kinesiology, and KSI each agreed to kick in \$33,333, which now put us at \$300,000 and more than enough to begin construction. Just 6 weeks after starting our quest in the Fall 2015, we had solidified the funding we needed to get the project started.

Then everything went sideways. In Spring 2016, we were informed that the original estimates were inaccurate and that this project would require an overhaul of the building's electrical system. The new cost for the facility alone would now be approximately \$400,000— \$150,000 more than we had originally thought. This news was brought to me while I was attending the American College of Sports Medicine meeting in Boston, May of 2016. I literally had my breath taken away when I read the email. Within 15 minutes, I was walking the hallway of the conference center to initiate phone calls to try and keep the project alive. We had come way too far in this journey to be deterred by \$150,000, not just in the effort to build the facility, but in the totality of the legacy UCONN had established in this field.

We went back to work raising money (again). To the rescue came Jeff Seeman (again), and Interim Provost Jeremy Tietelbaum, each offering assistance to keep the project alive, who fully respected the work of KSI and the success we have had with securing external funding. In addition, we reached out to the many friends of KSI to seek out support to reach our goal of building this incredible facility. In honor of all those who assisted, I need to say that nearly every person/organization that we asked for assistance agreed to help.



Overall, we were emotionally blown away by the show of support. The National Football League, the Professional Football Athletic Trainers Society, the National Football League Players Association, Eagle Pharmaceuticals, Scott Chafin (lawyer for the exertional heat stroke victim Henry White), Steve Yerrid and Jeff Murphy (lawyers for exertional sickling victims Ted Agu and Ereck Plancher), Michele Ciancola and Patrick Barry (mother and lawyer of exertional heat stroke victim Joe Ciancola), John Jardine, MD (Chair of KSI's Medical and Science Advisory Board), the Class and Knighton families (in honor of their exertional heat stroke survivor sons, respectively Gavin and Hunter), the Falmouth Road Race, Dr. Larry Armstrong and his wife Elizabeth, and Jeff Pash, amongst many others, graciously donated to our cause. In an incredible show of support, over 20 members of KSI's Medical and Science Advisory Board also gave donations. The corporate partners of KSI need to be thanked as well, because this would have never have happened without them. The nine partners are the backbone of our efforts: UConn, NFL, Gatorade, Heartsmart.com, Mission, CamelBak, National Athletic Trainers Association, Kestrel, and Eagle Pharmaceuticals make it all possible. We had done it. With the collaborative efforts of the entire extended family of KSI, we had found a way to make this happen.

The construction of the heat chamber began in Spring 2017, and we eagerly watched every day to see our dream come to life. As I stood in the facility each morning at about 5:00 am to see the work from the previous day, I was filled with an emotional surge of excitement and accomplishment, given the long road we had travelled to get to this point. By the end of August, the construction team was ready to turn on the switch of the new laboratory for the first time, and the designing team from Mission arrived in early September to give a final touch to the facility. As we stand here today for the grand opening on September 22, 2017, we celebrate the start of something incredible. For me, it marks the journey's end. The end to construction and a wonderful beginning for what awaits to make a bigger difference to assist athletes, warfighters, and laborers. Last but not least, I would like to give special thanks to Luke Belval and Chuck Brome– two remarkable people who steered this enormous ship on a daily basis that allowed this all to happen.



OUR MISSION AND ENDEAVOURS COULD NOT HAVE BEEN MADE POSSIBLE WITHOUT OUR CORPORATE PARTNERS. WE ARE GREATLY APPRECIATIVE OF YOUR CONTINUED SUPPORT.



National Football League: The National Football league is a founding partner of the Korey Stringer Institute. The NFL supports multiple player safety initiatives for athletes of all levels. For more information on the NFL's Health and Safety Initiatives, visit [NFL Evolution](#).

Gatorade: Gatorade is a founding partner of the Korey Stringer Institute. Gatorade and the **Gatorade Sport Science Institute** continue to search for and study new and innovative ways to help athletes improve performance by facilitating proper hydration and nutrition.

National Athletic Trainers' Association: The National Athletic Trainers' Association is the professional membership association for certified athletic trainers and others who support the athletic training profession. Its mission is to engage and foster the continued growth and development of the athletic training profession and athletic trainers as unique health care providers.

University of Connecticut: The Korey Stringer Institute is housed at the University of Connecticut. The **Department of Kinesiology** faculty are renowned for their research and expertise in the areas of heat and hydration, injury prevention, and strength and conditioning.

Camelbak: The mission of Camelbak is to continuously reinvent and forever change the way people hydrate and perform. Visit [Hydrated](#) for useful resources on hydration practice.

Kestrel Pocket Weather Meters by Nielsen-Kellerman: Nielsen-Kellerman is committed to ensuring that people know the weather and environmental conditions that impact their health, safety and bottom line. NK's Kestrel meters are rugged, accurate, fully calibrated, portable, affordable and easy to use. KSI uses these wet bulb globe temperature thermometers to determine environmental conditions during research studies both inside the heat chamber and in field studies. Visit [heatstress.com](#) for resources on physical activity in heat stress.

Mission: Mission has a dual mission. While delivering world-class innovations that meet the unique needs of an athletic lifestyle, Mission also makes an impact off the field of play through the **M Foundation**, which promotes the health and safety of youth athletes, and simultaneously recognizes and awards high school athletes that give back to their community. Mission is currently running the **Heat Safety Pledge** initiative to advocate for heat safety awareness.

Heartsmart.com: HeartSmart.com is a leading provider of Automated External Defibrillators, also referred to as AEDs. HeartSmart.com offers AED program to support AED owners with essential services, support, product maintenance, and training.

Eagle Pharmaceuticals: Eagle Pharmaceuticals is a specialty pharmaceutical company focused on developing injectable products, primarily in the areas of critical care, orphan diseases, and oncology. Its goal is to provide safer and more convenient solutions for patients and healthcare professionals with optimized formulations.

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KSI
Korey Stringer Institute
UNIVERSITY OF CONNECTICUT
Preventing sudden death in sport

SPOTLIGHT

THE **SPOTLIGHT** SERIES FEATURES THE PEOPLE OF THE KSI, AND THOSE WHO SHARE AND REPRESENT THE PASSION OF THE KSI.



**ANDREW
GRUNDSTEIN, PHD**

**MEDICAL & SCIENCE
ADVISORY BOARD**

KOREY STRINGER INSTITUTE

Could you tell us about yourself?

I am a professor in the Geography department at the University of Georgia and specialize in Climatology. My particular interests are in how weather and climate affect human health. A lot of my work focuses on how weather and climate data can be used to understand dangers from heat for the general public, athletes, and especially children. Some of my current research has examined regional heat acclimatization for football players, case studies of exertional heat-related fatalities, assessment of heat and morbidity in urban environments, and most recently monitoring individual heat exposure among different populations. As part of my work on heat safety and athletes, I collaborated with a team that helped the Georgia High Schools Association (GHSA) develop new heat safety guidelines.

Could you tell us about your first involvement/interaction with the Korey Stringer Institute?

I first met Dr. Casa and was introduced to KSI through my involvement with the GHSA. Following our work on this project, he invited me up to UCONN to visit KSI and participate in a meeting on heat safety and football. It was nice to meet not only the KSI staff but also people from Kestrel, Gatorade, and USA Football with interests in heat safety.

In what ways has KSI impacted you?

It has been wonderful working with KSI. My training is in Geography and Climatology, so I have learned so much about athletic training and physiology by working with the KSI staff. Also, academics can sometimes feel removed from the real world. I really enjoy seeing how directly KSI's work positively impacts athletes and their safety. It has influenced my own work by making me think more carefully how a coach or athletic trainer could effectively use research my colleagues and I produce.



GEORGE CHIAMPAS, DO

BOARD OF ADVISORS

KOREY STRINGER INSTITUTE

Could you tell us about yourself?

I was born and raised in Chicago, both of my parents emigrated to the United States from Greece and I was fortunate to grow up appreciating all of the opportunities and watching my parents work towards providing me opportunities they didn't have. Education was a cornerstone in our family and a constant theme highlighted as a key to success. I was fortunate to have had a Jesuit education in high school and college which focused on being a person who gives to their community in every part of their life and this continues to be a constant in my personal and work life. I worked in the healthcare setting since I was eighteen in several capacities and in multiple hospital environments including the intensive care unit and emergency room which provided me a unique skill in communicating in a difficult environment and circumstances. I attended medical school at Midwestern University and am a proud Osteopathic physician which additionally, focuses on the human body as a whole and this base is a good one to have when caring for people. It stays true to the "art" of medicine. I went on to complete an Emergency medicine residency at Cook County hospital in Chicago and during that time began volunteering in several capacities in sports medicine. Covering my high school football games as well as the Chicago Marathon. During those years, my interest in sports medicine grew and I began contemplating how can this specialty coexist with sports medicine. I was fortunate to meet key mentors who offered key insight while assuring the process may be difficult. In fact, two years after I completed my residency I did a sports medicine fellowship as the first fellow at Resurrection medical center. Since then I have had several opportunities which included great challenges as well which have led to where I currently am. I serve as the medical director of the Bank of America Chicago Marathon with the 2017 marathon being my 11th in this capacity. I was a team physician with Northwestern University athletics for 5 years 2 of which I served as the head team physician overseeing the department. I work and continue to work clinically as an assistant professor in emergency and sports medicine at

Northwestern University and Northwestern Medicine. I am and have been a team physician for the Chicago Blackhawks and as of 2015 have been the Chief Medical Officer for US Soccer. Finally, I additionally work as the visiting team medical liaison for the NFL being a conduit for visiting NFL teams while in Chicago and very recently have been named the medical director of Superior ambulance special events division, the 3rd largest private ambulance service in the country. I serve on various organizations including FIFA's new medical committee as well as am on the advisory board for the Korey Stringer Institute. I have a foundation which I started called "CCARES" Chicago Cardiac Arrest and Resuscitation Services an organization seeking to increase survival of sudden cardiac arrest by teaching "hands only CPR and the use of an AED across our communities. I have been very fortunate to utilize the platforms in sports and be connected with good leadership which have allowed me to push this message in sports from the youth through the pro's. My areas of focus and research are in mass event management and preparedness, heat and hydration matters in sports and emergency care of the athlete. Most recently within soccer I was a part of the decision to change the rules of heading in soccer in the united states in the youth game as well as have created a national platform called Recognize to Recover which is a platform of player health and safety in our game. We have developed the first heat guidelines in the sport of soccer in collaboration with KSI a project which will protect players and build upon a culture of player and sport safety. Additional content pieces focus on concussions, cardiac safety, nutrition and emergency action plans to name a few. This project is extremely exciting as the impact across the sport is significant. At the same time within US Soccer's development academy which has over 18k players we have mandated that Athletic Trainers (ATC's) be present at all competitions a move which highlights and establishes a culture of safety and best practices for others to follow. Finally, I am married to my wife Lori who I met in college and we both juggle our busy schedules as she to is a Pharmacist at Lurie Children's hospital in Chicago and we are proud parents of our 2 children Katia (14) and Athan(12) both who play soccer primarily and growing up way to fast.

Could you tell us about your first involvement/interaction with the Korey Stringer Institute?

Honestly, I still remember watching and hearing about Korey Stringer, as a Bear's fan and as a medical provider these types of incidents are what should drive you. Additionally, I would routinely read of Dr. Casa's work in position statements book chapters and once I heard of the KSI initiative I knew key best practices were forthcoming. My initial connection had to be within the Marathon work I do. In 2007, the Chicago Marathon was one that has been integral in advancing runner safety. That year saw the hottest and humid temperatures and was the event we canceled a few hours into the 2nd largest marathon in the world. While our efforts that day truly protected runners and the public as an organization we set forth to build, set and disseminate best world class practices in mass events. Specifically, my work in communications and management of heat related issues and our CPR and AED education across our event were in line with what KSI was doing in youth sports. I believe that Doug appreciated my work as I did his and collaborating and brainstorming on ways to keep athletes safe is our ultimate objective. Over the past several years KSI and the team have been integral in the sports medicine realm on keeping players safe while highlighting the benefits of sport. We have recently worked together on several projects including a youth consensus on player safety across sports, a document which undoubtedly will protect athletes and save lives.

In what ways has KSI impacted you?

Two things. One is that our work in medicine never ends, we continue to strive to follow science and implement life saving measures as well as educate coaches, referees, players and parents on key issues in the health and safety within sporting activities. Second is that in some way KSI drives me and the areas I work within to be better, to constantly strive for positively impacting our players in a healthy and safe way.

**"IN SOME WAY KSI DRIVES ME AND
THE AREAS I WORK WITHIN TO BE BETTER,
TO CONSTANTLY STRIVE FOR POSITIVELY IMPACTING
OUR PLAYERS IN A HEALTHY AND SAFE WAY."**

TD Bank Beach to Beacon 10K



BRAD ENDRES, ATC, CSCS, ASSISTANT DIRECTOR OF SPORT SAFETY

Road races have a knack for bringing out the best in a community. They are often organized in such a way that highlights the local culture, which always facilitates an enjoyable time for spectators and runners alike. Sometimes, a road race can stand the test of time and transcend from a regional tradition into an international staple. One such example, is the annual TD Bank Beach 2 Beacon 10K road race held in Cape Elizabeth, ME. Local recreational runners joined a world class pool of professional racers in a truly one-of-a-kind event. At this year's 20th anniversary race, KSI's staff had the fortunate opportunity to volunteer in a variety of ways.

On Thursday evening, August 3rd, KSI CEO, Douglas Casa, presented at the medical symposium that was held prior to the race. This symposium was offered to all interested medical personnel, as well as runners who were interested in race medicine. His talk was entitled, "Maximizing Performance and Safety During Intense Exercise in the Heat." This symposium was a great avenue to facilitate continuing education and familiarization of emergency best practices among medical volunteers as well as educate race participants about the safety aspects of the event in which they were about to take part.

The race was held on the morning of Saturday, August 5th with temperatures hovering around 70° F when the first runners took off. By the end of the race, temperatures dropped slightly but the humidity increased to nearly 90%. KSI staff members, Samantha Scarneo, Christopher Myers, and I, assisted with the medical team. Each one of us was assigned to the "Pre-Race Finish" team and were responsible for covering different sectors of the course just before the finish line. Each sector was about 50 yards in length and two medical volunteers covered each sector. About 45 minutes into the race, I was covering my station when I noticed a man stumbling towards the barrier at the edge of the course. He was noticeably in distress, and when I approached him he acknowledged that he was really struggling to finish the race. After assisting him off the course and during my assessment, it became apparent that he was experiencing some central nervous system (CNS) disturbances and struggling to maintain consciousness. I definitely suspected exertional heat stroke (EHS) at this point, and a call was made to have him transported to the main medical tent at the finish line for differential diagnosis and on-site cooling, if indeed the man was suffering from EHS. Within a few minutes of the call, he was receiving more advanced treatment at the medical tent.



I do not know for certain if this man was indeed suffering from EHS, but I do know that he was treated and released from the medical tent by the time the festivities ended that morning. What is for certain is that 10 EHS were diagnosed that morning, and all 10 individuals were appropriately treated on-site and medically discharged that day without a hospital visit. This could not have been possible without the incredible organization and preparation of the Beach 2 Beacon medical team. This team, led by Chris Troyanos, ATC, embraced best-practices for emergency care and applied them to the road race setting. They were ready for any emergency that day, especially EHS. Even though the conditions weren't overly oppressive, the medical team was prepared for the worst. This planning saved lives that day, and it was such an honor to work along-side such an effective team. To Chris and the entire Beach 2 Beacon medical team and volunteers who worked so diligently to #Strive2Protect, we at KSI extend our many thanks and a much-deserved "well done".



Could you tell us about yourself?

I have been working as a Research Assistant for the Korey Stringer Institute since June, after graduating from Washington and Lee University in Lexington, VA. While at Washington and Lee, I studied Neuroscience and Renaissance Art History. I also avidly pursued athletics, competing as a collegiate swimmer and power lifter. In my free time, I taught swim lessons and conducted research on ant social behavior. I grew up and currently live in Essex, Connecticut with my twin brother, Paul, younger brother, Patrick, and my mom and dad. I am currently applying to medical school, where I hope to concentrate on Orthopedics and Sports Medicine. If all goes according to plan, I will be attending my first classes in the summer of 2018.

Could you tell us about your first involvement/interaction with the Korey Stringer Institute?

During the year between college and medical school, I knew I wanted professional exposure to Sports Medicine. The Korey Stringer Institute was a perfect fit for me. Aside from its prestigious reputation, its involvement in the full spectrum of sports related injury prevention interested me. Through its multifaceted approach, from clinical practice, to research, to policy initiatives, the Korey Stringer Institute provided the most comprehensive look at the field I want to pursue as a career. In my first few months with KSI, I have not only learned about these topics, but have also met colleagues who are welcoming, talented, dedicated, and generous with their time to share their interests and knowledge. I look forward to making contributions to this important cause and team.

In what ways has KSI impacted you?

My education before KSI largely took place in class rooms. I learned about health care, anatomy, and current issues through textbooks and lectures. In my first ten weeks with KSI, my education has moved from the classroom to practice. At competitive road races in Falmouth, Massachusetts and Cape Elizabeth, Maine, I actively aided medical professionals treating runners with exertional heat stroke, a potentially life-threatening condition. In the KSI offices, I get to conduct research using their new state-of-the-art environmental chamber to better understand heat stroke. On a lighter note, I got to play soccer with Dr. Casa, his children, and many members of the KSI staff. Both socially and professionally, I have really enjoyed my time so far with KSI.

SPOTLIGHT



**CHRISTOPHER
MYERS, MS**

**KOREY STRINGER
INSTITUTE
RESEARCH FELLOW**

Health and Safety Ranking for High School Athletics

SAMANTHA SCARNEO, MS, ATC, DIRECTOR OF SPORT SAFETY

On Tuesday, August 8th, the Korey Stringer Institute held a press conference for the release of the Health and Safety Policy Ranking for High School Athletics, reaching approximately 500 different media coverage within the 3 days of the event. The goal of this project was to review publicly available information from high school associations and state legislation to determine how states are mandating safety standards for their athletes. A positive finding from this study is every state, including the District of Columbia, has some type of health and safety policy requirement for their high schools to follow. However, not a single state meets all of the minimum best practice requirements for the areas focused on in this project; which happen to be the top causes of sudden death in sport, accounting for over 90% of sport-related deaths.

North Carolina is leading the way, scoring a 79%, followed by Kentucky (71.13%) and Massachusetts (67.4%). KSI was honored to have Mr. Bob Gfeller, Mr. David Csillan, and Dr. Morgan Anderson as well as Dr. Douglas Casa and Dr. William Adams, speak at the press conference. Dr. Adams began the press conference stating the methods used for this project, which included accessing publicly available information from state high school associations and legislation. Dr. Casa followed up with information pertaining to the results of the study. Csillan, a secondary school athletic trainer from New Jersey, provided comments about his continued advocacy for New Jersey to implement best practice standards statewide. Mr. Gfeller spoke on the importance of implementing policies to ensure that no parents need to go through the tragic loss of a child. Dr. Morgan Anderson echoed these comments by stating *"We have tragic examples from the past that motivates us daily to make a change."*

The Orthopedic Journal of Sports Medicine will publish the study with these findings in the September issue. The accepted version of the manuscript is also available on our website:
<http://ksi.uconn.edu/high-school-state-policies/>

Change is difficult. There may be states who are not thrilled with these published findings, too. However, these data *are* the reality of current health and safety policies in high school athletics. This report is dedicated to the parents who have lost, or those parents who have their sons and daughters participating in sport, and it can be the conduit in making sure that your children's safety are accounted for by the governing organizations. I urge you all to contact your state high school association leaders and legislators to find out if they are 1) aware of where they stand in the ranking and 2) their plans forward for improvement.



Athlete Monitoring: Purposes and Practices

RYAN CURTIS, MS, ATC, CSCS, CES
ASSOCIATE DIRECTOR OF ATHLETE PERFORMANCE AND SAFETY

Athlete monitoring is becoming standard practice for maximizing player performance, reducing injury risk, and optimizing competition readiness. For high-performance programs, monitoring load-performance and load-injury relationships are essential for providing insight into how athletes are responding to stresses incurred during and outside of training and competition. Ultimately, how an athlete performs is impacted by the accumulation of stress and the efficacy of training. Therefore, it is important to evaluate stress imposed during training and match sessions, as well as, the strain incurred by each athlete. Understanding the difference between stressors (i.e., intense exercise, heat, cold, altitude, etc) and the strain (body's response to stress) experienced by a biological system (i.e., human body) is essential to monitoring and manipulating parameters important for athlete preparation. Other benefits to monitoring athletes beyond determining training efficacy, such as gathering scientific explanations for changes in performance or injury risk, enhancing coach and practitioner confidence when manipulating training loads, and boosting athlete-coach-practitioner relationships all contribute to the efficacy and buy-in of monitoring practices. There are four main purposes for monitoring athletes; optimizing readiness, ensuring proper prescription of stress and recovery (periodization), reducing injury risk, and monitoring safe and effective return to play programs (Figure 1). While each of these purposes are important, emphasis and priority placed on these purposes will vary based on team's load monitoring

philosophy.

Monitoring Training and Competition Load

When monitoring the dosage of stress imposed during training or competition, practitioners and scientists typically refer to training load. Load is simply the product of duration and intensity of activity. Training load can be further described as either external (work imposed independent of internal strain) or internal (response of the body to external load), as shown in Figure 2. The association between external and internal load can give great insight into the status of the athlete (i.e., fresh vs. fatigued). With advancements in wearable technology, monitoring of athletes' external load has received a great deal of attention. Specifically, global positioning systems (GPS) capabilities have allowed ease of monitoring parameters such as distance, time, and efforts in multiple velocity zones (0-7.2 km/h-walk, 7.2-14.4 km/h-jog, 14.4-21.6 km/h-run, >21.6 km/h-sprint) used for tracking running performance. GPS-enabled devices use positional differentiation to calculate distance and acceleration.

Beyond quantifying the intensity distribution of session types (i.e., match, training, conditioning, etc.), GPS metrics are often reported as aggregate measures such as high-intensity running distance (distance >14.4 km/h), number of sprints (efforts > 25.2 km/h), and average speed (meters per minute). However, GPS technology is limited in its ability to detect external movement beyond positional change and additionally, has serious limitations with tracking movement indoors. This leaves monitoring of indoor

team sports such as basketball and volleyball at a disadvantage. However, modern player tracking technology typically uses integrated inertial sensors such as accelerometers, gyroscopes, and magnetometers to help quantify stress imposed in all three planes. Calculated metrics such as PlayerLoad™ (Catapult) from integrated inertial sensors have a strong relationship with running performance measures such as total distance covered, while additionally estimating general load on the body and therefore stress from actions such as tackling, accelerations, decelerations, changes of direction and collisions. Due to the inertial movement sensors ability to detect magnitude of movement (i.e., g-forces) in 3 planes of motion, a single arbitrary unit of load might give a more accurate display of total stresses incurred during activity.

Both physiological and psychological measures such as heart rate, lactate, muscle oxygen, and rating of perceived exertion (RPE) can be used to monitor loads sustained internally. Of the numerous methods of objectively quantifying internal load, heart rate derivatives such as time in heart rate zones, expressed as percent of maximum heart rate, and weighted scores such as training impulse (TRIMP) are most commonly used. These measures allow categorization of training stress into relative zones such as high, moderate, and low. Of the methods to quantify internal load by subjective means, using RPE and session RPE (sRPE) are by far the most common. sRPE is simply the product of session duration and the athlete-reported RPE post-training/competition. This subjective measure has shown good association with external running performance measures.



Figure 1. Four Primary Purposes of Monitoring Athletes

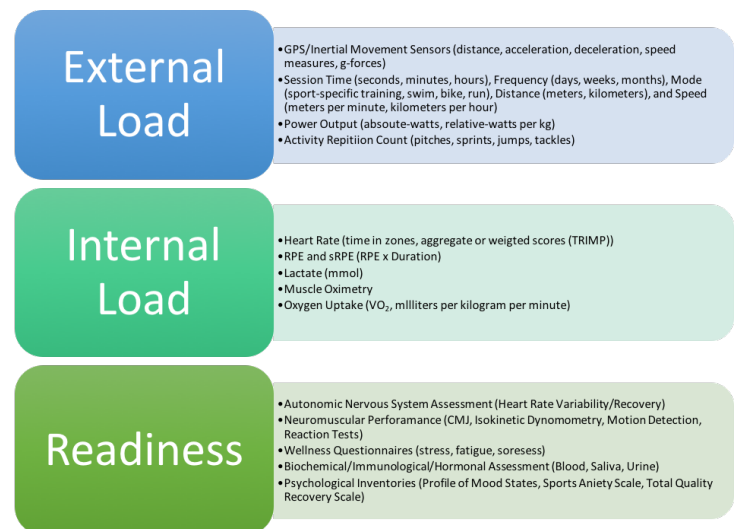


Figure 2. Common Variables and Units Used to Monitor External Load, Internal Load and Readiness

“Understanding the difference between stressors and the strain experienced by a biological system is essential to monitoring and manipulating parameters important for athlete preparation.”

Monitoring Readiness, Recovery and Wellness

Monitoring readiness, recovery, and wellness requires both physiological and psychological assessment in order to gain understanding of an athlete's true state. These assessments could be as simple as asking the athlete "how do you feel?" or as complex as using microtechnology (telemetry or photoplethysmography) to ascertain the variability in heart beat to beat intervals during rest or sleep. Monitoring the response to training and/or competition gives the practitioner great insight into individual dose-response relationships and helps to promote precision with recovery practices. For example, if an athlete is excessively fatigued, coaches may prescribe a recovery session or reduce training load for that day. Current practices in monitoring athlete readiness prior to activity include heart rate-based autonomic nervous system assessment (i.e., heart rate variability; heart rate recovery), neuro-muscular function tests (i.e., counter movement jump; reaction tests), and wellness questionnaires/assessments (i.e., stress, fatigue, soreness, anxiety). More extensive monitoring such as biochemical/immunological/hormonal assessment (i.e., blood, saliva, and urine-biomarkers) and psychological inventories (i.e., Profile of Mood States, Sport Anxiety Scale, Rest and Recovery Questionnaire) can give insight into overtraining or maladaptation if assessed longitudinally.

Limitations in Athlete Monitoring

While there is much to gain from monitoring athletes, there are several limitations that must be considered when implementing a monitoring

program. Monitoring athletes does not always require large funding sources (i.e. subjective markers of training load combined with wellness reporting), however analyzing data does require time, manpower, and experience/skill. With vast amounts of data pouring in from sometimes multiple technologies and questionnaires, persons experienced in data management and analysis are often needed derive meaning and interpretation beyond simple descriptive reporting. In addition, attaining buy-in from athletes and coaching staff is sometimes difficult if immediate returns are not seen. Regarding technological limitations, very little validation and reliability testing is conducted by parties outside of the technology manufacturer. With that, the way in which raw data is processed and filtered varies by manufacturer and software version. Because software updates can occur quite often and the way in which data is filtered and reported is changed, validity and reliability of the device will change concurrently. This has severe implications when determining the precision and consistency of measurement longitudinally.

Taken together, programs must weigh the benefits and limitations of athlete monitoring together. Without structure in data management, plans for implementation based on data analysis, and athlete-coach buy-in, monitoring athletes can be a waste of time and resources that could be used to gain advantage elsewhere. However, if care is taken in promoting, structuring, and implementing a purposeful and practical monitoring program, teams stand to gain a great advantage in maximizing the health and performance of their athletes.



Understanding Environmental Heat Stress

YURI HOSOKAWA, PHD, ATC
VICE PRESIDENT OF COMMUNICATION, VICE PRESIDENT OF EDUCATION

As the brutal summer heat takes a toll across the country, high school athletes and youth sport leagues are ramping up their summer camps and pre-season workouts in preparation for the fall season. While the importance of hydration is often emphasized during summer workouts, the use of environmental-based activity modification guidelines is often overlooked. The two major goals of environmental monitoring and activity modification guidelines are: (1) to minimize prolonged exposure to dangerous heat stress and (2) to optimize the use of practice time in the heat without overstraining the athletes.

Two of the well-accepted environmental-based activity modification guidelines for exercise in the heat are published by the National Athletic Trainers' Association and the American College of Sports Medicine. Each guideline provides specific wet bulb globe temperature (WBGT) ranges and recommended modifications, with different types of athletic activities and populations in mind. Understanding the differences between the two guidelines will help clinicians decide which guideline better fits their needs.

National Athletic Trainers' Association's Guidelines (2015)¹

The most recent position statement from the National Athletic Trainers' Association (NATA) provides example WBGT guidelines from the Georgia High School Athletics Association. The uniqueness of these guidelines is that it provides activity modification recommendations that best suits fall American football training. Epidemiological studies suggest that youth football athletes are one of the most vulnerable populations to exertional heat stroke, given the time of the year they start the season and the unique physical demands in the heat that is amplified with wearing protective equipment. Therefore, having football specific modification guidelines required at the high school level across the country could direct not only the athletic trainers, but also the coaches and referees in what the appropriate modifications should be given the environmental temperatures.

It should be noted that the example provided by the NATA is adjusted for the regional environmental conditions normally observed in the state of Georgia during fall football training. Consequently, the temperature threshold may not be realistic for states in the northern part of the continental U.S. (i.e., the threshold temperatures are set too high to be practical). To address this potential regional discrepancy, Dr. Andrew Grundstein and his colleagues³



have proposed adjustment to the WBGT threshold by regions to account for the environmental differences observed (i.e. environmental conditions observed in Louisiana versus environmental conditions observed in Maine).

American College of Sports Medicine Guidelines (2007)²

Football is not the only form of physical activity that takes place during the summer months. While other team sports, such as soccer and lacrosse, may benefit from adapting the NATA guidelines, sports such as cross country may not find the guidelines as helpful due to the different nature of activity (i.e., intermittent vs. continuous activity). In such case, coaches and clinicians may be referred to the guidelines published by the American College of Sports Medicine (ACSM). Their activity modification recommendations are less specific to the type of sport, making it easier to implement as a global precaution for any type of physical activity in the heat. For that reason, the ACSM guidelines are also often implemented by various road race organizers in deciding if they should cancel, modify, or postpone mass participation events such as road running races.

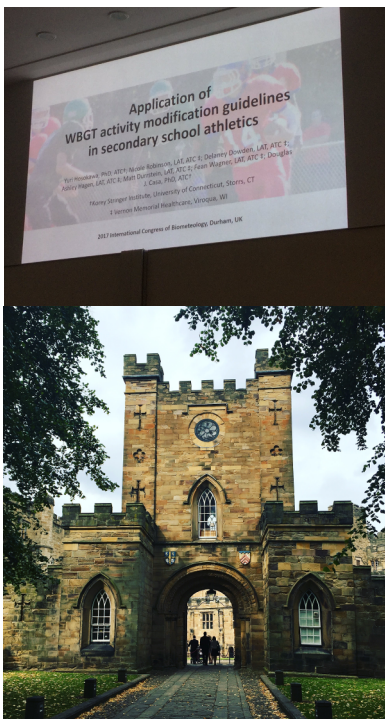
It should also be noted that the same study³ by Dr. Grundstein and his colleagues have made the regional adjustments based on the ACSM guidelines to accommodate for the various climatology we observe in different parts of the country.

Take Home Message

Environmental monitoring is a simple way for athletic trainers and coaches to reduce the risk of heat related injuries. It also ensures that the athletes are getting quality practice time during the summer days, where many athletes may be just getting ready to not only get used to the heat but also to exercise itself.

References:

1. Casa DJ, DeMartini JK, Bergeron MF, et al. National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses. *J Athl Train*. 2015;50(9):986-1000. doi:10.4085/1062-6050-50.9.07.
2. Armstrong LE, Casa DJ, Millard-Stafford M, Moran DS, Pyne SW, Roberts WO. American College of Sports Medicine position stand. Exertional heat illness during training and competition. *Med Sci Sports Exerc*. 2007;39(3):556-572. doi:10.1249/MSS.0b013e31802fa199.
3. Grundstein A, Williams C, Phan M, Cooper E. Regional heat safety thresholds for athletics in the contiguous United States. *Appl Geogr*. 2015;56:55-60. doi:10.1016/j.apgeog.2014.10.014.



21st International Congress of Biometeorology Durham, United Kingdom

Dr. Hosokawa attended the 21st International Congress of Biometeorology in Durham, United Kingdom, and gave a presentation titled "Application of WBGT activity modification guidelines in secondary school athletics". The theme of this year's meeting was "Weather and Climate Information for Risk Management" and researchers from various disciplines gathered to share their recent work in addressing environmental hazards. Extreme heat was the most commonly studied topic at the conference, and many researchers called for future interdisciplinary collaborations to comprehensively address heat induced health hazards to the society. Hosokawa's presentation demonstrated ways in which athletic trainers effectively use climate data to mitigate exertional heat illness in secondary school athletics.

Hosokawa's trip was supported by the National Athletic Trainers' Association International Committee's International Speaker Program.

6th Annual Fund Raising Gala

GABRIELLE GIERSCH, MS

ASSOCIATE DIRECTOR OF EDUCATION AND ASSISTANT DIRECTOR OF ATHLETE PERFORMANCE AND SAFETY

On May 11th, KSI hosted our **6th annual fundraising gala** at the NFL headquarters in New York City. Our staff traveled down and were humbled and honored by the incredible turnout and support from those that attended. The efforts of KSI to prevent sudden death and maximize safety and performance were major topics of remarks made throughout the night.

We were honored by the presence of several of our corporate partners who help immensely in making the mission of KSI a reality. It was truly a night for people to come together in joyous support of the work of KSI and their role in it. We were especially excited to welcome heartsmart.com since it was their first KSI event as a corporate partner.

We were also able to honor three incredible people with our KSI awards. The 2017 KSI Lifesaving Research Award was presented to R. Dawn Comstock, PhD from the Colorado School of Public Health at the University of Colorado, the 2017 KSI Lifesaving Service Award was presented to James L. Thornton, ATC from Clarion University, and the 2017 KSI Lifesaving Education Award was presented to Brain Hainline, MD, CMO of the National Collegiate Athletic Association.

We would like to give a special thanks to the UConn Foundation for assistance in helping the evening run so smoothly. We also cannot thank the attendees enough for traveling to attend the event, proudly showing your support for KSI and our mission, and always being so generous with your time and advocacy.



Research Corner:

Adams WM, Scarneo SE, Casa DJ.

State Level Implementation of Health and Safety Policies Pertaining to Preventing Sudden Death and Catastrophic Injury in Secondary School Athletics

Orthopedic Journal of Sports Medicine. 5(9), 2017. DOI:2325967117727262.

Background: Sudden death and catastrophic injuries during sport can be attenuated with the implementation of evidence-based health and safety policies. However, the extent of the implementation of these policies within secondary school athletics is unknown.

Purpose: To provide an assessment of the implementation of health and safety policies pertaining to the leading causes of sudden death and catastrophic injuries in sport within secondary school athletics.

Study Design: Descriptive epidemiology study.

Methods: A rubric for evidence-based practices for preventing the leading causes of death and catastrophic injuries in sport was created. Five equally weighted sections for sudden cardiac arrest, head injuries, exertional heat stroke, appropriate medical coverage, and emergency preparedness comprised the rubric. State high school athletic association (SHSAA) policies, enacted legislation, and Department of Education policies were extensively reviewed for all 50 states and the District of Columbia. States meeting the specific criteria in the rubric, which required policies to be mandated for all SHSAA member schools, were awarded credit; the weighted scores were tabulated to calculate an aggregate score. States were then ranked from 1 (best) to 51 (worst) based on the aggregate score achieved.

Results: The median score on the rubric was 47.1% (range, 23.00%-78.75%). States ranked 1 through 10 (from 78.75% to 56.98%) were North Carolina, Kentucky, Massachusetts, New Jersey, South Dakota, Missouri, Washington, Hawaii, Wisconsin, and Georgia, respectively. States ranked 11 through 20 (from 56.03% to 50.55%) were Arkansas, New York, Mississippi, West Virginia, Oregon, Illinois, Tennessee, Arizona, Texas, and District of Columbia, respectively. States ranked 21 through 30 (from 49.40% to 44.00%) were Virginia, Pennsylvania, Florida, New Mexico, Alabama, Maine, Rhode Island, Indiana, Nevada, and Utah, respectively. States ranked 31 through 40 (from 43.93% to 39.80%) were Ohio, Delaware, Alaska, Vermont, Louisiana, Maryland, Oklahoma, Connecticut, Idaho, and South Carolina, respectively. States ranked 41 through 51 (from 38.73% to 23.00%) were Michigan, North Dakota, Nebraska, New Hampshire, Kansas, Wyoming, Minnesota, Montana, Iowa, California, and Colorado, respectively.

Conclusion: State scores ranged from 23.00% to 78.75% for the implementation of evidence-based best practices for preventing the leading causes of sudden death and catastrophic injuries (sudden cardiac arrest, traumatic head injuries, exertional heat stroke, and exertional sickling) in sport. Continued advocacy for the development and implementation of policies at the secondary school level surrounding sudden death and catastrophic injuries is warranted to optimize the health and safety of these student athletes.

Table. Ranking of States Regarding the Implementation of Evidence-Based Best Practice for Preventing and Managing the Leading Causes of Sudden Death in Secondary School Athletics. (Table 3. from Adams WM, Scarneo SE, Casa DJ. *Orthopedic Journal of Sports Medicine*. 5(9), 2017. doi: 2325967117727262.)

Rank	State	Score (%)	Rank	State	Score (%)
1	North Carolina	78.25	26	Maine	47.10
2	Kentucky	71.13	27	Rhode Island	46.73
3	Massachusetts	67.40	28	Indiana	46.00
4	New Jersey	67.03	29	Nevada	45
5	South Dakota	60.58	30	Utah	44
6	Missouri	60.00	31	Ohio	43.93
6	Washington	60.00	32	Delaware	43.73
8	Hawaii	59.13	33	Alaska	43.40
8	Wisconsin	59.13	34	Vermont	42.38
10	Georgia	56.98	35	Louisiana	41.00
11	Arkansas	56.03	36	Maryland	40.63
12	New York	55.75	37	Oklahoma	40.50
13	Mississippi	55.25	38	Connecticut	40.00
14	West Virginia	54.33	38	Idaho	40.00
15	Oregon	53.59	40	South Carolina	39.80
16	Illinois	53.38	41	Michigan	38.73
17	Tennessee	52.73	42	North Dakota	38.00
18	Arizona	52.00	43	Nebraska	37.75
19	Texas	50.80	44	New Hampshire	36.00
20	District of Columbia	50.55	45	Kansas	35.75
21	Virginia	49.40	46	Wyoming	35.00
22	Pennsylvania	49.00	47	Minnesota	33.35
23	Florida	48.25	48	Montana	33.25
24	New Mexico	48.08	49	Iowa	33.00
25	Alabama	47.20	50	California	26.00
			51	Colorado	23.00



KOREY STRINGER INSTITUTE IS PROUD TO ANNOUNCE THE OPENING OF OUR NEW MISSION HEAT LAB AT UCONN'S KOREY STRINGER INSTITUTE.

WE INTERVIEWED SOME OF OUR SUPPORTERS AND ASKED WHY THEY DECIDED TO GIVE GIFT TO THE HEAT LAB FUND.

Scott Chafin , Lawyer, Gregorio, Chafin & Johnson, L.L.C.

Please share your relationship with the Korey Stringer Institute.

I represented the family of a Grambling State [University] student-athlete who died of heat stroke while on a punishment run. Doug Casa was one of our expert witnesses on the case, and explained to the jury how the death was completely preventable.

What motivated you to provide a gift to the Korey Stringer Institute's new heat laboratory?

The jury saw that Doug Casa was very passionate about his work. So did I. I decided after that trial if I could ever help Doug in return, I would. When Doug told me about the KSI heat lab, I was all in.

What excites you about the potential use of the new heat laboratory?

The exciting part about the heat laboratory is that it will save more lives.

Lawrence Armstrong, Professor, University of Connecticut

Please share your relationship with the Korey Stringer Institute.

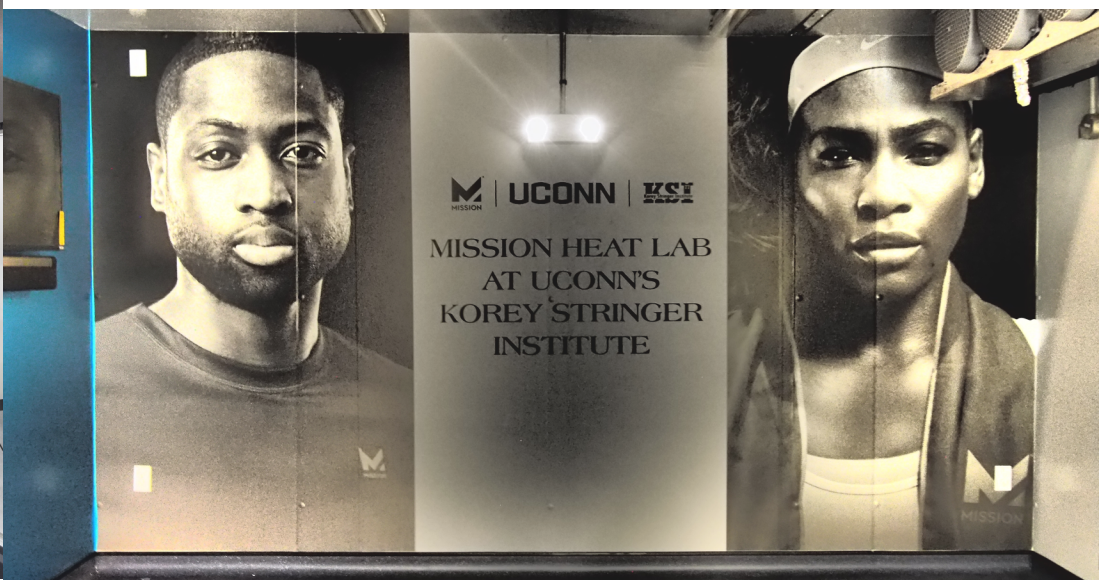
I serve on the KSI Medical and Science Advisory Board.

What motivated you to provide a gift to the Korey Stringer Institute's new heat laboratory?

Prevention and treatment of exertional heatstroke have been significant interests of mine since 1984. KSI emphasizes prevention of sudden death in sport, including heatstroke among athletes, laborers and soldiers.

How do you hope to see this new research lab used?

To support cutting edge research studies that focus on human heat acclimation, hydration, fluid replacement, and body temperature regulation.



MISSION Heat Lab at UCONN's Korey Stringer Institute

Michele Ciancola, Exertional Heat Stroke Awareness & Prevention Advocate

Please share your relationship with the Korey Stringer Institute.

My first interaction with the Korey Stringer Institute was in November of 2011, a few weeks after my son Joseph died from complications of an exertional heatstroke. I received a call from Rob Huggins of KSI who informed me that he and Dr. Casa were at a conference in Boston when Joseph's death came across the news media. Rob encouraged me to call the medical examiner for Joey's CPK blood results. When I called him back with the results of 190,540, he told me that I should have my son's death investigated for EHS (exertional heatstroke). Joseph was a healthy twenty-year-old with no prior health conditions. He collapsed on a New England college campus athletic field during a baseball strength and conditioning practice. He was a pitcher and it was the initial week of training. My son was ultimately taken to a local county hospital geographically closer to the college but once there, the decision was made to transport him to Rhode Island Hospital since they were equipped with a trauma unit. By this time, and before any real emergency treatment, his core body temperature was 106, he became afflicted with rhabdomyolysis (breakdown of muscle fibers that leads to kidney failure) and DIC (disseminated intravascular coagulation). By the time he arrived, he was in multi-organ failure.

What motivated you to provide a gift to the Korey Stringer Institute's new heat laboratory?

Dr. Casa's dedication to EHS research and his lifetime mission to educate and save lives has touched my heart in so many ways. Even as a parent of two collegiate athletes, I was not educated on exertional heatstroke until my call with Rob Huggins. There are too many athletes, parents, and athletic personal, who are uneducated on the prevention, recognition, and treatment of EHS. Since Joseph's death, I have become deeply passionate with the research at KSI on how we can ensure that proper protocols and emergency action plans are in place. EHS is preventable and treatable. The number of athletes who suffer from EHS without proper treatment is unacceptable. This is why in 2012, I worked with a legislator to pass a bill, which mandated immediate point of placement of an automated external defibrillator, or AED, to be on site at any state or private college/university within the state of Connecticut. Further, this bill included a provision that any athlete collapsing from apparent heat exertion or sports related collapse should be taken to a hospital with a trauma unit. My goal is to continue to advocate for proper protocol and emergency action plans in hopes that they are adopted across the country for all athletes.

What excites you about the potential use of the new heat laboratory?

The heat laboratories will enable the Korey Stringer Institute to become a state of the art research facility. I believe in the mission of KSI and I want to be a part of the change and continued success of this organization. Saving a life can be as simple as preventing, recognizing, or treating EHS. It is imperative that athletic trainers and other allied health professional have the appropriate training on how to recognize and manage medical emergencies in order to prevent sudden death in athletes. The new heat laboratory will mimic the environmental conditions for athletes and soldiers and will allow KSI to continue to educate and develop proper treatment protocols for EHS. Just knowing that I had a small part in this success is my gift to my son.



KSI Summer Intern Fellowship

MIWAKO SUZUKI, BA

ATHLETIC TRAINING STUDENT, INDIANA STATE UNIVERSITY

My name is Miwako Suzuki, and I am an Athletic Training student at Indiana State University. Gratefully, I was chosen to receive the opportunity to intern at the Korey Stringer Institute in the Summer Fellowship Program. I am originally from Japan, and I studied Athletic Training there as well. While receiving my education in Japan, I found it necessary to learn more about prevention and management of emergency conditions, and this sense of mission brought me to the United States. I became aware of the KSI four years ago when I was still in Japan through Dr. Yuri Hosokawa, Vice President of Education and Communication at the KSI, and I have been attracted to the KSI since then. The past two months and ten days that I spent with the KSI members were full of great experiences and learning.

Among the several projects that I worked on during the summer, the main focus was placed on the Athletic Training Locations and Services (ATLAS) Project. The aim of the ATLAS Project is to determine the extent of current athletic training services provided in the secondary school setting, and it was launched in January 2016 with these goals: (1) Create a real-time database of athletic training services in secondary schools, (2) Create a directory for each state's athletic training association and high school athletics association, (3) Assist states in moving toward full-time athletic training services, (4) Provide useful data to each state's athletic training association and high school athletic association, (5) Identify common factors associated with increased athletic training services across the country, (6) Provide data to assist with legislative efforts to improve healthcare for high school athletes.

At the beginning of the summer, the ATLAS Project was at the stage of working on the last 10% of high schools that we had been unable to reach. To reach those schools, I have tried multiple methods such as making phone calls, writing emails to athletic directors, and searching their website for athletic trainer's information. Even though I made some progress with these strategies, the most effective method was reaching out to athletic trainers of the neighboring high schools of the unknown schools for help. From this experience, I have learned firsthand that ATLAS is not only a great database but also a very useful communication tool. While interacting with high school athletic trainers throughout the nation, many of them showed their appreciation and support for this study. I am very grateful to be one of the members to propel this important project forward. I would like to thank Dr. Robert Huggins for including me in this project and always guiding me. I also would like to thank Sarah Attanasio, ATC, for teaching me and providing help whenever I asked.

Additionally, I was also involved in the testing for the Falmouth Road Race study that began in mid July. We conducted a modified heat tolerance test on recreational runners of a wide range of ages who are participating in the New Balance Falmouth Road Race on August 20th, 2017. Although the study will not be completed until the race day, collecting data on individuals' physiological responses to exercise in the heat was a great learning opportunity for me. I believe that the wide distribution of demographics of this study allowed me to encounter various responses among the subjects. With regard to conducting a laboratory test, I observed the effort of the KSI members to make the study robust. I was very fortunate to learn from such experienced and passionate colleagues. I would like to express my deepest gratitude to Dr. Yuri Hosokawa and Kelsey Rynkiewicz, ATC, for

including me in this study.

I appreciate every aspect of the activities that I took part in at KSI. The Korey Stringer Institute is a greater place than I had expected. All the members are making great efforts on their projects. Showing strong passion and commitment to KSI's mission. I believe this is why KSI has been successfully leading our profession. Lastly, I would like to thank Dr. Douglas Casa for providing such a great opportunity. I fully enjoyed summer 2017 with such great colleagues.



UPCOMING EVENTS

**Mission Heat Lab at UCONN's Korey Stringer Institute
Grand Opening**
September 22nd, 2017
Storrs, CT

**Malignant Hyperthermia Association of the U.S.
Scientific Conference**
September 23rd - 24th, 2017
Minneapolis, MN

Camelbak Elite Athlete Testing
October 5th-6th, 2017
Storrs, CT

**New England American College of Sports Medicine
Annual Fall Conference**
October 19th - 20th, 2017
Providence, RI

Round Table on Activity Modification in Heat
October 19th, 2017
Washington, DC

Marine Corps Marathon and Medical Symposium
October 20th, 2017
Arlington, VA

Sports Biometrics Conference
November 28th - 30th 2017
San Francisco, CA

**National Strength and Conditioning Association
Coaches Conference**
January 3rd - 8th, 2018
Charlotte, NC

Eastern Athletic Trainers' Association Annual Meeting
January 5th - 8th, 2018
Boston, MA

Youth Sports Governing Bodies Meeting
Date: TBA
Location: TBA

Collaborative Solutions for Safety in Sport
Date: TBA
Location: TBA

7th Annual Korey Stringer Institute Gala
May 10th, 2018
NFL Headquarters, New York, NY

American College of Sports Medicine Annual Meeting
May 29th - June 2nd, 2018
Minneapolis, MN

**National Athletic Trainers' Association
Clinical Symposia & AT Expo**
June 26th - 29th, 2018
New Orleans, LA

**National Strength and Conditioning Association
National Conference**
July 11th - 14th, 2018
Indianapolis, IN

**Sport Analytics Innovation Summit/
Wearable Tech in Sport Summit**
July 19th- 20th, 2018
San Francisco, CA

New Balance

Falmouth Road Race

YURI HOSOKAWA PHD, ATC

VICE PRESIDENT OF COMMUNICATION, VICE PRESIDENT OF EDUCATION

RYAN CURTIS, MS, ATC, CSCS, CES

ASSOCIATE DIRECTOR OF ATHLETE PERFORMANCE AND SAFETY

Our summer is not complete without going to Falmouth, MA, to work at the New Balance Falmouth Road Race medical tent and continue our research and educational initiatives. We have been very fortunate to have the support from the race board members to have KSI presence at the pre-race medical symposium, health & fitness expo, and at the race as medical volunteers and research staff.

NB Falmouth Road Race Medical Symposium

With a host of medical volunteers and invited guests in attendance, this year's NB Falmouth Road Race Medical Symposium featured presentations on a range of relevant topics including recognition and treatment of running-related orthopedic injuries, physiological concerns when developing strategies to optimize performance in the heat, and wearable technologies that can assist in optimizing performance.

Veteran NB FRR orthopedic medical provider, Dr. Don O'Malley, drew upon his experiences to give a thorough review of his top 10 running related orthopedic injuries. Dr. William Adams, a member of KSI's medical and science advisory board and current assistant professor at the University of North Carolina at Greensboro, presented on physiological concerns and strategies when optimizing performance in the heat. The third invited speaker was Ryan Curtis, MS, ATC, CSCS, Associate Director of Athlete Performance and Safety, who discussed integration of wearable technology to optimize performance in the heat. The symposium was concluded with our Chief Medical Officer, Dr. John Jardine, who also serves as the Co-Medical Director of the NB Falmouth Road Race. He briefed attendees on the logistics and chain of command that will be followed on the day of the race. Overall, the 2017 NB FRR Medical Symposium featured not only relevant topics in medicine but additionally offered a glance into the future of health and performance optimization.

Health & Fitness Expo

This year was our first time to participate in the Health & Fitness Expo as an exhibitor. The increased recognition of the KSI among the Falmouth runners was evident. We had many runners come stop by, and it was such a rewarding experience to have some of them share their personal stories about how they or their family members and friends were saved from exertional heat stroke by the NB Falmouth Road Race medical volunteers.

At the expo, we also met with this year's study participants who already participated in a series of laboratory tests at the University of Connecticut in mid-July to early August. These runners were provided with an ingestible thermistor pill, which allow researchers to readily measure their internal body temperature on the day of the race.

Race Day

Race day for both medical and research volunteers started before dawn on Falmouth Sunday. The research crew set up the morning data collection booth at Lawrence School, which was where all runners met to get on shuttle buses to the starting line in Woods Hole. The research data collection included measurements such as participants' gastrointestinal temperature, sweat rate, and pre- and post-race blood and urine collection.

At the medical tent, medical volunteers gathered to review the triage protocol and proper methods for treating exertional heat stroke. Chris Troyanos, Medical Coordinator of the NB Falmouth Road Race, Dr. Jardine and Dr. Robert Davis, the co-medical directors, and Dr. Douglas Casa from KSI lead the group of veteran and novice medical volunteers so that the medical tent was ready for runners who would be finishing the 7.1-mile course in the forecasted warm and humid conditions.

Findings from the NB Falmouth Road Race study will be analyzed over the course of the next several months and will be prepared for scientific presentations at the National Athletic Trainers' Association and American College of Sports Medicine annual meetings in 2018.





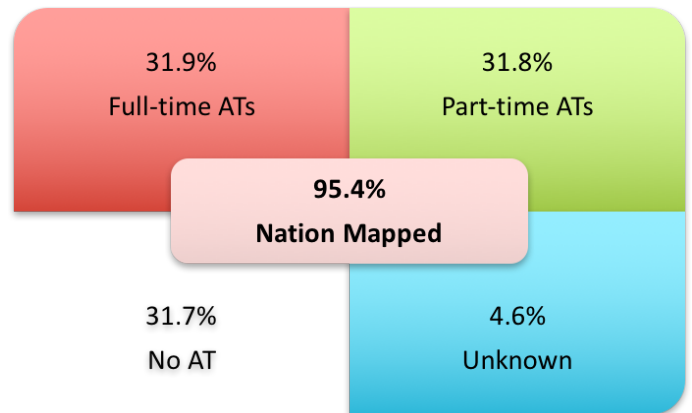
ATLAS

ATHLETIC TRAINING LOCATIONS AND SERVICES

Updates

SARAH ATTANASIO BS, ATC, ASSISTANT DIRECTOR OF RESEARCH

Korey Stringer Institute, National Athletic Trainers' Association, and the Secondary School Committee (SSC) have worked immensely to identify all of the athletic training coverage in every high school in the nation. As of August 2017, there are only 797 schools left to identify out of 20,723 public, private, alternative, magnet and special education schools in the country. There is just 9 states left that we are working on identifying until we have each state mapped with their athletic training coverage. We have identified 96% of the high schools athletic training coverage and found that full-time, part-time services and no athletic training services were represented evenly nation wide. The information is identified through the ATLAS survey, as well as through working with the SSC and various athletic trainers in the states.



Full time athletic training service coverage covers 31.9%(6,604/20,723) of the high schools and part time services cover 31.8%(6,597/20,723) of schools. There are still a large percentage of schools that do not employ an athletic trainer at the high school level covering 31.7%(n= 6,565/20,723) of the schools. Within the next few months we hope to be 100% mapped. This information can be useful when hiring an athletic trainer, filing for insurance claims as well as moving from part-time to full-time athletic training services.

Recent Publications

FALL 2017

- Katch RK., et al. **Top 10 Research Questions Related to Preventing Sudden Death in Sport and Physical Activity.** *Research Quarterly for Exercise and Sport* 88.3 (2017): 251-268.
- Grundstein AJ, Hosokawa Y, Casa DJ. **The Need for Regional Heat Safety Guidelines: A Study of Fatal Exertional Heat Stroke Incidents.** *Journal of Athletic Training.* Accepted.
- Adams WM, Belval LN. **Return-to-Activity Following Exertional Heat Stroke.** *Athletic Training and Sports Health Care.* Accepted.
- Adams WM, Hosokawa Y, Troyanos C. **Pearls of Practice: Organization and Execution of On-site Health Care during a Mass Participation Event.** *Athletic Training and Sport Health Care.* Accepted.
- Lee EC, et al. **Biomarkers in sports and exercise: tracking health, performance, and recovery in athletes.** *The Journal of Strength & Conditioning Research* (2017). doi:10.1519/JSC.0000000000002122. [Epub ahead of print]

Preventing Sudden Death in Sport

CoxHealth Sport Safety Conference

BRAD ENDRES, ATC, CSCS, ASSISTANT DIRECTOR OF SPORT SAFETY



The prevention of sudden death in sports begins well before a catastrophic injury occurs. Many stories throughout the country give testament to the athletic trainers who saved lives of athletes due to an appropriate and timely response to medical emergencies in sport. While these stories are indeed uplifting, they are often the result of a great amount of effort dedicated to being prepared in the event of an emergency. During their 2017 Sports Medicine Conference, the Sports Medicine team at CoxHealth exemplified the old adage that “practice makes perfect”, and it was truly a sight to behold. This team, led by Dr. Shannon Woods, was a shining example of how to collaborate with multiple health care providers in order to create and implement “best-practice” policies and procedures with the intent to promote athlete safety. KSI was invited to travel to Springfield, MO to take part in the Conference, and it was inspiring to witness the rubber meet the road in regards to the practical application of research.

Throughout the two days of the conference, KSI staff led evidence-based educational sessions on exertional heat illnesses. KSI Vice-President of Communication and Education Dr. Yuri Hosokawa started off the conference on Friday morning with an evidence-based presentation about the prevention, recognition, and treatment of exertional heat illnesses. After the presentation, she led the participants through a practical lab session on the “best-practices” of responding to an individual suffering from exertional heat stroke (EHS). The participants attending the Friday session of the conference included athletic trainers, coaches, sports medicine physicians, EMS personnel, and school administrators from local area high schools. These practical skills would be vital for treating their athletes in the event they developed EHS.

On Friday afternoon, CoxHealth staff led mock emergency scenarios where participants were able to practice what they had learned that morning. The participants took the scenarios seriously, which led to great discussions during the debriefings. Additionally, the local Springfield news station recorded a segment about the conference in order to spread the word about emergency preparedness and athlete safety. On the final day of the conference, the participants included physical therapists, physicians from other specialties, parents of young athletes, and other interested members of the community. We geared our presentations to a slightly different audience, but the message was largely the same: evidence-based policies and procedures that can save lives. Yuri and I were thankful to be invited to the 2017 CoxHealth Sports Medicine Conference, and proud to represent KSI at such an impressive collaborative event. Being in compliance with “best practice” emergency response policies is not always easy, but networks like CoxHealth Sports Medicine are proving that it can be done. Because of their efforts, the athletes they serve will undoubtedly be safe and well cared for.

Seamless Triage Saves a Life of an Athlete

YURI HOSOKAWA, PHD, ATC

VICE PRESIDENT OF COMMUNICATION, VICE PRESIDENT OF EDUCATION

Earlier this summer, when everyone was relieved to have completed the spring sport season, we were invited to give a lecture and hands-on training for exertional heat stroke emergency at CoxHealth Sports Medical Conference in Springfield, MO. This was their second annual gathering to review and practice updated policy and procedures for athlete health and safety. Physicians, athletic trainers, emergency medical technicians, athletic directors and coaches of local high schools attended this meeting. During the hands-on training, multiple scenarios were practiced. For example, what do you do when the first responder was an individual who was not medically licensed? What is the chain of command when an athletic trainer is present and not present? What cooling modalities are acceptable? What precautions must be taken during cooling? This lab also reiterated the importance of cool first, transport second. I am happy to say that updated policy used by CoxHealth athletic trainers specifically states to cool first and then transport after the patient's rectal temperature is down to 102 degrees Fahrenheit and that no other measures of body temperature assessment is acceptable. Throughout the meeting, I was very impressed to see their collaboration and understanding of each other's role and I know their athletes are in good hands.

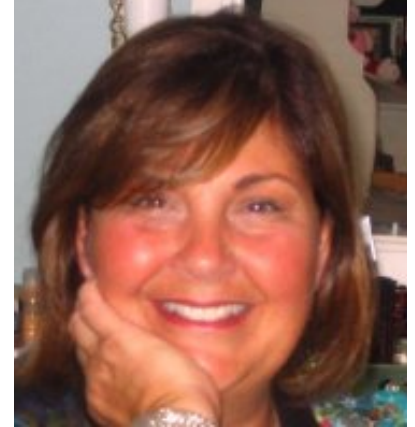
A month and half after the meeting, I received an email from CoxHealth stating that their emergency preparedness was put to a test— where an athlete was successfully recognized and treated for exertional heat stroke. Sarah Bankhead (ATC, athletic trainer at CoxHealth), who treated the athlete, recalls the day as follows: *When our athletes were putting away the blocking bags after practice, a coach noticed one of the athletes closing his eyes and beginning to fall over in the shed. The coach caught him and immediately called for help. The first coach to reach him checked his pulse and noticed shallow rapid breathing---. The head coach called 911 and the other two coaches started putting ice in the groin, neck, and armpit areas. I, the athletic trainer, soon came over with a rectal thermometer, inserted it, and got an initial temperature of 108 degrees Fahrenheit. After confirmation of exertional heat stroke, a tarp was immediately placed underneath the athlete and began to be filled with ice and water to start the cooling process before the emergency medical service arrived. We ensured that the athlete's temperature was cooled to 102 degrees Fahrenheit, and then the athlete was transported via ambulance for follow up evaluation. The athlete has made a full recovery with no deficits thanks to the quick actions of those above, an effective policy in place, and the Sports Safety Summit which prepared my coaches to respond.*

Personal Story

#06: MICHELE CIANCOLA SHARES HER STORY ABOUT HER SON,, JOSEPH PAUL CIANCOLA, WHO SUCCUMBED TO EXERTIONAL HEAT STROKE IN 2011. THIS ARTICLE IS ADOPTED FROM MS. CIANCOLA'S SPEECH.

My Name is Michele Ciancola

Thank you for the invitation to speak with you today. I want to share with you the circumstances surrounding my son's exertional heat stroke (EHS) event and the measures taken in the days that followed in the attempts to save his life. October 24, 2011, my twenty year old son, Joseph Paul Ciancola, a healthy, athletic young man with no prior health conditions collapsed on a New England college campus athletic field during a baseball strength and conditioning practice. He was a pitcher and this was the initial day of training. From what I know of the event, he ran 2.1 miles to the football stadium where he did 15 minutes of bleachers then ran another 2.1 miles and dropped to do



a one mile army crawl with the team down a gulley and back up. During this rigorous strength and conditioning workout, Joseph fell to his knees and told the strength and conditioning coach that something was wrong and he didn't feel right. Joseph tried to get up but began crawling in the wrong direction and then collapsed. During this time a player ran over to Joey and saw that he was foaming at the mouth and struggling. Joey opened his eyes for a final time, rolled over, turned to his teammates and said "finish without me boys". He obviously knew something was terribly wrong.

My son was ultimately taken to a local county hospital geographically closer to the university but once there, the decision was made to transport him to Rhode Island Hospital as they were equipped with a trauma unit. By this time, and before any real emergency treatment, his core body temperature was 106°F, he became afflicted with rhabdomyolysis (breakdown of muscle fibers that leads to kidney failure) and DIC (disseminated intravascular coagulation). By the time he arrived he was in multi-organ failure. I'm going to speak with you about the next few days of Joseph's life, the pain that he bore and his struggles while trying to survive this horrific ordeal. Over the next three days Joey was resuscitated four times, required 394 units of blood product due to DIC and bleeding, had compartmental syndrome with fasciotomy, laparotomy and right lung removal. This horrific chain of events provides you with a description of the pain that my young healthy son endured.

October 25, 2011

He had rhabdomyolysis, severe DIC and was in liver failure. While Joseph lay there struggling to survive his team mates brought in his iPod and headphones. When they put his headphones on and played his favorite music the heart rate monitor started to go crazy so the boys knew that he could hear the music. This brought me hope. Later that day, while he was being transported to have tests done, he rolled on his side and started pulling his tubes out of his mouth. The nurses immediately needed to stop and restrain him. They gave him more pain medication to sedate him. He was now in kidney failure. The doctors tried three different dialysis machines, each one failed as rhabdomyolysis and DIC set in and the muscle tissue was clogging the machine.

October 26th, 2011

Joseph coded and was resuscitated, which took them 8 minutes. Soon after, he squeezed his coach's hand as he prayed to him. He was responding. I had hope.

“This was an untimely death that I believe could have been prevented.”

October 27th, 2011

The family was gathered and told that Joseph had compartmental syndrome and his muscles needed to be debrided. He had only a 50 percent chance of surviving this procedure but without it he would certainly die. His 195 lb. body now weighed 312 lbs., due to bladder pressures and abdominal compartmental syndrome.

He required a fasciotomy of both arms and legs and his abdomen. This also led to a laparotomy and right lung removal. He was resuscitated three times during this procedure as I stood by his bedside. After almost three hours in surgery his pulmonary artery ruptured and the trauma team couldn't stop the bleeding. He lost his battle and died in my arms at 5:25 pm.

A few weeks after I buried Joey, I received a call from Rob Huggins from KSI stating he and Dr. Casa were at a conference in Rhode Island when Joey's death came across the news media. Rob encouraged me to call the medical examiner for his creatinine phosphokinase (CPK) blood results. When I called him back with the results of 190,540, he told me that I should have his death investigated for EHS. I am so grateful for his phone call. As a parent of two athletes, I wasn't educated on EHS. Since then, I've become so passionate with the research at KSI on how we can ensure that no other athlete and their family will ever experience the pain my family has gone through.

I chose to advocate through public and political conversation. In 2012, I worked with legislation to pass a bill which mandated immediate point of placement of an automated external defibrillator, or AED, to be on site at any state or private college/university within the state of CT; and also a provision that any athlete collapsing from apparent heat exertion or sports related collapse should be taken to a hospital with a trauma unit.

It is my hope that all athletic programs across the country make the following changes.

- An emergency action plan needs to be developed and practiced according to NCAA guidelines for EHS
- A thermistor—a rectal thermometer, should be used in order to validate core body temperature. These devices provide a safe, fast, and accurate assessment of core body temperature.
- Appropriate work to rest ratio
- Water breaks
- Ensuring opportunity for body cooling and have ample time to rehydrate
- Regulate the intensity of activity—the body needs to become acclimated to the volume of exercise
- A strength and conditioning coach and a sports medicine staff member should be part of the athletic administration. They will provide continuing education for the entire coaching staff and medical teams to recognize and manage medical emergencies to prevent sudden death in athletes.

This was an untimely death that I believe could have been prevented. Currently, the NCAA states that EHS is the third leading cause of on the field death in athletes.

Recognition of EHS and rapid cooling via whole body ice water immersion are the keys to survival. I want to thank you, as doctors and scientists, you are doing important work to understand and treat EHS. You are also helping to educate the public on the dangers of EHS and recommending practices and procedures for expediting diagnosis and intervention especially in young athletes. Again, I thank you for all you have done, but I also challenge you to continue researching to understand this condition and to continue to educate coaches and academic institutions so no other young athlete will suffer the same fate as my son.

SPOTLIGHT



RYAN CURTIS

MS, ATC, CSCS, CES

**ASSOCIATE DIRECTOR OF
ATHLETE PERFORMANCE AND
SAFETY**

KOREY STRINGER INSTITUTE

THE SPOTLIGHT SERIES FEATURES THE PEOPLE OF THE KSI, AND THOSE WHO SHARE AND REPRESENT THE PASSION OF THE KSI.

Could you tell us about yourself?

I am a husband, proud father, and Missouri native. Regarding my education and career, I have tried to focus equally on my passions of performance, medicine, and sport. After completing four years at Culver-Stockton College as a collegiate football player, athletic training student, and strength and conditioning intern, I transitioned to a graduate assistantship with the Kansas State University football and tennis teams. After completing a master's degree at KSU, I took dual role positions over the next 6 years as both a strength and conditioning coach and athletic trainer for the United States Marine Corps, United States Tennis Association, and for professional tennis players on the ATP/WTA Tour. At KSI, I serve as the Associate Director of Athlete Performance and Safety. My focus is on building sport and data science skillsets to bridge my experiences as an athlete and practitioner. During my free time, I enjoy all things fitness, Star Wars, and anything that makes my daughter smile.

Could you tell us about your first involvement/interaction with the Korey Stringer Institute?

While I had been aware of KSI and their efforts for several years, my first interaction was an interview with the staff at the 2015 NATA Convention. At the time, I was living out of suitcase about 35 weeks a year while traveling on the tennis tour. I knew this wasn't sustainable and when an opportunity opened at KSI/UConn, it was an easy decision to put in for the position. Completing a PhD has always been a lifelong goal of mine, however I wanted to study and work in an environment where research and education were on the cutting edge. KSI and UConn was a great fit for me.

In what ways has KSI impacted you?

The biggest impact for me has been the practical experience working on multiple projects of interest. Specifically, research within the areas of athlete monitoring and wearable technology, which have become natural extension of my passions for optimizing performance and mitigating injury risk. I feel fortunate to get hands-on experience functioning as a sport and data scientist daily, which I know is highly unique and very impactful for my career. I feel as though these experiences are really setting me up for success in the future. Additionally, I highly value the opportunity to work alongside highly intelligent and highly motivated staff and peers. The opportunity to learn from and beside others as passionate as me has been a privilege.

"Research within the areas of athlete monitoring and wearable technology, which have become natural extension of my passions for optimizing performance and mitigating injury risk."

Could you tell us about yourself?

My educational path has been chosen very purposefully, and has developed me into the athletic trainer I am today. I could not be happier with the choices I made, and my clear passion for the profession has traveled with me over the years. I grew up in Camas, Washington, and although I spent time all over the country, I made it back to Portland, OR. Though most athletic trainers had a prior injury introducing themselves to the profession, I on the other hand, was introduced by shadowing my high school athletic trainer. I attended the University of Idaho for undergrad, and during my time there, a passion and deep interest was bred for evidence based medicine and research. This prompted my decision to attend the University of Connecticut at the NEAG School of Education for my Master's degree in Kinesiology. However, my mother was not keen on the idea of me moving across the country. The time I spent here served as a great proponent in my professional development and was so eye opening for the prevention of sudden death in sport. I was able to be involved with so many opportunities with forward thinking individuals that was life changing. After this, I did an athletic training physician extender surgical residency at Emory University in Atlanta, GA. Here, I gained the tools to assist in orthopedic surgeries and see patients in a clinical setting to improve efficiency and increase patient satisfaction. I worked under well-renown orthopedic surgeons that helped indulge my need for knowledge. This propelled me to where I am today. 5 years ago, I was offered a position with Orthopedic + Fracture Specialists in Portland, OR that has allowed me professional development, direct involvement with the efficiency of the practice, and keeping community outreach alive. I have been involved with multiple local events and specifically with Lincoln High School in downtown Portland. So far, the time I've spent back in the Pacific Northwest has been enjoyable and eye opening to the differences of the east and west coast in healthcare, but both follow the same mantra: safety of our athletes needs to be our priority.

Could you tell us about your first involvement/interaction with the Korey Stringer Institute?

When I was first exposed to the Korey Stringer Institute, it was in 2011, and it was just an idea. The idea was being discussed amongst Doug Casa, Kelci Stringer, a few doctoral students and graduate students, and a couple of individuals who knew what it would take to help our ideas become a reality. I recall sitting around a conference room table throwing out ideas and finalizing the KSI logo. It almost had a focus group feel, and overall was very exciting. Doug Casa's enthusiasm is a bit contagious to say the least. I helped gather articles, organize the category of emergency conditions, and developed the initial KSI Wikipedia page. That specific task was a challenge for me personally, since I find even the navigation of a Smart TV difficult! Having the experience with the infancy of this institute and seeing where it is now has been both rewarding and enticing. I know from experience the work this institute produces and the trust I have in it. I have kept this close to me since then.

In what ways has KSI impacted you?

KSI is such an inspiring and integral aspect to many professionals in the sports medicine community. For me specifically, I have used it in the promotion and discussion of current practices to fellow colleagues. When I first moved back I spoke at our Northwest Athletic Training Association (NWATA) district meeting about the correct method of core body temperature assessment and how our weather shouldn't eliminate exertional heat stroke from possibility. I was very proud of what I learned, and eager to share. As an athletic trainer, I am taught to evaluate all situations I am in. I have a checklist of location of AED, environmental factors, and potential personal health issues whenever I'm covering an event. KSI has given me many tools to help prepare myself as a healthcare individual. I have been involved with raising funds for a 2 AEDs for a local school, and continue to dedicate efforts to purchase more for them. Just a couple months ago, I had the unfortunate event of experiencing death of an athlete. This was not your normal or typical scenario, but it really never is. I wasn't working, but playing flag football, when I witnessed a seizure. Without going into great detail, an AED was found, used, but ultimately the individual passed away. Despite immediate efforts, tragedy still occurs, and this specific event has allowed me to grow. Not only have I grown, but it gave me the opportunity to give consult to the organization about potential EAPs, AEDs, and PPEs. My education and the Korey Stringer Institute will always be a part of my professional endeavors. I thank Doug Casa and the staff for all they continue to do.



**JESSICA
MARTSCHINSKE**

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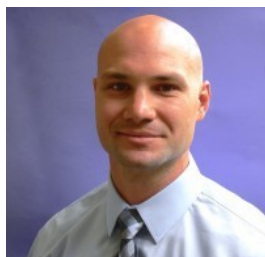
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Korey Stringer Institute. *Pertinacity*. 2017;3(2).

Editor-in-chief, Yuri Hosokawa, PhD, ATC

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