INTEGRATION OF HEALTH CARE IN SPORTS MEDICINE

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INTEGRATION

- Sports medicine chiropractors have reached the pinnacle of professional and amateur sports.
- The history of this path to the pinnacle required establishing diagnostic accuracy, better treatment outcomes, and the ability to work in a multi-disciplinary, integrated care environment.

INTEGRATION

- Historically, it was commonly believed that if a DC were to be in charge of medical care at a sporting event that MD’s, DO’s, and PT’s would be excluded.

EARLIEST INTEGRATION

- Tim Brown, DC became the first DC appointed as Director of Sports Medicine for a sport, which was Beach Volleyball. The organization was the Association of Volleyball Professionals (AVP), which functions under USA Volleyball (NGB).

EARLIEST INTEGRATION

- Tim Brown made the event medical tent inclusive of all specialties for the benefit of the athlete.
- For the first time, sports medicine DC’s worked side-by-side with orthopedic surgeons, internists, physiatrists, physical therapists and athletic trainers.
Several outcomes derived from this:

1) The athletes were very happy with the level of care they desired and required to have peak performance.
2) The allied medical specialties saw that the most utilized health care personnel in the medical tent were the sports medicine chiropractors.
3) The various specialties learned to work together in the athlete’s best interest.

As Tim Brown became busier, he had Doug Andersen, DC, DACBSP® take over as Medical Director of the AVP.

Doug Andersen served in this role for over ten years. Andersen began making standards for the DC’s to provide care on-site.

The AVP model was an ideal for other sports organizations to follow.

Tim Brown became the Western Hemisphere Co-Medical Director of the Association of Surfing Professionals (ASP).

Tim brought the successful integrated care model with him to major international surfing events.

Mike Reed, DC, DACBSP® became the Director of Sports Medicine for USA Weightlifting.

Once Mike Reed fully developed the relationships and the roles of a DC while he was Medical Director for US National Championships, World Championships, Olympic Trials and Olympic Games for weightlifting, he also expanded the staff to include more sports med chiropractors, sports med orthopedic surgeons, physical therapists and athletic trainers.
Jeremy Summers, DC, CCSP, ATC recently became the Director of Sports Medicine for US Fencing. Jeremy Summers fully understood the needs of the fencers as he was an alternate for the US 2000 Olympic Team. He is developing medical teams to cover these very large events (2013 US National Championships had 7,000 competitors). He is also trying to build a network of multi-disciplinary providers around the country for these athletes.

NFL players continually sought chiropractic care. The care sometimes produced “hit and miss” results.

A few NFL teams began placing sports medicine chiropractors on their medical staff. Some were “official” positions and others were “unofficial”.

This concept grew rapidly.

Today, every NFL team has a sports medicine chiropractor in either an official or unofficial position. These DC’s formed the Professional Football Chiropractic Society and they now meet annually at the NFL Combine.

Many NCAA universities are incorporating sports medicine DC’s, but this will be a long process. USC hired Ed Scale, DC, DACBSP® ten years ago to support their teams.

The National Hockey League Collective Bargaining Agreement (CBA) indicated that the home team must provide a chiropractor to the visiting team upon their request, even if the home team did not have a Team Chiropractor.
IN VolvEmEnt AT thE OLymPIC LevEl

- Leroy Perry, DC treated many athletes in the 1960’s, 1970’s and 1980’s.
- Personal and organizational politics prevented Perry from going to the Olympics for the USA.
- Perry represented several other countries from 1968 until the early 1980s. Perry kept his doors open for any athlete, regardless of their country, who wanted his care. This is no longer permissible in the Olympic Games.

INTEGRATION AT THE OLymPIC LevEl

- George Goodheart, DC became the first DC selected to go to the Olympic Games for Team USA. Goodheart was selected in 1979 for the 1980 Games.
- The USA, and some of its allies, boycotted the 1980 Olympic Games in Moscow, so Dr. Goodheart never actually served as the first Olympic Chiropractor.

INTEGRATION AT THE OLymPIC LevEl

- Eileen Hayworth, DC became the first DC selected to actually serve as the first Olympic Chiropractor in 1984 in Los Angeles.
- Dr. Hayworth still practices in Santa Monica, CA with her husband, Dan Altculer, DPM.
- Chiropractors have served in an official capacity in every Olympic Games since Goodheart and Hayworth. The Winter Olympic coverage for chiropractors began in 1998.

INTEGRATION AT THE OLymPIC LevEl

- Mike Reed, DC, DACBSP® left USA Weightlifting to become the first DC to be Director of Sports Medicine for the United States Olympic Committee. It was Reed’s integrated care at international and national weightlifting events that drew the attention of the USOC.
- Bill Moreau, DC, DACBSP® became the second DC to be Director of Sports Medicine for the USOC, and he currently holds this position.

CHIROPRACTIC Sports MEDICINE

- What is the difference between a general chiropractor versus a sports medicine chiropractor?

- Are there skill sets that are unique to sports medicine?

- The answer is “Yes, there are unique skill sets required and there are differences”.

CHIROPRACTIC Sports MEDICINE

- The need for a sports medicine specialized chiropractor arose for DC’s to have skills including:
  - manipulative skills,
  - ability to identify and manage concussions,
  - knowledge of trauma radiology,
  - identify and manage dehydration,
  - identify and manage heat exhaustion and heat stroke,
CHIROPRACTIC SPORTS MEDICINE
› provide soft tissue manipulative techniques,
› provide stretching and taping techniques,
› rehabilitation for various sports demands,
› understand the basic concepts of strength and conditioning, overtraining, and recovery,
› understand basic concepts in nutrition and understand how this field will require special knowledge related to the anti-doping regulations (USADA & WADA),

CHIROPRACTIC SPORTS MEDICINE
› understand epidemiology of various sports injury patterns.
› be able to work in an integrated, multi-disciplinary environment, and role in a team or individual sport setting,

CHIROPRACTIC SPORTS MEDICINE
› This need for sports medicine knowledgeable DC’s led to the formation of the American Chiropractic Board of Sports Physicians (acbsp.com), which created the certification Certified Chiropractic Sports Physician/Practitioner in the late 1970’s.
› The higher certification, Diplomate of the American Chiropractic Board of Sports Physicians, started in 1990.

INTEGRATION OF SPORTS MEDICINE
› Integration of health care does not simply mean having a working relationship with one extremity orthopedic surgeon.
› True integration involves a seamless network of multiple specialties and multiple disciplines that actually interact with each other in the best interest of the patient. This is true sports medicine.

INTEGRATION OF SPORTS MEDICINE
› Specialties needed for integrated care include:
  1) radiology (musculoskeletal and neuroradiology),
  2) orthopedic surgery (shoulder, knee, foot & ankle, wrist & hand, pediatric, joint replacement),
  3) neurosurgery,
  4) pain management (acute and chronic),
  5) internal medicine,
  6) neurology,
  7) cardiology,
  8) sports/performance psychology, psychology, psychiatry,
  9) podiatry.
Disciplines for perspective, data and knowledge include:
1) physical therapy,
2) athletic training,
3) strength and conditioning,
4) coaching (sport, position),
5) evidence-based nutrition,
6) researchers in mTBI, biomechanics, exercise physiology, motor learning, and radiology.
7) support groups (e.g. 12-step programs, trauma support groups, eating disorders, etc.)

I believe the field of sports medicine put DC’s in a position to learn to integrate care earlier, both individually and also collectively to push chiropractic sports medicine integration further.

The athletes are usually seeing multiple specialists already. Communication between specialties is expected by the athlete, and they are frustrated when there is no communication.

The "quarterback" role places the sports medicine chiropractor as the center of the case management with all specialties, subspecialties and disciplines communicating with the DC.

The sports medicine chiropractor can also ascertain which specialists will work together for the best interest of the patient.

The DC can lead the integration of care.

The chiropractor can hold a very unique position in integrated sports medicine.

Most specialties are focused on their narrow perspective, which is entirely reasonable.

The sports medicine chiropractor can serve as the "quarterback" of the sports medicine team for the athlete.

Information from various specialties and disciplines can be interpreted and communicated back to the patient/athlete.

The sports medicine chiropractor can serve many roles to the benefit of the athlete.
INTEGRATION OF SPORTS MEDICINE

- This effective, integrated network will further develop by reputation amongst athletes, and referrals from the athletes, agents, and coaches.
- High-level quality of care is the best practice building tool.

INTEGRATION OF SPORTS MEDICINE

- The amateur or professional team sports medicine team is a bit more complex.
- As of this date, there is no major professional team or elite university which has a sports medicine DC as Medical Director. Interviews have taken place for this position, but have not come to fruition yet.

TEAM MEDICAL STAFF INTEGRATION

- Clinical diagnostic skills
- Concussion/mTBI
- Dehydration/rehydration
- Heat exhaustion/heat syncope/heat stroke
- Hypothermia
- Trauma/cervical spine/spine board
- Soft tissue mobilization
- Taping
- Therapeutic stretching
There are 1.6 to 3.0 million concussions each year (CDC 2006).

Previously reported to be 300,000 cases annually.

This new number is most likely underreported as well.

Not uncommon from MVA’s or falls in the non-sports population.

Pt should present with concussion-like symptoms (to be discussed in following material).

Pt may have an intracranial bleed (usually epidural or subdural hemorrhage).

In dozens of states, general practice DC’s have had their right to diagnose and manage concussions revoked. Too many general practice DC’s either don’t diagnose sufficiently, or certainly don’t know how to diagnose or manage a concussion.

The state of Washington and Alaska have reversed this position. These states now permit CCSP’s and DACBSP’s to diagnose and manage concussions.

Colorado revoked the diagnosis and management of concussions for general practice DC’s but allowed DC’s working at the Olympic Training to diagnose and manage concussions. These two DC’s have their DACBSP® certification.

The ACA is now pushing to change the Colorado law to include any current CCSP or DACBSP® in Colorado, since precedence has been established in CO.

More states will be addressed by the ACA to reverse this position on concussion management by CCSP’s and DACBSP’s.
The clinical diagnostic ability of a sports medicine chiropractor is critical and mandatory for the management of concussions. These diagnostic and management skills separate the sports medicine DC from the rest of the profession. State governments are recognizing this (Washington, Alaska, Colorado for now).

Pt may have an intracranial bleed (usually epidural or subdural hemorrhage). If a hemorrhage is suspected, then a stat CT scan is required. CT will reveal hemorrhage and can be obtained quickly (both scheduling and the scan).

Possible f/u MR scan.

Transient disturbance of brain function. Has a variety of definitions. Easy to recognize, difficult to define.

Pts do not need to have direct head trauma to have a concussion.

Rapid acceleration and deceleration of the head and neck can cause the brain to impact against one side of the cranium then the other.

Rotary forces can be worse. Can cause diffuse axonal injury (tearing).

Disturbance of brain function is (largely) related to: neurometabolic dysfunction, rather than structural injury, typically associated with normal structural neuroimaging findings (i.e., CT scan, MRI).

Concussion may or may not involve a loss of consciousness (LOC) (< 10–20%) (CDC Heads Up: Brain Injury in Your Practice 2007).

When taking a hx, a number of clinical issues will manifest:

Retrograde amnesia
Pt may not recall the accident or time preceding the accident/injury.
CONCUSSION SYMPTOMS

• When taking a hx, a number of clinical issues will manifest:
  
  • Confusion
    Pt appears to be easily overwhelmed and is not clear on his/her purpose or actions. Key criteria in the now obsolete AAN Guideline.

• When taking a hx, a number of clinical issues will manifest:
  
  • Cognitive deficits
    Simple tasks are not able to be performed, or they take much more time. Pt may report this (if asked) with regard to tasks at work or school.

• When taking a hx, a number of clinical issues will manifest:
  
  • Emotionality
    Pt may have inappropriate emotional outbreaks or responses. Pt may suddenly cry. Very typical of head trauma.

• When taking a hx, a number of clinical issues will manifest:
  
  • Word searching
    Pt often stops speaking while trying to find the next word they wish to use. Pt cannot think of the word. Pt becomes frustrated which only appears to make the situation worse.

• When taking a hx, a number of clinical issues will manifest:
  
  • Loss of mental focus
    Pt may stop in the middle of a sentence and forgets what he/she was talking about. This usually happens repeatedly.

• When taking a hx, a number of clinical issues will manifest:
  
  • Fatigue
    Common complaint of concussed pts. Fatigue is perceived without any exertion. Very frustrating for pts.
When taking a hx, a number of clinical issues will manifest:

- **Vertigo**
  Pt will describe vertigo. This may be exacerbated with exertion (exertional vertigo). May be subjective or objective vertigo.

When taking a hx, a number of clinical issues will manifest:

- **Headaches**
  Very common after concussions. Will usually exacerbate with exertion (exertional headaches).

Simplification of concussion symptoms categories can help make the diagnosis more simple.

**PHYSICAL**
- Headache
- Fatigue
- Dizziness
- Sensitivity to light/sound
- Nausea
- Balance difficulties

**EMOTIONAL**
- Irritability
- Sadness
- Feeling more emotional
- Nervousness

There is no absolute consensus on management of concussions.

There have been eight guidelines in the last twenty-five years.

Hence, the information is continually changing. Doctors must keep up with the changes through high-quality continuing education.
CONCUSSION GUIDELINES

- Colorado Guideline (J. Kelly, et. al., approx 1994).
- Prague International Conference 2, 2004
- Zurich International Conference 3, 2008

Zurich Consensus is the most current thinking on mild traumatic brain injury (mTBI).

- The conclusion is our knowledge of traumatic brain injury is evolving.

CONCUSSIONS

- Concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Several common features that incorporate clinical, pathologic, and biomechanical injury constructs that may be utilized in defining the nature of a concussive head injury include:

- Concussion typically results in the rapid onset of short-lived impairment of neurologic function that resolves spontaneously.

- Concussion may result in neurometabolic changes, but the acute clinical symptoms largely reflect a functional disturbance rather than a structural injury (except for diffuse axonal injury).

- Concussion results in a graded set of clinical symptoms that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course; however, it is important to note that in a small percentage of cases, post-concussive symptoms may be prolonged.
CLASSIFICATION OF CONCUSSIONS

- Classification of concussions
- American Academy of Neurology has three grades, as did Cantu/ACSM and the Colorado Guidelines.
- Vienna Guideline suggesting abandonment of the grading system and refer to concussions as mild or complex.

CLASSIFICATION OF CONCUSSIONS

- Classification of concussions continued:
  - Zurich Consensus recommends abandoning the mild and complex classification.
  - There was unanimous consensus that 80%-90% of concussions resolved in 7-10 days.

PEDIATRIC CONCUSSION

- Should we manage pediatric concussion cases the same as adults?
  - No. Err on the side of conservative with pediatric cases. Their brains are still developing and the effect may be more pronounced. Recovery may take longer in pediatric cases.

PEDIATRIC CONCUSSION

- Children have difficulty with a 0-7 scale of a question.
  - Better to give children a binary scale (e.g. does your head hurt? Yes or No? Do you feel dizzy? Yes or No?)
  - It is never appropriate to RTP a child or adolescent athlete the same day as the injury (Cantu, USOC Concussion Conference 2011).

PEDIATRIC CONCUSSION

- Should we manage pediatric concussion cases the same as adults?
- The panel strongly endorsed the view that children should not be returned to practice or play until clinically completely symptom free, which may require a longer time frame than for adults.
  - In addition, the concept of “cognitive rest” was highlighted.
COGNITIVE REST

- Cognitive rest has special reference to a child’s need to limit exertion with activities of daily living and to limit scholastic and other cognitive stressors (e.g., text messaging, video games, computer use, television, etc.) while symptomatic. School attendance and activities may also need to be modified to avoid provocation of symptoms (British Journal of Sports Medicine 2009 43 (Suppl I) i76-i84).

MANAGEMENT OF PEDIATRIC CONCUSSION

- It is difficult to keep a child still. As the child improves, a graded approach can be used, (e.g., 10 min of videogames per hour IF THIS DOES NOT EXACERBATE ANY SYMPTOMS).

CONCUSSIONS IN FEMALES

- Being female is a possible modifier in the management of concussion was discussed at length by the Zurich panel. There was not a unanimous agreement that the current published research evidence is conclusive that this should be included as a modifying factor, although it was accepted that sex may be a risk factor for injury and/or influence injury severity.

- Females have less strength and muscle mass in the cervical spine. Therefore, there is less ability to decelerate head movement during traumatic forces.

- Females have 50% less isometric strength, 23% less neck girth, 50% greater head-neck peak angular acceleration (Tierney et al. 2005).

CONCUSSIONS IN FEMALES

- 178,000 females participate in NCAA sports (DeHass 2009).
- 3,000,000 females participate in high school sports.

CONCussion

- NCAA Injury Surveillance Survey
### MALE/FEMALE CONCUSSION OCCURRENCE

<table>
<thead>
<tr>
<th>Men's Sports</th>
<th>Women's Sports</th>
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<tbody>
<tr>
<td>Football 6.0%</td>
<td>Ice hockey 18.3%</td>
</tr>
<tr>
<td>Ice hockey 7.9%</td>
<td>Soccer 5.3%</td>
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<tr>
<td>Soccer 3.9%</td>
<td>Basketball 4.7%</td>
</tr>
<tr>
<td>Basketball 3.2%</td>
<td>Softball 4.3%</td>
</tr>
<tr>
<td>Baseball 2.5%</td>
<td>Lacrosse 6.3%</td>
</tr>
</tbody>
</table>

Lincoln et. al., AJSM 2011


<table>
<thead>
<tr>
<th>Boy's Sports</th>
<th>Girl's Sports</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football 8%</td>
<td>Cheerleading 26%</td>
</tr>
<tr>
<td>Wrestling 27%</td>
<td>Field hockey 20%</td>
</tr>
<tr>
<td>Soccer 13%</td>
<td>Soccer 17%</td>
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<tr>
<td>Basketball 17%</td>
<td>Basketball 24%</td>
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<td>Lacrosse 17%</td>
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</table>

Lincoln et. al., AJSM 2011

### CONCUSSION

- Risk of concussion directly related to amount of head acceleration (linear and angular) during force application (Gennarelli et al. 1982).
- Females may have greater head acceleration secondary to less neck muscle mass and neck strength.

### DEHYDRATION/REHYDRATION

### DEHYDRATION

- Dehydration is a problem that most sports medicine DC’s must contend with at various levels of sports competition, from recreational athletes to elite athletes.
- Dehydration is preventable. There is no excuse for dehydration.
- Those athletes who have dehydration problems usually don’t drink as much as they perceive.
- Pre-hydration can be a useful tool.
DEHYDRATION

“I would always drink on Saturday morning for the finals on Sunday afternoon”.

Sinjin Smith
All-Time Pro Beach Volleyball winner -- 149 wins

Note: Sinjin never experienced dehydration during his career. Players often had IV solutions during last day of tournament.

Sinjin Smith hydrating at a tournament.

DEHYDRATION

› Athletes can lose more fluid and electrolytes, especially sodium much faster than one would think.

› Thirst is a poor marker to use. The thirst mechanism follows dehydration.

› Once the athlete perceives thirst during the event, it is too late. The athlete is already dehydrated.

DEHYDRATION

› Athlete will lose fluid faster than the body can absorb fluid.

› Fluid intake must be deliberate and planned. Use training weeks and months to determine how the athlete will feel with the intake.

› “Use practice to practice”. Don’t wait to the event to practice any modulation of performance factors, including altered fluid intake.

DEHYDRATION

› Weigh yourself before and after training.

› Weight loss will be fluid loss.

› An effective method of addressing the fluid loss is to replace the lost fluid within 6 hours of the completion of the fluid loss.

DEHYDRATION

› For example, if you lose 6 lbs. during a training session, you should replace this with 16 ounces of fluid per pound lost or “a pint per pound” (as Doug Andersen and Tim Brown state) if the next day is not a particularly difficult day of training or competition.

› If the next day is a tough training day too, consume 24 ounces of fluid per pound lost within 6 hours.
All the fluid intake should not be water alone. If you lose a great deal of fluid and replace it with water alone, you can dilute the sodium levels in your blood and you can develop hyponatremia.

Fluid intake prior to, or during competition should not have a high sugar intake. The more concentrated the fluid, the longer it will take to leave the stomach (gastric emptying).

Dilute the sports drink before and during competition and training.

Drink more concentrated solutions after training to replace glycogen stores in muscle and liver, and to replace fluid and electrolyte levels.

Prehydration may be necessary for some.

Drink 16 ounces of fluid per hour for three hours before competition. Athlete will lose 50% to urine output, but is still 24 ounces ahead.

Drink comfortably and regularly during competition.

There is no excuse for dehydration. It is the result of bad planning with the exception of unusual circumstances (triple overtime in a team sport).

Some athletes require sodium supplementation such as Thermotabs, or simply salting their foods more and selecting foods with a higher sodium level.

WARNING: This applies to athletes who are in good condition and good health and have dehydration issues. This is a bad idea for anyone with high blood pressure or CHF (not a triathlon population).

"Sports drinks are a good idea for athletes in hard training. Sports drinks are a bad idea for people sitting on their couch watching sports."

-- Doug Andersen, DC, DACBSP®
Certified Clinical Nutritionist
2000 OLYMPICS

- Suzy Hamilton collapsed on last turn of last lap of 1500m race.
- Dehydration in the 1500m final ended her quest for an Olympic medal.
- Retrospective view: Hamilton dehydrated during flight to Australia. Taking ibuprofen (more dehydration). She reports after collapsing that she has had little urine output and it was dark. Conclusion: There was ample evidence of dehydration which could have been managed.

NO EXCUSE FOR DEHYDRATION

DEHYDRATION

SUMMARY
- Monitor weight loss at event, competition or training.
- Many athletes overestimate their fluid intake.
- Symptoms can include loss of power, fatigue, decreased concentration, overheating, muscle cramping, abdominal cramping, overheating, decreased blood volume therefore increased workload on heart; decreased synovial fluid.
- By the time the athlete is thirsty, it is too late . . . the athlete is already dehydrated. The thirst mechanism follows dehydration.

DEHYDRATION

SUMMARY
- Replace one pound of weight loss with 16 ounces of fluid within 6 hours.
- Replace one pound of weight loss with 24 ounces of fluid within 6 hours if there are back-to-back games (Tim Brown, DC & G. Douglas Andersen, DC, CCN).
- Pre-hydration may be required.
- Sodium supplementation may be required.

DEHYDRATION

SUMMARY
- Concentrated fluids will delay gastric emptying.
- Use dilute fluids before and during event.
- Use more concentrated fluids after event.
- No insulin spike for two hours after severe exercise.
- Depleted glycogen is restored without insulin.

HEAT INJURIES
HEAT INJURY
Heat injuries are common in:
- Athletes
- farmers
- farm laborers (recent death in fields in Central California)
- laborers
- any others with compromised thermal regulation or prior heat-related illness.

FORMS OF HEAT INJURY
- Heat Cramps
- Heat Syncope
- Heat Exhaustion
- Heat Stroke

ACCLIMATIZATION
- Athletes who will exercise in a hot, or hot & humid, environment require adaptation and monitoring. Communication with the coach is ideal.
- Athletes should have repeated graded exposure to exercise during warm periods.
- The primary change with acclimatization is achieved through changes in the circulatory system. The system becomes more efficient with a graded exposure.

ACCLIMATIZATION
- Advise the athlete (and coach if possible) to:
  - Take plenty of rest periods for heat dispersal,
  - Drink plenty of water to minimize dehydration,
  - Wear light colored clothing and lightweight clothing if possible (communication with coaches may be needed)
  - Practice in early morning or late afternoon.
- The acclimatization will require at least 4-7 days.

ACCLIMATIZATION
- Some sports have pads and equipment (e.g. hockey and football) which slows the dispersal of body heat.
- Body heat rises which leads to more sweating to cool the body, which causes more dehydration, which makes the system more inefficient and diminishes power output and mental focus.
- NHL goalies can lose 7–12 lbs. in a game (3-period game), more in overtime.

ACCLIMATIZATION
- Football (professional, college and high school) training camps are held in the summer. Heavy clothing and pads in the summer sun and humidity can lead to difficulties from poor heat acclimatization.
HEAT CRAMPS
- The most common heat related injury
- A form of muscle spasm
- Typically an early season game played on a hot humid night or day game.
- The athlete may have had multiple practices per day in camp and may have a starting position with many plays per game.

HEAT CRAMPS
- Cramping may occur in:
  - calf
  - thigh (hamstring and quadriceps)
  - abdominal muscles (typical of dehydration). Weigh the athlete if possible.

HEAT CRAMPS
- Caused by heavy sweating, which produced fluid and sodium loss.
- If the athlete drinks a large volume of water without electrolytes, he/she may develop hyponatremia. A low salt intake may also contribute to hyponatremia. Symptoms could include nausea, vomiting, confusion, loss of energy, cramps, seizures, LOC, coma.

WHICH SPORTS ARE MORE AT RISK?
- The obvious sports are football, hockey, soccer, marathon, triathlons and cycling. Tournaments with multiple games can be problematic.
- There are susceptible sports you may not have considered: volleyball and basketball (indoor facilities may be warm), beach volleyball (sand thermometers can read 122° F plus high humidity), wrestling (making weight, but rules changed for the better).

WHICH ATHLETES ARE AT RISK?
- Athletes unacclimatized to heat
- Athletes using diuretics (fluid loss)
- Heavy athletes (overheat easily, e.g. linemen)
- Recently sick (fever leading to dehydration)
- Equipment related issues (pads and equipment = poor heat dispersal, e.g. hockey goalies)
- Poorly conditioned athlete (cardiopulmonary and cardiovascular conditioning not developed yet)
- Individuals who had prior heat injury (more susceptible)

TREATMENT OF HEAT CRAMPS
- Termination of sport activity/participation
- Move the athlete to a cool place (shade of medical tent or indoors)
- Cool saline solution (Gatorade-like products)
- Calm and reassure the patient
- Gentle stretching and rest
- IV therapy may be needed if the S/S do not resolve (used more often than one would think)
TREATMENT OF HEAT CRAMPS

- Serial examinations on the sideline/medical tent are mandatory to monitor for clinical decline of the patient.

HEAT SYNOCOPE

- Characterized by a loss of consciousness in an athlete who suddenly stops exercising.
- Secondary to maximum vasodilatation especially in the dehydrated athlete.
- Venous pooling in the extremities
- Leads to the subsequent light-headedness or fainting

HEAT SYNOCOPE

Treatment includes:

1. Lay the athlete down and elevating their feet at the episode
2. Make sure the athlete is adequately hydrated
3. Make sure the athlete is properly acclimatized for prevention
4. Emphasizes the cool down periods for prevention.

HEAT EXHAUSTION

- Shock caused by a high core body temperature
- Secondary to exertion in hot weather and the resultant water depletion
- Some believe that this disorder is an early stage of heat stroke

HEAT EXHAUSTION

The onset may be over the course of hours to a few days

- This is the reason that weight charts are so important. Dehydration is an integral component. Tracking weight loss will help prevent the athlete from reaching heat exhaustion.

- Weight charts are one of the most simple, readily available and successful tools in managing dehydration.

- Weigh the athlete before and after every practice and game.

- The weight loss during practice and games is fluid loss.

- The weight chart allows the doctor to know how much fluid the athlete needs and allows a broad overview of the weight loss tendencies of the athlete.
**HEAT EXHAUSTION**

- Some coaches will use the weight chart against the athlete (especially against female athletes).
- If so, chart only the weight loss during the practice and game, not the actual starting and ending bodyweight.
- The athletes will usually comply with this approach.

**HEAT EXHAUSTION SIGNS & SYMPTOMS**

The signs and symptoms may include:

- 1. profuse sweating
- 2. dizziness
- 3. exhaustion
- 4. elevated temperature
- 5. headache
- 6. weakness
- 7. rapid shallow breathing
- 8. decreased urinary output

**HEAT EXHAUSTION SIGNS AND SYMPTOMS**

- 9. altered mental state is possible, but not the norm
- 10. heat cramps
- 11. tachycardia
- 12. orthostatic hypotension
- 13. myalgia
- 14. vomiting
- 15. diarrhea
- 16. tingling in the extremities
- 17. temperature slightly elevated to 103°F

**TREATMENT**

1. All the care used for heat cramps
2. Rapid cooling
   - fans (if available)
   - ice over major vessels
   - remove heavy clothing & pads to improve heat dispersal
3. Hypotonic oral fluids
4. Treat for shock
5. Transport

**HEAT STROKE**

- A true medical emergency
- High mortality and a high morbidity rate.
- The second leading cause of fatalities in football

**HEAT STROKE**

- Cardiac output is decreased to the point that sweat production is stopped with a subsequent elevation in the core temperature that may lead to vascular failure.
HEAT STROKE

- Body core temperature of greater than 105° F.
- This injury is potentially fatal due to the body's inability to regulate the core temperature

HEAT STROKE SIGNS & SYMPTOMS

- The athlete typically has hot, red, dry skin, but this is not always present
- rapid deep respirations
- tachycardia
- confusion
- behavior alterations
  - confusion
  - disorientation
  - agitation
  - hysterical behavior

WHAT ABOUT SWEATING?

- 50% of patients with heat stroke will be sweating
- Significant mental status alterations are the best method of evaluating these injuries in the field
- Rectal temperatures are also useful, but somewhat impractical in the field setting

HEAT STROKE TREATMENT

- Rapid and immediate cooling of the athlete to prevent cardiovascular or CNS collapse.

HEAT STROKE TREATMENT

1. Activate (EMS) emergency medical service immediately
2. External cooling should begin on site with ice packs placed at the neck, axilla, wrist, and groin (cooling of large vessels to decrease body temperature)
3. Use fans if available. This should be planned before the season begins.
4. Monitor core temperature and vitals (serial monitoring). Don't leave the patient.
5. Watch for vomiting.
6. Systemic support (O2, airway, etc.) as needed. Be prepared.
7. Preparation for these conditions must be planned before the season begins.
HEAT STROKE VS EXHAUSTION

- The mortality of severe heat injury is closely related to the amount of hyperthermia.
- A delay in cooling increases the risk of serious injury.

SKILL SETS

- These examples: concussion, dehydration/rehydration, and heat injuries are just a few skills that a sports medicine chiropractor needs that a general practice DC does not require (except for concussions from MVA’s and falls).

EMERGENCY MANAGEMENT

- These additional conditions are not usually encountered by the general practice DC:
  - Ability to manage spine trauma, primary and secondary surveys, CPR.
  - Work with other medical staff on the field. Must be prepared in advance.
  - Plans need to be worked out before a problem occurs.
  - Always walk the perimeter and field before the event.
- But these are topics for another day.

THANK YOU