

# clinical conduit

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## Upcoming Courses for 2014

Advanced Manual Therapy Series  
Clinical Orthopedic Rehab Education

Part 5: The Lower Quarter—Oct 11-12, 2014  
(Leg, Ankle, and Foot) - ONE SPOT LEFT

2015 dates should be available  
in November

A detailed description of the course content and learning objectives is available at our web site — [www.continuing-ed.cc](http://www.continuing-ed.cc)

Single course attendance is allowed on a space-available basis

## Texas Summers and Heat Illness Prevention Strategies



While we've enjoyed relatively "mild" temperatures this summer it is still that time of the year when extreme caution (and preparation) are needed for those exercising in outdoors. There are basically five classifications of heat illness derived from exercise exertion. They include:

- 1) Exercise-Associated Muscle Cramps
- 2) Heat Syncope
- 3) Heat Exhaustion
- 4) Heat Stroke
- 5) Exertional Hyponatremia

These are listed in order of severity and generally differentiated based on body core temperature and the severity of symptoms or level of consciousness.

Heat cramps and syncope do not necessarily have elevated body temperatures but represent electrolyte imbalances, fluid deficiency, and/or fatigue. With heat exhaustion the core temperature is elevated but still under 104° F while with heat stroke the core temperature is now over 104° with the presence of life-threatening physiological changes and pending organ failure. Hyponatremia actually represents "hyper" hydration (water intoxication or excessive sodium loss). This usually only happens with prolonged levels of exercise (marathon type events) where the participant drinks too much fluid.

The best treatment for heat illness is to prevent its occurrence. There are a number of suggestions for athletes to help reduce the risk of heat-related problems.

- Immediate and convenient access to ice bags, ice towels, rectal thermometers, and ice pool baths

- Acclimatize for 10-14 days
- Match fluid intake with sweat and urine loss
- Monitor body weight day-to-day (should not exceed 2% loss)
- Adhere to weather guidelines for participation modification (cancel activities at wet bulb globe temperatures > 28° C which generally equates to conditions in which the summed ambient temperature and humidity exceed 130-140° F.
- Provide frequent rest and water breaks – breaks every 15-30 minutes whether thirsty or not)
- Pre-hydrate with 16 fluid ounces (500-600 ml) 2-3 hours prior to activity and 8 fluid ounces (200-300 ml) during every 15 minutes of intense exercise
- Wear loose fitting, absorbent, lighter color, mesh materials (dri-fit)

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## Cost Effectiveness of Preventing Ankle Sprains?

In the last issue I reviewed an article from the *Journal of Bone and Joint Surgery* regarding the cost efficacy of preventing ACL injuries. This month I want to discuss the findings from a recent article in the *American Journal of Sports Medicine* that studied the "economics" of preventing recurrent ankle sprains. Lateral ankle sprains are notorious for recurrence and most physical therapists and athletic trainers advocate for neuromuscular retraining and bracing as a means to prevent further injury. In other words, from a prophylactic standpoint, what is the cost-effectiveness of preventing subsequent sprains? Previous research has established that either neuromuscular retraining or bracing should reduce the risk by approximately 50%.

The study was a prospective, three-arm trial to evaluate the economic cost (and result) of bracing, home-based neuromuscular re-training, or both. Participants were randomly allocated to one of the three groups - Aircast A60 Ankle Support, balance board neuromuscular retraining, or both. The ..



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## Heat Illness Prevention Guidelines continued ...

### REFERENCE

Binkley HM et al. National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses. *J Athl Train.* 2002; 37(3):329-343

There are a number of non-environmental factors that also increase your risk for heat-related illness. These include medical conditions that predispose you to dehydration, recent illness (where you suffered with vomiting or diarrhea), or excessive alcohol or caffeine use. Both children and the elderly are also at greater risk for heat illness. Children have a proportionally smaller surface area for sweat evaporation while seniors will increase their heart rate 1 beat/minute for every degree over 75° when exercising outside. Obviously, regular hydration is absolutely critical in these populations.



Should you have a patient suffer heat illness here is a brief review of important treatment considerations:

**Heat Cramps** – stop exercising and replace lost fluids with a sodium-containing beverage. Provide mild stretching in a recumbent position while massaging the “cramping” muscles. Some advocate an acupressure “lip pinch”.

**Heat Syncope** – move the athlete to a shaded (or cooler) area and place in a recumbent position. Begin rehydration while monitoring vital signs.

**Exercise-associated Heat Exhaustion** - Assess core temperature via a rectal thermometer if possible. Remove as much clothing as possible to enhance skin evaporation. Cool the athlete with fans, ice towels, or ice bags in cool or shaded environment while starting fluid replacement and monitoring CNS status.

**Heat Stroke** – this is a medical emergency where you must lower body temperature as quickly as possible via a circulating ice bath or pool. Arrange for emergency transport while monitoring vital signs and cognitive status.

**Exertional Hyponatremia** - if serum sodium level drops below 130-135 mmol/L you should arrange for immediate emergency transfer where IV meds can be provided to increase sodium levels. In the meantime induce diuresis if possible and do not provide any further fluids



## Question of the Month Fluid Replacement during Exercise

*What about sports drinks – should they be used for fluid replacement instead of water?*



That is a tough question that has been debated for years. Generally speaking, water is perfectly adequate in providing fluid replacement secondary to sweat loss while exercising in the heat. We know that at about a 3% body weight loss the risk for heat-related illness begins to increase and at about 5% physical performance will begin to become notably compromised. Other indicators of an athlete’s hydration status is the visual assessment of their urine color or through urine specific gravity testing. Urine color is graded on a 9 shade spectrums with lighter colors indicating proper hydration and darker or more golden colors indicating a more dehydrated status.

I don't personally think that events that are less than about 45

minutes in length require a drink that contains electrolytes or carbohydrates (CHO) during the activity. However, energy drinks or electrolyte replacement beverages may be necessary if exercising for longer periods of time or at the conclusion of the event. The ideal CHO dilution for energy drinks is about 6%. A concentration of > 8% (especially if high in fructose) will compromise fluid emptying from the stomach. Obviously, drinks with alcohol or caffeine should be avoided as they will increase diuresis. In regards to sodium chloride replacement, you only need to supplement if you're on a restricted diet, early in

your environmental acclimatization period, or the physical activity is in excess of 4 hours. When used, the sodium levels should be in the range of 0.3 - 0.7 g/L.

Research has generally shown that oral ingestion of fluids is as effective as IV replacement with the ideal drink temperature between 50-59° F. The average sweating rate in athletes ranges from 0.5 - 2.5 L/hr so the idea of pre-hydration of a 1/2 liter (16 oz) prior to activity and 1/4 liter (8 oz) every 15 minutes should maintain adequate fluid levels for most exercising athletes. The final consideration is cost and calorie count. Water is free of calories while most sports drinks average around 200 calories/liter and water is obviously cheaper than the energy drinks but if the flavoring will encourage rehydration it may be worth the extra cost.



Good  
Good  
Fair  
Dehydrated  
Dehydrated  
Very Dehydrated  
Severely Dehydrated

Questions you would like addressed in a future issue can be sent to [mulliganpt@tx.rr.com](mailto:mulliganpt@tx.rr.com)

**Reference**

Janssen KW, Hendriks MR, van Mechelen W, Verhagen E. The Cost-Effectiveness of Measures to Prevent Recurrent Ankle Sprains: Results of a 3-Arm Randomized Controlled Trial. *Am J Sports Med.* 2014 Apr 21;42(7):1534-1541



**"Featured Internet Link"**

<https://www.youtube.com/watch?v=BOJTEgn9RuY>



How often have you heard this in your clinic? — "I hurt my back and I need an x-ray or MRI." I understand the patient's perspective—their back hurts and there has to be something "anatomically" wrong that would explain their symptoms. However, we know that most of us have pathoanatomical anomalies which do not manifest themselves symptomatically. Imaging of garden variety, non-specific LBP is only needed when patients have failed appropriate PT interventions over 6-8 weeks and/or have significant red flags in their history.

For those patients that need a little convincing that imaging is not the initial answer to their pain you may find this YouTube link of value to share with your patients. Dr. Mike Evans provides an excellent white board explanation of low back pain that any patient would find valuable and should affirm your perspective of the benign and self-resolving nature of most low back pain (without the need for expensive imaging).



**Ankle Injury Prevention Cost Considerations** continued -



costs associated with these intervention groups were approximately \$75 for the brace, \$50 for retraining equipment, and \$125 if both were used. Injury recurrence was monitored for one year.

Over 100 subjects were allocated to each group with no significant differences in sex, age, sports experience, or injury history severity. During the one-year follow-up 20% suffered a recurrent ankle sprain. This rate is well-below most published reports for either functional or structural chronicity. There were differences between intervention groups in regards to reinjury with the neuromuscular training group re-injury rate at 27% while the bracing group was at 15% and the combined group at 19%.

These results show that the bracing intervention dominated in the cost-value of injury prevention. Despite being slightly more costly than the neuromuscular training the re-injury rate was significantly lower. This is not say that neuromuscular training is ineffective but that bracing has a significant return on investment value. Also one should not extrapolate from this study that neuromuscular retraining is not without benefit. For instance, the study did not take into account the subject's pain level, feeling of giving way, or ability to return to sports and/or previous level of play. Also, it would be interesting to contrast the economic value of multiple physical therapy visits vs. the single instruction in an independent program of balance training. The recent study by Cleland, et al, in the *J Ortho Sports Phys Ther* showed improved outcomes when regular, supervised physical therapy appointments are utilized. We also don't know if the brace used in this study is the "best" - just that it had significant cost value.

**CrossFit Injury Rate**

CrossFit training has become extremely popular in the past decade and concerns about the injury rate have been voiced secondary to its "macho" mentality, ballistic nature, and competitive temperament. In the past year a

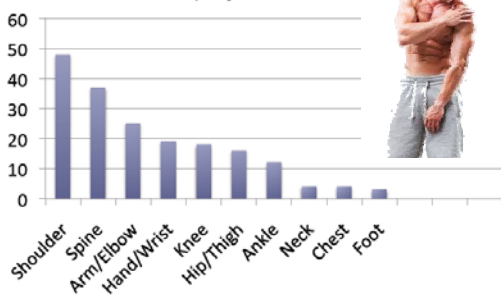


couple two studies have offered insight into the injury rate and patterns amongst CrossFit Athletes. The first was published in the *Journal of Strength and Conditioning Research* and reported an injury rate of 3.1 per 1000 hours of participation. This is similar to the injury rates in comparable activities such as Olympic weightlifting, power-lifting, and gymnastics but lower than competitive contact sports such as rugby and football. As outlined in the chart below, Crossfit injuries tend to occur to the upper extremity and spine areas with a much lower prevalence in the lower extremity. This is not surprising given some of the commonly performed exercises (ropes, muscle-ups on the rings, medicine ball tosses, kettlebell exercises, kipping pull ups, sledgehammer tire slams, and cleans/snatches.) This injury rate is similar to the findings of a subsequent study by Weisenthal et al, in the *Orthopaedic Journal of Sports Medicine* earlier this year which found the rate to be 2.4/1000 hours with a prevalence of about 20%. In this study the authors found that the gymnastic type exercises caused a higher proportion of the shoulder injuries while the low back was most commonly injured in the power lifting maneuvers. Both studies showed a relatively low rate of "severe injury" or cases of rhabdomyolysis.

The most consistent demographic trend in injury frequency had to do with the lever of trainer involvement. The supervisory presence of an instructor seems to significantly reduce the risk for injury. The prevalence of injury dropped from 31% with trainer presence "some of the time" to 24% when the trainer was present "most of the time" and down to 15% when the trainer was present "all of the time". Men were more likely to suffer an injury than women and this may be attributable to their motivational predisposition to participate.

My personal opinion is that injury rates could be further reduced with pre-participation assessment of strength, mobility, and flexibility impairments and coaching on proper alignment and biomechanical movement principles. Maybe most importantly, a philosophical approach that de-emphasized "as-many-reps-as possible" and a reduction of the competitive, exercise-to-failure mindset.

**CrossFit Injury Location**



Previous issues are archived at  
[www.continuing-ed.cc/newsletter.htm](http://www.continuing-ed.cc/newsletter.htm)



*If it's important to you,  
you'll find a way - if not,  
you'll find an excuse*



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### CORE Education Series and Residency Training Opportunities for 2015



The "Clinical Conduit" newsletter is an every other month publication available to any allied health care provider free of charge upon request. Individuals who would like to be included on the email distribution list should contact the editor at [mulliganpt@tx.rr.com](mailto:mulliganpt@tx.rr.com)

We're in the midst of another great year of education with our Clinical Orthopedic Rehabilitation Education (CORE) series. All of our programs in the series are sold out for this year (although we have one last spot available for the lower quarter class in October) but we are planning to continue the series for the sixth year again in 2015 for those who'd like a comprehensive overview of orthopedic physical therapy (literally from head to toe) based on the APTA's definition of advanced specialty practice. We have a long history of assisting participants successfully prepare for the specialty examination.

For those that would like a more comprehensive learning and mentoring experience you may want to consider participating in one of our APTA accredited residency programs at UT Southwestern. We are now accepting applications for our 2015 residency positions. We expect to select our 3 orthopedic residents by mid October and our neurological and sports resident in early 2015. Residents attend the education series as well as practicing in our faculty clinics or satellite sports medicine center. More information about the CORE education series is available at <http://www.continuing-ed.cc/residencycourse.htm>. Resident employment information can be found at <http://www.utsouthwestern.edu/education/school-of-health-professions/programs/residency-programs/index.html>.



## Posture Shirts



Many of our upper quarter patients have their symptoms magnified (if not caused) by poor posture. The finding of a forward head, increased upper thoracic kyphosis, and rounded shoulders is a common concern. Many of us have used a variety of taping techniques to facilitate improved muscular awareness and maintain a more desirable position. Generally the literature has suggested that these taping techniques improve scapular and cervicothoracic position but offer inconsistent and variable benefit in regards to muscular facilitation. Because of the location of the tape it is difficult, if not impossible, for the patient to self-treat. A few years ago I noticed the commercial availability of posture shirts with elastic bands that proposed to provide a similar stimulus. The most well known of these shirts is the Spine and Scapula Stabilizing (S3) brace made by Aligned. These "braces" consist of a compression shirt with a front zipper and hook-and-loop attachment sites to secure posterior elastic tension straps. A legitimate question regarding these shirts is "do they work"? Is there an actual change in posture (forward head or shoulder) or electromyographic activity in the scapular force couple muscles (serratus and trapezii)?

While there have been numerous testimonials from both health care providers and professional athletes I've only seen one peer-reviewed study to test the validity of these claims. An article in the *Journal of Athletic Training* (Cole AK et al, 2013; 48(1):12-24) looked at the impact of posture and muscle activity in 38 healthy volunteers. The authors did find that the application of the tension straps while wearing the compression shirt improved the forward shoulder angle but had no significant effect on the forward head angle. In regards to altering EMG activity the authors also found a small increase in lower trap activity during sagittal and scapular plane elevation while decreasing upper and mid trap activity during extension maneuvers.

These findings seems similar to what we know about taping (more helpful with scapular alignment than scapular contractile facilitation). While these shirts are certainly not a cure they may possibly provide a nice training stimulus and posture reminder for our patients. My current clinical habit is to start with leukotape and, if successful, recommend transition to the posture shirt.

We have a number of home studies that are relevant to the management of the common shoulder conditions. These are all TPTA approved and can be accessed free of charge. A post-test for CEU credit is available at <http://www.continuing-ed.cc/homestudy.htm> for a reasonable fee.

### Home Studies Now Available

**Study and learn at your own pace at home!**

|   |                |
|---|----------------|
| Medical Screening for the PT              | .3 CEUs        |
| Knee Osteoarthritis                       | .2 CEUs        |
| Pharmacology for the PT                   | .2 CEUs        |
| Radiology for the PT                      | .3 CEUs        |
| Goniometry 101                            | .2 CEUs        |
| Foot-Ankle Anatomy                        | .3 CEUs        |
| Achilles Tendinopathy                     | .2 CEUs        |
| Lateral Ankle Instability                 | .2 CEUs        |
| Plantar Fasciitis                         | .2 CEUs        |
| Knee Meniscal Injuries                    | .2 CEUs        |
| Orthopedic Hip Injuries                   | .2 CEUs        |
| Principles of Joint Mobilization          | .2 CEUs        |
| <b>Functional Anatomy of the Shoulder</b> | <b>.3 CEUs</b> |
| Scapular Significance: Ortho Perspective  | .2 CEUs        |
| Proximal Humerus Fracture Rehab           | .2 CEUs        |
| Subacromial Impingement Syndrome          | .2 CEUs        |
| Examination-Treatment of Hand/Wrist       | .3 CEUs        |
| Ethics and Professional Responsibility    | .2 CEUs        |

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