Mid-Atlantic Athletic Trainers' Association (MAATA) Free Communications Abstract Presentations

The following abstracts were accepted and presented at the 2024 MAATA Annual Meeting in Virgina Beach, VA.

Athletic Trainers' Attitudes Towards Concussion Biomarkers and Their Future Use in Concussion Diagnosis

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Context: Currently, concussions are diagnosed using subjective criteria that typically require baseline measurements to be considered accurate. In some cases, symptoms may not be immediately evident following a brain injury. Recently, studies have begun analyzing the possibility of using biomarkers as a means of objectively diagnosing concussions. However, more research and information on biomarkers are required before implementation of diagnostic methods are possible; therefore, the purpose of our study was to explore and analyze current practicing athletic trainers' attitudes toward the future implementation of concussion biomarkers in clinical practices. **Methods:** A phenomenological qualitative research design was used to gather information regarding attitudes of athletic trainers toward the future implementation of biomarkers in clinical practices. Participants were recruited from a previous survey-based study through the National Athletic Trainers' Association (NATA) research survey service. A total of 11 Athletic Trainers (five female, six male) were interviewed via Zoom. Semi-structured Interviews were conducted by the lead researcher until data saturation occurred. Data analysis was guided by consensual qualitative research tradition processes broken down into five cycles. The 4-person research team reached consensus on common themes and subthemes. Each member of the research team then focused analyzing their respective theme for the results. **Results:** The 4th theme, Attitude About Biomarker Use, primarily focuses on analyzing how Athletic Trainers feel about the use of concussion biomarkers in their future practice and how they compare to current diagnostic methods. The sub-categories for this theme included "Towards its future use in general," "Compared to gold standard," and "Feasibility at current site." All participants expressed a desire or need for the future implementation of objective concussion diagnostic methods. **Conclusions:** Considering the research is still relatively new, current practicing athletic trainers have little knowledge on what they are and how they can be used; however, all participants agreed that with more research, using biomarkers for concussion diagnosis could prove to be a promising objective measure. Participants expressed the future implementation of biomarkers would enhance concussion diagnosis.

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Measuring Psychological Readiness with the Shoulder Instability-Return to Sport After Injury Scale in Athletes with Traumatic Shoulder Dislocations: A Critically Appraised Topic

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Focused Clinical Question: How can using the Shoulder Return to Sport after Injury (SI-RSI) scale to measure mental readiness in athletes after a shoulder injury improve return-to-play protocol? **Data Sources:** In September 2023, a computerized search of PubMed for evidence was completed. The search terms were fear of reinjury or psychological readiness, kinesiophobia, confidence, and return to play or return to sport, or RTP. The search was limited to studies published between 2018 and 2023. Study **Selection:** The inclusion criteria consisted of studies that used the SI-RSI to measure fear during return to play and shoulder injuries that required surgery. The criteria were written in English and performed using an observational or experimental design. Studies were excluded if the patients did not play sports preoperatively. **Data Extraction:** Outcomes included quantitative evidence of SI-RSI scores to identify a connection between SI-RSI scores and the athlete's decision to return to play. One study took a cohort-study approach, one used a cross-sectional approach, and the third used a retrospective comparative cohort study. All three used the SI-RSI to analyze mental preparedness before return to play. **Summary Measures:** All three studies used the SI-RSI to measure psychological readiness before return to play. Two studies compared the SI-RSI score with the Subjective Shoulder Value (SSV). These two studies had a mean SI-RSI score of 68.9 ± 22.0 and 41.5 ± 21.9 with a p-value of $p<0.0001$. **Evidence Appraisal:** All three studies were evaluated using the STROBE Critical Appraisal Checklist. **Search Results:** The computerized search returned 534 studies, 46 of which were included based on inclusion criteria, eight of which were included based on title, and three articles that met the exclusion criteria were kept for review. **Data Synthesis:** Two of the included studies concluded that patients who returned to sport passed the SI-RSI benchmark of 56 73.1% and 81.4% of the time. One study revealed that participants who returned to sport scored higher on the reinjury fear and risk subscale 42.2 ± 23 compared to those who did not return 27.3 ± 16 ($p<0.05$) even if they didn't pass the benchmark. **Evidence Quality:** The STROBE Critical Appraisal Checklist resulted in a score of 17/22 for the cross-sectional study and retrospective comparative cohort study and 18/22 for the cohort study. Points were removed for not including statistical analysis, bias, funding, and an explanation for the loss of participants. **Conclusion:** The Strength of Recommendation Taxonomy checklist concluded a Level C recommendation because of the consistent rating of Level 3 evidence across all three studies. Moderate evidence suggests that the SI-RSI helps evaluate psychological readiness before returning to play after a shoulder dislocation. Clinically, this may limit the recurrence of shoulder dislocations by requiring athletes to pass the SI-RSI benchmark of 56.

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Consistency In Patient-Reported Outcomes Survey Response

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Context: Patients returning from ACL or other knee injuries must be physically ready to return to activity and mentally. Patient-reported outcome measures are important means to evaluate the level of patient readiness. Many healthcare providers utilize multiple surveys as part of their intake process to determine current status. The distribution of multiple surveys related to one joint may be problematic. A question of completeness and consistency among participants is a limitation of most measures. The purpose of this study was 1) to determine the level at which people will persist in multiple surveys and 2) to determine the consistency in participant response across questions repeated across surveys, similar questions, or movement patterns. **Methods:** The study design for this research was a qualitative survey of a convenient sample. Participants were recruited via their university, asking for participation in the study. The survey was distributed through the host's school email system, and Qualtrics hosted the survey. To be included in the study, participants had to be either a student, faculty, or staff member of the university. The study included general demographic information (age, gender, ethnicity, and history of injury or pain in the knee) and four knee-related quality-of-life surveys, which included the Anterior Cruciate Ligament Return to Sport After Injury (ACL-RSI) scale, International Knee Documentation Committee (IKDC), Knee Injury and Osteoarthritis Outcomes Scores (KOOS), and Lysholm Knee Scoring Scale. Ran interclass correlation coefficient to determine Cronbach's Alpha. Significance was set at the 0.05 level. **Results:** The number of participants who consented to participate in this survey was 663. Of these 663 participants, only 292 (45.34%) completed all 4 surveys. A total of 152 (22.93%) participants stopped after the demographics, 85 (12.82%) completed at least 1 survey, 84 (12.67%) completed at least 2 surveys, and 15 (2.26%) completed at least 3 surveys. Seventy percent of participants complained of knee injury or pain and 27% occurred more than 5 years ago. Response consistency was seen with question looking at confidence in knee (ICC .869, 95% CI 845 to .891), confidence to perform (ICC .94, , 95% CI .927 to .951), locking and catching in the knee (ICC .479, , 95% CI .374 to .570), stairs (ICC .93, 95% CI .917 to .942), kneeling (ICC .885, 95% CI .856 to .909), squatting (ICC .895, 95% CI .873, .915), and sitting (ICC .731, 95% CI .676, .788). **Conclusion:** These results support response consistency across the four surveys. Survey compliance overall was low, but because it did not impact the consistency of responses, using one survey encompassing questions from all four surveys might increase survey compliance while still gathering sufficient information.

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Reliability and Validity of the iPhone to Measure Hip Internal and External Rotation

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Context: Clinicians use a traditional goniometer or a quick visual estimate to measure range of motion (ROM) in patients, these methods can be time consuming or inaccurate. The purpose of this study is to assess the reliability and validity of the iPhone Measure app to measure hip internal rotation (IR) and external rotation (ER). **Methods**: 20 participants were recruited; they were physically active and aged 18-28 years old. Hip IR and ER was measured prone with the subject on a table. The measures were taken three times and bilaterally for each, then recorded. The ROM was measured by 2 student clinicians using the iPhone Measure app, and one clinician using the traditional goniometer. The clinician using the goniometer is a certified athletic trainer, preceptor, and professor that has taught students how to use this tool. Intraclass correlation coefficients (ICCs), coefficients of variation (CV) and standard error of measurement (SEM) were utilized to assess reliability. To assess validity of the Smartphone application against the bubble inclinometer intraclass correlation coefficients were utilized. **Results**: There was excellent reliability for IR (ICC=.992) and excellent for ER (ICC=.988). The iPhone Measure app interrater reliability in IR was excellent (ICC = .993), and ER interrater reliability was excellent (ICC = .990). The iPhone when compared to the goniometer in IR had excellent validity (ICC= .983-.989). The validity of the iPhone compared to the goniometer in ER was excellent (ICC=.972-.983). **Conclusions**: Smartphones, specifically iPhones are often very accessible for clinicians and could be a great tool to quickly and easily measure joint ROM. Clinicians should be consistent with their choice of ROM measure and avoid switching back and forth with one specific measure or one patient.

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How Comorbidity with ADHD Impacts on Neurocognitive Performance in Adolescents After Sport-Related Concussions: A Scoping Review

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Context: The number of sport-related concussions (SRCs) is higher in adolescents than in other age groups and accounts for 32% of concussions. Athletes with attention-deficit hyperactivity disorder (ADHD) have a higher risk of previous history of concussion and future concussion risk compared with those without ADHD. People with ADHD present lower baseline scores of neurocognitive performances compared with those without ADHD. Neurocognitive deficits after SRC lead to increase risk of musculoskeletal injuries or another concussion after return to play (RTP) and affect RTP process. There is no consensus regarding the management of SRCs for those with ADHD. This scoping review aims to provide the currently available evidence regarding how ADHD impacts neurocognitive test performance after sustaining SRCs in adolescent athletes. **Methods:** A scoping review of literature published in English was conducted in February 2024 using Google Scholar. Key terms included "adolescent," "athlete," "sport-related concussion," "ADHD," "neurocognitive test," and "Impact test." Articles were excluded if they were systematic reviews or meta-analyses and included participants with a history of brain surgery or meningitis due to the influence on neurocognitive performance. Articles written in English and including adolescent populations were inclusion criteria. The search yielded 11 studies for possible inclusion. Of these, three were included based on inclusion criteria. **Results:** All neurocognitive performance was measured using the ImPACT test. One study showed that among the 4 compositions of the neurocognitive test, verbal memory (ADHD: 72.1±16.60, Control: 79.1±13.40) and visual motor speed (29.9±8.60, 35.3±8.30) were significantly decreased ($p<0.01$) post-SRC in those with ADHD compared with those without ADHD. Another study found among those with ADHD not taking medication, both verbal memory (0.87(0.67-1.06), 0.68 (0.64-0.71)) was and reaction time (1.25 (0.83-1.66), 0.96 (0.90-1.01)) was showed significantly greater standard deviation from the baseline($p<0.05$) compared with individuals without ADHD. Finally, verbal memory (82.8 ± 12.80, 86.9 ± 10.66), visual memory (73.0±14.17, 77.8±12.76), and visual motor (36.0±7.28, 38.5±7.07) were significantly decreased and reaction time (0.63±0.10, 0.60±0.10) was significantly increased ($p<0.01$) in patients with ADHD. **Conclusions:** As a neurodevelopment disorder, ADHD results in an individual having trouble paying attention (e.g., listening, following through on instructions, being distracted, and organizing) and/or being hyperactive (e.g., difficulty waiting, fidgeting). Existing research shows adolescent athletes with ADHD tend to have worse neurocognitive test and symptom performance following acute SRCs compared with those without ADHD. Clinicians must evaluate the baseline assessment for this population and create a relationship among parents, coaches, school nurses, and teachers to discuss care plans that may be unique for ADHD patients. Considering the number of adolescent athletes with ADHD and the potential impact of SRC among this population, the amount of research on recovery and return to learning challenges is lacking.

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Changes in Neural Excitability Following 6-week of Balance Training in Individuals with Chronic Ankle Instability

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Context: Individuals with chronic ankle instability (CAI) often struggle with balance issues due to changes in the central nervous system (CNS). Specifically, difficulties in modulating spinal reflexive excitability and enhancing corticospinal excitability contribute to poor balance, indicating challenges in transferring control to supraspinal centers. A recent study found that a single session of balance training could positively impact the CNS, improving spinal reflexive excitability modulation and corticospinal excitability in CAI patients. However, there is limited research on the effects of long-term balance training on neural excitability in CAI individuals. Therefore, this study aimed to investigate the effects of a 6-week balance training program on spinal reflexive excitability modulation, corticospinal excitability, and balance performance in CAI individuals. **Methods:** 28 participants with CAI (F:16, M:12, 22.5±2.8yrs, 171.1±9.0cm, 77.3±19.6kg) were randomly assigned to the balance training group (BAL) or control group (CON). We assessed their spinal reflexive excitability modulation using Hoffmann-reflex (H-reflex) testing in prone and single-limb stance positions. Corticospinal excitability was measured during single-leg balance using transcranial magnetic stimulation (TMS), assessing motor evoked potential (MEP), active motor threshold (AMT), and cortical silent period (CSP). Balance function was evaluated by performing single-leg balance on a force plate to measure center of pressure (COP) variables. The BAL group underwent a 6-week progressive balance training program, engaging in sessions three times a week for 20-30 minutes each. Training comprised static (single-leg stance with eyes open and closed) and dynamic exercises (hop and stabilization, hop and reaching). Statistical analysis utilized separate 2x2 mixed-model analysis of variances (ANOVA) to examine the interaction effect of group (BAL and CON) x time (baseline and post-training) on each variable. Cohen's d effect sizes were calculated to determine the significance of differences, with significance set at $P<0.05$. **Results:** There was a significant group x time interaction in CSP ($F=19.63$, $P=0.01$). A large effect size ($d=0.49$[0.25, 1.20]) suggested that CSP was significantly shorter at post-testing (72.4±30.4) in BAL when compared to baseline (100.7±38.8). Furthermore, a significant group x time interaction was present for modulation of spinal reflexive excitability ($F=8.06$, $P = 0.01$). There was a moderate effect size (d =.88, [0.08, 1.63]) indicating that post-testing (44.0±21.8) spinal reflexive excitability modulation was greater than the result of baseline (29.5±35.2) in BAL. **Conclusions:** Balance training resulted in a decrease in cortical silent period (CSP), indicating enhanced corticospinal excitability among individuals with CAI. It was also observed that spinal reflexive excitability modulation was improved after balance training. The balance-related neurosignature of individuals with CAI might be restored with 6-week of balance training. Clinically, these alterations following balance training could suggest why balance training has been successful in preventing recurrent ankle sprains as well as improving balance performance in individuals with CAI.

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Chronic Neck Pain, Vasculopathy, and Pre-Syncope in a Young Adult: A Type 4 Case Study

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Background: The patient is a 23-year-old college female presenting with chronic cervicalgia, bilateral upper extremity neurovascular symptoms, and insidious pre-syncope episodes over the past 3.5 years. Upper extremity neurovascular symptoms include bilateral numbness and tingling into the hands and bilateral throbbing arm pain originating proximal to the elbow and traveling to the fingers, which worsens with cervical rotation bilaterally. The patient has experienced 10 episodes of pre-syncope lasting less than 30 seconds that occur with cervical flexion, extension, or bilateral rotation. Pre-syncope symptoms include lightheadedness, blurry vision, increased neck/arm pain, headache, and malaise. Upon clinical evaluation, no obvious deformity, discoloration, or swelling of the cervical spine were present. The patient was tender to palpation on C2-C5 spinous processes. Cervical range of motion (ROM) was within normal limits; a deficit of 15 degrees was present for right cervical rotation. Cervical manual muscle testing (MMT) were all 5/5, with pain in the posterior cervical spine during ROM and MMT of cervical flexion, extension, and bilateral rotation. Positive findings were reported with cervical distraction, vertebral artery (bilaterally), Allen's (bilaterally), and Adson's (bilaterally) special tests. Neurological assessment identified horizontal maltracking of the eyes, causing lightheadedness and headaches. All other components of a cranial nerve assessment and upper quarter screen were normal. **Differential Diagnosis:** Differential diagnoses include herniated disk, nerve root compression, brachial plexus pathology, spondylosis, vertebral fracture, vertebral osseous lesions, vascular stenosis and/or occlusion, and Thoracic Outlet Syndrome (TOS). **Treatment:** The patient was evaluated by her primary care physician, followed by a sports chiropractor, spine physiatrist, general orthopedist, spine orthopedist, physical therapist, vascular surgeon, and neurologist. When one provider could not make a definitive diagnosis or an intervention failed, the patient was referred to the next provider. Multiple differential diagnoses were ruled out via diagnostic imaging and laboratory results, including radiographs, MRI, and SPECT-CT of the cervical spine, brain, upper extremity, and chest CT Angiogram. The patient received a diagnostic bilateral upper extremity duplex ultrasound, which revealed mild arterial pressure variability with maneuvers. Imaging of the cervical spine revealed signs of spondylosis and TOS. Initial treatment included sports chiropractic care, rehabilitation, and Tizanidine prescription. Limited pain relief from the 2 interventions resulted in the patient undergoing 2 occipital nerve blocks and 3 radiofrequency ablation procedures performed by the spine physiatrist. The patient attended physical therapy for 3 months where she followed a cervical spine and TOS protocol and failed to notice meaningful change in symptomology. **Uniqueness:** This case is unique as there was no specific mechanism of injury. Diagnostic imaging and laboratory tests have resulted in no significant positive findings, making diagnosis challenging. The spine orthopedist, vascular surgeon, and neurologist cannot explain the medical link between pre-syncope in combination with cervicalgia and neurovascular symptoms. The cumulation of the patient's symptoms has impacted her activities of daily living (ADL) and quality of life (QoL), such as difficulty completing schoolwork, lack of adequate sleep, heightened fear of driving, and increased anxiety. She feels stressed and overwhelmed by the time demand of medical services, the complexity of the health insurance process, and cost of services. **Conclusion:** The patient required extensive medical evaluations and interventions from multiple healthcare providers, which is still on-going. Her experiences over the last 3.5 years negatively impacted her ADLs, QoL, and overall mental status, which resulted in the patient feeling discouraged, frustrated, and alone. In patients who present with chronic signs and symptoms, especially when there is not a definitive diagnosis, it is important for athletic trainers to remain diligent in providing patient-centered care. Athletic trainers must continue to advocate and remain knowledgeable about additional healthcare providers or resources that can be a part of the patient's care plan.

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Figure 1.

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Single Limb Postural Control Throughout a Collegiate Football Season

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Context: It is estimated that college football players sustain an average of 3 subconcussive blows to the head per game. Limited research has demonstrated that collegiate football players present with decreased static postural control, as measured using the Balance Error Scoring System, at the end of season compared to baseline. Interestingly, neurocognitive test scores in collegiate football players were not found to differ preseason, midseason and postseason. Authors hypothesized that using neurocognitive tests may not have been sensitive enough to detect the effects of the subconcussive impacts. Force plate data provides valid information of postural control. The purpose of this study was to evaluate static postural control throughout a collegiate football season in players who had sustained no known concussion throughout a season. **Methods:** This case series consisted of 45 volunteers from a Division I collegiate football team (age = 20.55 ± 1.50 years, height = 183.22 ± 7.24 cm, weight = 99.42 ± 21.88 kg) with no known concussion at time of first data collection visit. Participants completed three data collection visits (early season, mid-season, end-of-season). At each visit, participants completed three successful 30-second trials of single limb, eyes closed balance on a force plate. The following center of pressure (COP) force plate outcomes were analyzed: COP sway in the mediolateral (ML sway) and anteroposterior (AP sway) directions, COP pathlength, COP maximum path velocity, and 95% ellipse. For each outcome, a repeated measures ANOVA was conducted to compare means over time. Post hoc t-tests were used for those differences that were found to be significant. A significance level was set *a priori* at $P \leq .05$. **Results:** Significant differences were found for COP sway in AP ($F_{2,129} = 4.28$, $p = .017$) and ML ($F_{2,129} = 10.66$, $p < .001$) directions. For both measures, postural control was worse at end-of-season (COP AP sway = 0.08 ± 0.37; COP ML sway = 0.071 ± 0.45) compared to early season (COP AP sway = 0.319 ± 0.46; COP ML sway = 0.556 ± 0.67). There were no differences between early season and midseason and no differences between midseason and end-of-season. There were no statistical differences between COP pathlength ($F_{2,129} = 0.32$, $p = .730$), COP maximum path velocity ($F_{2,129} = 0.33$, $p = 0.72$), or 95% ellipse ($F_{2,129} = 1.739$, $p = .182$). **Conclusions:** Our results show inconclusive postural control differences in non-concussed football athletes throughout a season. Further analysis of our participants is planned to determine if playing time may impact balance during a season. At this time, it does not appear that a football season has an impact cognitive function as measured via static postural control.

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Injury Prevention Programs: Factors that Effect if a Coach uses Injury Prevention Programs

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Context: The purpose of this study was to determine how coaches view injury prevention programs (IPP) and how this affects their decision to implement an IPP with their team. The more information gained on a coach's influence to implement an injury prevention program for their team, the more athletic trainers can understand and educate on the importance of injury prevention programs. **Methods: Design:** Cross-sectional **Setting:** Web-based survey **Target Population:** Youth Sport Coaches **Dependent Variable:** Coaches beliefs on IPPs **Independent Variable**: Willingness to implement an IPP. Youth sport coaches were surveyed on their attitudes and beliefs about injury prevention programs. All questions used a five-point Likert scale (5=Strongly Agree, 1=Strongly Disagree for questions on Willingness or 5=Very Important, 1= Not Important). Questions on willingness to implement an IPP were dichotomized (4-5=Yes, 1-3= No). As a response of "3" indicates "Neither Agree nor Disagree" responses of "3" were considered "No" since they could not be considered agreement. Statistical analyses were performed using SPSS (Version 28; IBM Corporation, Armonk, NY) and the α level set a priori at $P \leq .05$. A Pearson $\chi 2$ test of association was used to identify any significant ($p<0.05$) differences in coaches' responses between sport (basketball and soccer). If no association was observed, chi-square tests were performed on the coaches as one group. Any categorical variables that displayed an expected count below five were omitted from this analysis. Ethics approval was obtained from University X's IRB (IRB #X12-116). **Results:** 150 coaches (Sport: Basketball=76 Soccer =74, Sex: Female=34, Male=116 Age=42$\pm$11) completed the survey. Coaches who indicated they plan to implement an IPP next season reported finding it of higher importance to prevent sport-related injuries ($\chi^2_{(2, N=138)}=8.831$, $P=0.012$), prevent ACL injuries ($\chi^2_{(2, N=137)}=13.826$, $P<.001$) and say it was "very important" to use an injury prevention program to prevent injury ($\chi^2_{(2, N=135)}=32.505$, $P<.001$) than coaches who said they do not plan to implement an IPP with their team in the upcoming season. **Conclusions:** Youth sports coaches who find it important to prevent sport-related injuries to the lower extremity and, more specifically, ACL injuries are more likely to use injury prevention programs. A vast majority of coaches do not utilize IPPs and find them of lesser importance. Education on the importance of these programs for coaches to help their teams reduce injury risk and rates at the youth sport level is warranted to help close this gap and increase coaches' knowledge of injury prevention programs.

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Effects of Passive Heat Interventions on a Person's Active Heat Acclimatization: A Critically Appraised Topic

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Focused Clinical Question: Does implementing a month-long passive heat protocol in a sauna affect a person's active heat acclimatization by decreasing average heart rate (HR), decreasing internal body temperature, and increasing skin temperature (Tsk)? **Data Sources:** A comprehensive search was conducted in September 2023 through PubMed. The search terms used were passive heat therapy, heat acclimatization, and hypoxia. Manuscripts were limited to those published within the last 5 years. **Study Selection:** Inclusion criteria consisted of physically active participants, measures of HR and body temperature, and randomized-controlled trials and crossover studies using saunas as a passive heat intervention. Exclusion criteria consisted of systematic reviews, meta-analyses, case studies, individuals with cardiovascular disease or any other underlying health conditions, animal studies, and the use of water-profused suits. **Data Extraction**: Studies measured HR, internal body temperature, and Tsk as outcomes of heat acclimatization. Body temperature was measured via an infrared thermometer (skin) and an oral mucosa test (internal). HR was measured by HR monitors and electrocardiograph (ECG). **Summary Measures:** Intra-group data was determined with the Wilcoxon test for paired samples in both groups. **Evidence Appraisal:** All 3 studies were analyzed using the PEDro scale to identify threats to internal validity. **Search Results:** The computerized search returned 21 studies. Eighteen studies were excluded because they did not use saunas, did not match study design, and did not include physically active participants. **Data Synthesis:** One study found a decrease in average HR (123.68 vs. 106.89, $p<0.05$), no increase in internal body temperature (37.43°C vs. 37.42°C, $p=0.002$), and an increase in Tsk (36.92°C vs. 37.74°C, $p=0.005$) at higher sauna temperatures (42°C) from session 1 to session 9. However, another study found varying results with internal and Tsk at both higher and lower temperatures. The third study did not find any significant difference in HR, body temperature, and Tsk between the control and sauna groups ($p>0.05$). **Evidence Quality:** Each study was assessed using the PEDro scale, losing points for not blinding participants and experimenters (7/11, 6.5/11, and 7/11). **Conclusions:** The strength of recommendation taxonomy yields B evidence due to inconsistency in study findings, suggesting moderate evidence that passive heat interventions can improve someone's active heat acclimatization over a month-long period. Having a healthy HR contributes to adequate blood flow to the extremities. In addition, having an increase in Tsk while exercising in a hot environment can increase sweat rate which enhances the thermoregulatory response. An efficient thermoregulatory system can help inhibit inflammation markers in the cells, thus limiting the chance of developing hypoxia. A decrease in a person's HR and internal body temperature attributes to effective heat acclimatization. Additional research can focus on at-risk populations, using Tsk patches, and hydration levels which play a vital role in thermoregulation.

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Anaerobic Capacity And Lower Body Strength Deficits Related To Thermal Protective Gear In Rural Volunteer Firefighters

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Context: Firefighting is a dangerous job with occupational hazards, strenuous shifts, and increased work-related fatigue that contributes to risk of injury. The weight of thermal protective gear (TPG) may increase neuromuscular challenges while on-duty. The purpose of this study was to investigate the influence of TPG on volunteer firefighters' anaerobic and lower body strength performance. **Methods:** Nine healthy males (mean±SD: age= 41±9.3 years; ungeared body mass= 96.47 ± 14.51kg; ungeared height=181.67 ± 4.48cm; VFF experience 8 years) participated in a cross-sectional correlation study during three visits to a university research laboratory. Participants' TPG included thermal pants, jacket, boots, and a standardized helmet and self-contained breathing apparatus (SCBA) with respirator. Lower extremity aerobic fitness capacity was assessed using the Timed Up and Go (TUG) test. A forward-facing (F) and perpendicular facing (P) start positions were utilized. Lower extremity strength was assessed using a five repetition sit to stand (STS) measured with a linear displacement accelerometer. All tests were performed with and without TPG. Statistical analyses to determine performance differences between the ungeared and geared conditions were conducted using paired sample t-test for TUG and STS. Pearson's coefficient correlations were conducted to determine relationships between geared and ungeared STS performance variables. **Results:** Geared TUG-P times were significantly slower than UG TUG-P and demonstrated a large effect size (p=<0.001, d= -2.07). No significant difference was identified between geared and ungeared TUG-F performance (p<0.120, d=-0.42). With STS performance, the geared condition was significant only regarding velocity and total time variables. Geared peak velocity, geared average velocity, and geared averaged peak velocity values were all significantly less than ungeared and demonstrated a large effect size (p=<0.001, d = 1.58; p=0.001, d = 1.43; p=0.001, d = 1.44, respectively). Finally, geared total time STS performance was significantly longer than ungeared and demonstrated a large effect size (p=0.004, d = -1.17). The ungeared STS strength variables exhibited positive, significant relationships with geared condition strength variables (UG-average power & G- average power, r= .325, p<.001; UG- average power & G- average peak power, r= .898, p<.001; UG-average power & G- average peak force, r= .937, p<.001; UG-average power & G- peak power, r= .856, p<.003; UG-average power & G- average peak force, r= .948, p<.001). **Conclusions:** Wearing TPG negatively affected anaerobic capacity and rapid strength compared to ungeared trials. Task completion times were significantly longer with gear compared to ungeared. Regarding strength, geared peak power and force correlated with ungeared average power. The additional weight from the TPG may cause the firefighter to exert more effort compared to the effort needed when ungeared. This decline in maximal and rapid strength and anaerobic capacity while geared simulates what the firefighter may encounter during fire rescue situations.

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Effects of Sex Hormones and the Menstrual Cycle on Knee Joint Laxity in Physically Active Females: A Critically Appraised Topic

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Clinical Scenario: In recent years, females have exhibited increased physical activity and sport participation than ever before. Recent studies have identified a rising incidence rate of ACL injuries and indicate that the risk of ACL tears is greater in females than males. Knee laxity and physiological variation in women during the menstrual cycle have demonstrated increased ligament laxity, therefore, varying hormone concentrations may contribute to changes in ligamentous mechanical properties. Despite these findings, it remains unclear whether fluctuating sex hormone concentrations directly correlate to measurable changes in knee laxity. **Clinical Question:** How do fluctuations in sex hormones throughout the menstruation cycle impact knee joint laxity among physically active females? **Data Sources:** A computerized search of electronic databases was completed. Search terms used to guide the search include sex hormones, knee joint laxity, and physically active females. **Study Selection:** The literature search yielded 51 total studies of which four adequately met inclusion and exclusion criteria. Selected studies explored the influence of sex hormones on knee laxity in physically active females with regular menstrual cycles and no use of contraceptives. **Data Extraction:** Observed outcome measures include analyzing hormone and measuring knee laxity throughout the menstrual cycle. **Summary Measures:** Across the four studies, anterior knee laxity was observed during ovulation (4.71mm $\pm$ 0.86). Two of the four studies revealed estradiol peaks during ovulation (187.27 pg/mL $\pm$ 27.26), while the remaining 2 studies found highest estradiol concentrations during the luteal phase (176.24 pg/mL $\pm$ 79.91). **Evidence Appraisal:** The Critical Appraisal Skills Program (CASP) and Oxford Center for Evidence Based Medicine (OCEBM) were utilized to appraise the quality of evidence included. **Search Results:** Databases including PubMed, EBSCO host, Medline, and CINAHL, were systematically searched for relevant studies. Initially, 51 studies were identified, with 12 duplicates removed. Following screening, 14 remained for further eligibility assessment. After thorough evaluation, four studies were selected for this Critically Appraised Topic. **Data Synthesis:** Two studies utilized a 95% confidence interval to examine changes in knee laxity concerning fluctuations in hormone levels within subjects. **Evidence Quality:** Reviewed manuscripts exhibit inconsistency in outcome measures and limited significance to enhance patient-centered evidence. **Summary of Key Findings:** Each study analyzed hormone concentration levels through blood draws and measured knee laxity using the KT-2000 arthrometer. Increased anterior knee laxity was observed during ovulation in two studies. Two of the four studies revealed peak estrogen levels during ovulation, while the remaining two studies found peak estrogen concentrations during the luteal phase. **Clinical Bottom Line:** Based upon the included studies, there is compelling evidence to suggest that sex hormone fluctuations across the menstruation cycle can impact the magnitude of knee laxity in physically active females.

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Conflict Management in Athletic Training: The Influence of Organizational Culture

Emerson CC: Kansas State University, Manhattan, KS

Context: Athletic trainers (ATs) face conflict within the social ecosystem of the organizations in which they practice and arises due to incompatibility of goals and interests. Within athletic departments, the ATs' role to advocate for health and safety often comes at odds with an organizational culture directed towards maximizing performance and winning. ATs are often evaluated by dominant and powerful members of organizations who may not understand or respect the AT's role. The purpose of this study was to examine the experience of managing conflict as an AT within the culture of athletics. **Methods:** This qualitative study explored experiences of conflict management through the perspectives of AT managers. AT managers hold positions which allow them to observe and facilitate conflict management in a variety of settings and with a range of personalities. An interview guide was developed based on conflict management and leadership literature and reviewed by an expert in organizational leadership. Eleven AT managers (7 males, 4 females; years certified=17.9±8.2; years as manager=7±4.9) participated in two 1-hour videoconference interviews, which were recorded then transcribed via an online transcription platform. For this study, the ATs' worksites (i.e., high school, college, recreational) were considered, not the healthcare organizations which employed the ATs. Member checks were performed to confirm accuracy, ensure clarity and intention, and offer the opportunity to provide additional information. Transcripts were analyzed through an inductive process, including descriptive, values, and versus coding strategies. Codes were clustered and thematized through a phenomenologically informed process. **Results:** Managers identified that the goals of conflict management were to ensure athlete safety and reach mutual understanding. Three organizational factors acted as barriers or facilitators, ultimately influencing the work environment: 1) contextual factors, 2) conflict culture, and 3) health and safety culture. Contextual factors increased the perceived stakes of ATs' decisions to remove athletes from play and led to emotionally charged conflicts. Decisions involving important games (i.e., playoffs), star players, implications on college recruitment, and schools with a history of athletic success were more likely to be met with emotional conflict. The college setting was considered more challenging for ATs than high school and recreational sports, involving more politics, higher perceived stakes, and higher stress. Conflict culture, the extent to which conflict and norms promoting productive conflict is accepted, complicated ATs' ability to manage conflict. Politics led to power dynamics, which favored the opinions of coaches and administrators over ATs. Some organizations accepted antagonistic and aggressive behaviors from coaches and administrators while expecting unwavering professionalism from ATs. ATs who were able to identify and navigate politics were considered better able to manage conflict. Health and safety culture, the extent to which health and safety is valued within an organization, was marked by the knowledge of—and respect for—the AT's role. Policies and procedures as well as support from administrators which granted ATs medical decision-making authority prevented and mitigated conflict. Excessive negative elements of conflict culture, health and safety culture, and contextual factors led to a negative work environment, marked by a lack of respect for the AT and pressure to clear athletes prematurely. Managers observed higher AT turnover in organizations with negative environments. **Conclusions:** ATs' ability to effectively manage conflict and ensure athlete safety is influenced by the organizational culture in which they practice. Conflict culture, health and safety culture, and contextual factors influenced ATs' experience with conflict management. Negative elements of culture were related to poor work environments and increased AT turnover. ATs should be aware of organizational factors which influence conflict and employ strategies to effectively navigate these factors to improve their workplace experience and maintain athlete safety.

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Effects of Concussion History on Risk Taking Behaviors in Collegiate Athletes

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Context: According to the literature, in the United States there are an estimated 1.6 to 3.8 million sport-related concussions annually with over 10,000 concussions among National Collegiate Athletic Association (NCAA) student-athletes[1]. The annual incidence of medically diagnosed pediatric concussions increased from 34 per 10,000 persons in 2003 to 150 per 10,000 persons in 2013[2]. There has been an increase in research studied on the physiological mechanisms and causes of concussions among people of all ages with sports participation being the etiology of about half of all pediatric concussions[2]. Concussions occur from excessive forces being applied to the skull resulting in a temporary or permanent injury to the brain leading to impairments of the neurological system[3]. This can result in decreased cognitive functioning, impaired decision-making abilities, poor judgement, and impulsive thoughts which influences risk-taking behaviors[3]. Student athletes with increased sensation-seeking behaviors could be at risk for failing to disclose a concussion, impact their safety, and result in decreased care post-injury[4]. Risk-taking behaviors can be categorized as financial, social, legal, physical, and psychological[5]. However, the engagement in risky behaviors is subjective and based on individual circumstances and concussion history. **Purpose:** To compare risk-taking behaviors in men's and women's Division I basketball players using a previously validated risk-taking questionnaire (RT-18)[5]. **Methods:** As part of annual baseline concussion testing, participants completed a basic medical history questionnaire and RT-18 questionnaire. The RT-18 is a brief 18-item survey using "yes/no" questions to evaluate individuals' risk-taking behaviors and perceptions of risk. Once completed, all data was exported to IBM SPSS Statistics v.28.0 for analysis. A Mann-Whitney *U* test was used to characterize the data and compare risk taking behaviors and perceptions of risk between two groups – those with a history of concussion and those without. **Results:** A total of 29 NCAA Division I basketball players (male=15, female=14) completed the RT-18 questionnaire and medical history form. Of the 29 players, 31% (n=9) reported a previous history of at least one concussion. There was no significant difference in risk-taking between those with concussion history (M=18.67) and those without (M=13.35) as indicated by performance on the RT-18, U=57.00, z=-1.57, p=.117. **Conclusions:** Concussions are severe life-threatening injuries, and the research supports increased prevalence amongst male and female NCAA athletes. The results from this study demonstrate that risk-taking behaviors are unrelated to a history of concussion, however this data is dependent on truthful reporting of concussion injury. Clinicians should encourage timely reporting of symptoms and remain knowledge about the signs of an unreported concussion to provide immediate treatment and decrease the potential risk of an adverse event.

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Orientation Using Standardized Patients Increases Athletic Training Student Communication Effectiveness When Transitioning to Clinical Education Experiences

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Context: Transitioning from didactic to clinical education is overwhelming for novice athletic training students. The change in the learning environment often causes anxiousness as students get acquainted with the clinical site, preceptor expectations, and demonstrating clinical skills during patient care. Learning to communicate provides additional challenges as students must convey information to their patients, practice active listening, relay patient information to their preceptor, and possibly navigate conflict management. Simulation-based orientations have been effective in other healthcare professions to ease this transition; however, it has not been examined in professional athletic training students. **Methods:** The study used a convenience sample of 17 first-year athletic training students (3 men, 14 women, age=22.59±0.99) enrolled in a CAATE-accredited professional master's program. Students had completed one didactic semester in the program and were preparing to transition to clinical education. A two-day simulated-based orientation was completed prior to beginning their first clinical education experience. Orientation was designed to introduce the role of clinical education, define student roles and responsibilities, examine how to navigate clinical learning, review policies and procedures, review clinical skills, and practice effective communication. The orientation delivery framework included lectures, facilitated discussion, clinical skill practice, 3 standardized patient (SP) encounters, and two facilitated debrief sessions (one debrief immediately following the orientation and a second debrief two weeks after orientation). A 15 item pre- and post-orientation communication confidence survey was completed. Eight questions evaluated confidence communicating with a preceptor, seven questions evaluated confidence communicating with patients. Descriptive statistics were calculated for all survey items. Paired samples t-tests were used to compare pre- and post-orientation communication confidence ratings. Alpha levels were set at 0.05. A semi-structured debrief guide was stimulated self-reflection during the two debriefs. Qualitative analysis of respondents' comments was completed using interpretive coding. **Results:** A paired sample t-test revealed that students' confidence significantly improved in communicating with preceptors (t=3. 697, df=14, P < 0. 001) and communicating with patients (t= 2. 344, df=14, P<0. 017) after participating in simulation-based orientation. Three themes were established from debrief data, including (1) Improved Communication, (2) Improved Clinical Skills, and (3) Role Clarity. Participants expressed improved confidence to present patients to their preceptors and to perform evaluations. Orientation improved confidence in clinical skill application through skill review yet students described apprehension when new skills were presented. Students grew in their role clarity and felt more confident to ask questions and to express day-to-day concerns and preferences with their preceptors. **Conclusions:** A simulation-based orientation was effective at improving professional AT students' communication skills. AT educators should focus on orientation strategies designed to prepare students for their transition from didactic to clinical education. Orientations that include simulations or standardized patients and facilitated debrief help ease the transition to clinical education.

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Presentation of Bilateral Acetabular Labral Tears in a Collegiate Women's Lacrosse Player: A Level 3 Clinical CASE Study

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Background: The hip and groin injury rate in female collegiate lacrosse players has been reported to be 35.06 per 100,000 athlete exposures yet the frequency of acetabular labral tears (ATL) remains unclear. Sports which involve repeated bouts of running in combination with frequent twisting and pivoting motions, have been suggested to have a higher prevalence rate of ALT. This level 3 case study will discuss the unique presentation of bilateral ALTs in a female collegiate lacrosse player. **Patient**: Patient is a 19-year-old Division I collegiate women's lacrosse player who first presented with pain in her left hip while at home during summer break. The patient could not recall a specific MOI and was initially evaluated and treated by a physical therapist. Since symptoms persisted, she was referred to a sports medicine physician who prescribed diagnostic imaging. Findings revealed a cam pincer lesion on the femoral head accompanied with an ALT. Upon returning to campus, the patient reported to the athletic training clinic complaining of left hip pain and instability after practice involving cutting, sprinting, and high-volume exercises. The patient outlined the previous months to the team athletic trainer, who performed an additional evaluation on her left hip. The athletic trainer developed a rehabilitation plan that centered on pain control and increasing stability while permitting the athlete to play as tolerated with certain limitations. Four weeks after, the patient began complaining of pain in her right hip. Despite having full strength and ROM, she underwent an MRI on her right hip, which revealed an ALT. Following this new diagnosis, the patient was removed from practice until she met with the orthopedic surgeon. At this meeting, the physician discussed both non-operative and operative treatment options. Ultimately, the patient opted for surgery which occurred 3 months following her initial presentation to the athletic training clinic. The patient continued rehabilitation for roughly 4 weeks until the first surgery, an arthroscopic acetabuloplasty of her left hip. Six weeks later, the patient underwent an arthroscopy with correction of impingement of her right hip. **Intervention or Treatment:** Following the initial injury presentation (left hip), the patient's rehabilitation program focused on strengthening the gluteal and abdominal muscle groups. Upon return to campus, the team athletic trainer developed an approach centered on pain control and increasing stability which allowed the patient to participate in practice as tolerated. Following the diagnosis of a right hip ALT, conservative and operative interventions were presented. The patient opted for surgery and underwent separate procedures for her left and right hips. **Outcomes or other Comparisons**: Despite having bilateral hip labral tears, the patient maintained a high level of strength and function. During the 4 months between her initial diagnosis (left hip) and discovery of ALT in her right hip, the patient participated in all strength and conditioning sessions and limited field work. In the weight room, she scored in the top 2% of all her teammates across the three lower body test lifts: front squat, hex bar deadlift, and Romanian deadlift. **Conclusions**: Recent evidence has reported the use of both conservative and operative management for patients diagnosed with ALTs, with accompanying symptomatic femoroacetabular impingement (FAI) being a primary reason for surgery. In this case, the patient was symptomatic in both hips with presence of FAI in the left. Consequently, the athlete opted for surgical intervention to both hips, spaced six weeks apart. **Clinical Bottom Line:** Athletes diagnosed with an ALT with FAI may still present with optimal lower body strength, making the decision for treatment more challenging. In these cases, it is important that the sports medicine team discuss all options with the athlete so an appropriate management plan can be instituted.

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Anxiety and Depression Amongst Female Athletes

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Context: Anxiety (categorized by a feeling of fear, dread, and uneasiness) and depression (mood disorder causing feelings of persistent sadness and loss of interest in things an individual once loved) are two major mental health disorders effecting females considerably who participate in sport. Females are more likely to present with anxiety (55-60%)[1] and depression (1.844 times)[2] compared to males. The purpose of this study was to examine the prevalence between mental health comorbidities (anxiety and depression), across female athletes aged 18-40. **Methods:** An anonymous survey was distributed via snowball sampling using social media. Demographic data, Generalized Anxiety Disorder-7 (GAD-7), validated for use as a screening tool and severity measure across various settings and populations,[3] and Beck Depression Inventory-II (BDI-II), with high reliability (0.83-0.96)[4] were utilized. Analyses were conducted using SPSS with an Alpha level set at $p < 0.05$. Power calculation indicated a sample size of 84 participants. Frequencies and proportions were determined. Female athletes (n= 96, age: 22.47 ± 4.38 years, height 165.41 ± 7.51 cm, weight 64.15 ± 9.12 kg, BMI 23.48 ± 3.23) who were exercising for ≥5 days a week in an organized sport (i.e., clubs, teams, recreational), with total exercise volume of at least 8 hours per week met inclusion criteria. **Results**: A total of 96 out of 109 participants completed the survey (88.1% completion rate). Some participants did not complete all questions, however for the GAD-7 and BDI-II, only those who completed those specific sections in full were used for analysis (GAD-7, n=90, BDI-II, n=80). Of those, 58.9% (n= 53/90) of participants were categorized as meeting clinically meaningful values of anxiety using the GAD-7. Less than 1% of participants reported taking anti-anxiety medication. 39.8% (n=30/80) of participants were categorized as having clinically meaningful values of depression and only 18.2% (n=8/80) of participants reported taking anti-depressant medication. 10 (11.1%) participants yielded severe anxiety scores and 6 (7.2%) scored severe depression. To note, 34.4% (n=31/90) presented with a comorbidity of both anxiety and depression. The majority (74%, n=71/96) of our population were collegiate athletes. **Conclusions**: While our results are congruent with elevated anxiety and depression in female athlete populations, early identification (screening tools) and interventions are essential for a holistic landscape of the physical and mental health among female athletes. Clinicians should be prepared and equipped to recognize as well as assist with mental health comorbidities for quality patient centered treatment plans.

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External Pressures on Injured Athletes' and Their Effects on Mental Health and Return to Play

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Context: Student athletes face many challenges in and out of their sport. Along with practicing and playing to their best ability, they have to worry about keeping up with schooling. Once a player is hurt and out of play, they add the pressure of getting back into play on their plate. Along with their own internal pressure, athletes may experience pressure from outside sources. These sources could include friends, family, coaches, and parental guardians. External pressures could play a role in how an athlete returns to play. This research can help us understand whether the external pressures end up causing the athlete more mental, emotional, or physical harm with re-injury. The purpose of this study is to determine whether the injured athletes feel any external pressure to return to play before they fully heal and if the external pressure affects their mental health. **Methods:** Participants were recruited by the university asking for their participation in this study. The survey was distributed through the university's mass email system and was hosted by Qualtrics. To be included in this survey the participants must be a student or facility member of the university. Participants must also have participated in a high school or collegiate sport and have sustained an injury that put them out of play. The survey included general demographic information (age, gender, race, education, what sport they played, and what injury they sustained). The survey also included questions regarding the external pressures the athlete experienced during their injury. These external pressures include parent/guardian, coaches, and friends. **Results:** 91 participants consented to do the survey. Out of those 91 participants, 41 (45.05%) did not complete the survey. This survey is done on a scale from strongly disagree to strongly agree. Out of the 50 participants that completed the survey, 29 (58%) stated that they felt external pressure during their time of recovery. 30 (60%) of participants stated that during their recovery their mental health declined. When asked if the external pressure the participants felt caused them to return to play before they were mentally ready 15 (30%) agreed, 10 (20%) neither agreed nor disagreed, and 25 (50%) agreed. 25 (50%) agreed that they pushed through pain and other symptoms because of external pressures. **Conclusions:** The study found that during the injury most athletes experienced external pressures and a decrease in mental health. Out of the 91 participants who consented to the survey only 50 (54.94%) completed the survey. This could be due to some athletes not experiencing an injury that put them out of play. Determining which external pressures contribute to decreased health will increase the awareness of mental health in student athletes related to injury.

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Interdisciplinary Approach to Management of an L4/L5 Disc Herniation in a Collegiate Football Player: A Type 3 CASE Study

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Background: The rate for low back injuries in collegiate football players has been reported as 2.70 per 10,000 athlete exposures with lumbar disc herniations (LDH) accounting for roughly 8% of these injuries. In athletic populations, the decision of surgical versus conservative management for LDH can present a unique challenge to the clinician and patient given an patient's concern for return to play with minimal time loss. This type 3 CASE study will discuss the non-operative management of an L4/L5 disc herniation in a collegiate football player and highlight the interdisciplinary team approach that allowed the athlete to play an entire competitive season without limitations. **Patient:** In January 2023, a 21-year-old male Division I collegiate football player (long-snapper) presented to the athletic training facility with lower back pain, which radiated down his left leg. No specific MOI was reported. Both lower back and radicular pain were reported to increase during prolonged sitting and standing up from a seated position, as well as lowering into a sport-specific position. The patient was evaluated by the team physician and referred for diagnostic imaging. The MRI revealed an L4 and L5 paracentral disc bulge with increased narrowing of the vertebral foramen. **Intervention:** Following diagnosis, the patient was cleared by the team physician to continue football-related activities as tolerated. The sports medicine team developed a management approach for this patient which included consults from a pain management physician and spine surgeon, rehabilitation sessions three times a week with a physical therapist, daily rehab and pain management sessions with the athletic training staff, weekly treatment from a chiropractor, and scheduled check-ins with team physician. Physical therapy sessions focused on increasing abdominal strength and stability. Exercises included supine alternating upper and lower extremity lifts with dumbbells, hip hinges, hamstring curls with physioball, quadruped resisted hip extension, and standing lumbar extension. The athletic training staff implemented daily treatments which included the following: lumbar heat pack in combination with electrical stimulation, SI joint mobilizations, piriformis release and stretching, and hip realignment. Additional therapeutic exercises performed twice weekly with the athletic trainer included quadruped fire hydrants, walking lunges, and Pallof marches. Weekly chiropractic care centered on mechanical lumbar traction and mild adjustment. All rehabilitation exercises were performed prior to practice while cryotherapy was provided following activity. Lastly, the patient was directed to take OTC NSAIDs as needed for pain, and received an epidural corticosteroid injection prior to the fall season. **Outcomes and Other Comparisons:** Given the patient's position (special team's long snapper) and limited plays per game, the patient was given the option for conservative treatment in effort to play the entire fall season and delay surgery to season's end. The patient opted for this conservative approach and received a comprehensive interdisciplinary management plan that allowed him to play the entire season without time loss. **Conclusions:** The election for surgical versus conservative management of LDH is often dependent on injury timing, patient symptoms, and the sport demands the athlete is returning to. In this case, the patient was a collegiate football player (long-snapper) who elected for conservative treatment. The interdisciplinary team, comprised of athletic trainers, physical therapists, a chiropractor, and team physician, worked together to develop a comprehensive management plan that allowed the patient to continue play throughout the competitive season. Upon completion of the fall season, the patient underwent microdiscectomy surgery to address his LDH. **Clinical bottom line:** This case highlights the benefits of an interdisciplinary team-based approach to injury management for a collegiate football player diagnosed with a LDH. Since all members of the interdisciplinary sports medicine team have important roles in optimizing patient outcomes following injury, it is important for athletic trainers to consider this approach.

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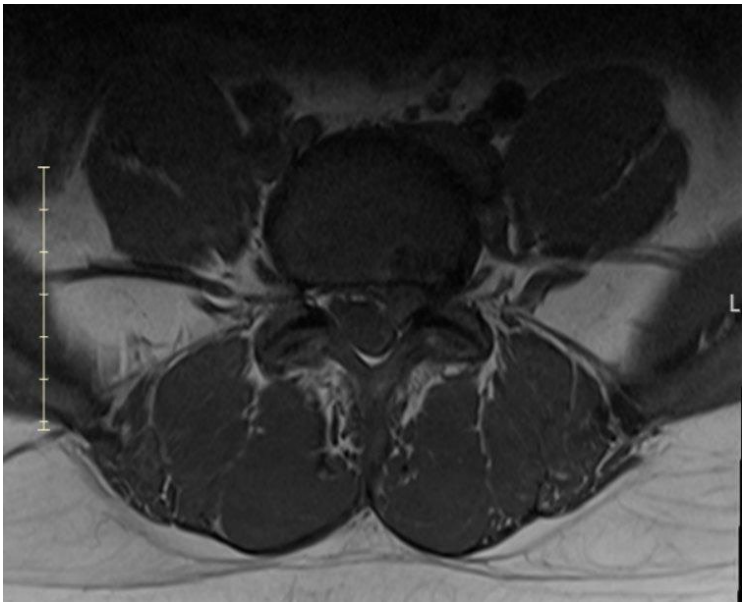
Image 1: MRI lateral view

Image 2: MRI transverse view



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Mole or Melanoma: Knowing your ABCDE's may save YOUR life!

Knaul, JH: Riverside Health System, Newport News, VA

Background: Skin cancer is the most common type of cancer in the United States. One in five Americans will be diagnosed with skin cancer in their lifetime, or about 9500/day. Research indicates that nonmelanoma skin cancer (NMSC), including basal cell carcinoma (BCC) and squamous cell carcinoma (SCC), affects more than 3 million Americans a year. More than 1 million Americans are living with Melanoma, nearly 200,000 cases of melanoma were diagnosed in 2022 with about 98,000 being invasive and 100,000 being non-invasive (in situ). The average age of diagnosis is 65. Melanoma rates in the US have been rising rapidly over the past 30 years, doubling between 1982 and 2011, but trends vary by age. In 2018, the Centers for Disease Control (CDC) reported 8,199 people died from melanoma. By making sun safety a habit, people can avoid sunburns and reduce the risk of melanoma. **Patient:** 47-year-old, Caucasian male with red hair, who spends a significant amount of time outside working as an athletic trainer. He had a history of blistering sunburns as a child, mostly on shoulders, nose and ears. He previously has had 4 suspicious lesions removed on head and back. The patient has bi-annual skin checks performed at a dermatologist's office. During his 8/1/2023 skin check, a small suspicious lesion was noted on his left jaw line, just inferior to his ear and posterior to the angle of the mandible. Patient was not aware of the lesion. The lesion was excised and sent for testing (see images below). **Differential Diagnosis:** Squamous Cell Carcinoma, Basal Cell Carcinoma, Invasive Melanoma, Non-Invasive Melanoma. **Treatment:** On August 6, 2023 results showed melanoma in situ (non-invasive). The dermatologist referred patient to a second dermatology procedure, a Slow Mohs procedure, which was scheduled for September 18, 2023. Results the next day showed melanoma in situ at site 1 (located posterior to Left ear lobe). A second Slow Mohs procedure was performed the following day (9/20/2023) with results on 9/21/2023 showing no additional melanoma present. **Outcome/Comparison:** A Slow Mohs procedure is a staged surgical excision used to precisely remove skin cancer while trying to save as much normal healthy skin around it. The tissue is processed in the Mohs method to allow a pathologist to examine 100% of the margins and allow the surgeon to "trace" the roots. The procedure went as expected and the outcome was considered very good, with continued follow ups every 4 months for the first year, then back to 6 months thereafter. **Conclusion:** This case illustrates the need for regular skin checks and appropriate skin care for all people who spend a significant time in the sun. Learning what to look for as an individual can help to identify an irregular mole and know when a referral to a dermatologist is required. Suspicious changes to pigmented areas should be monitored and evaluated using the mnemonic ABCDE:

A – Asymmetry - What is the shape?
B – Border - What do the contours look like?
C – Color - How many colors?
D – Dimension - What size?
E – Evolution - Have you noticed a recent change in one of the above?

Clinical Bottom Line: Athletic Trainers, like any outdoor athlete, have the potential for significant UV exposure. Sun protection should include sunscreen, protective clothing and behavioral changes, including regular skin checks. Outdoor winter sports are just as susceptible to UV exposure as outdoor summer sports.

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Figure 1

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Specific Barriers to Athletic Trainers' Familiarity with and Attitudes Toward Concussion Biomarkers: A Phenomenological Qualitative Study

McCormick, TE, Allen, JM, Swindell, KGS, Campbell, TR: Old Dominion University, Norfolk, VA

Context: The diagnosis of concussions is largely reliant on subjective information in conjunction with objective measures that might not be the most valid and/or reliable. There is now new research being performed evaluating the use of biological indicators, or biomarkers in the diagnosis and management of concussion. However, the amount of knowledge about biomarkers among athletic trainers is unknown. Additionally, the barriers preventing ATs from using such biomarkers has yet to be studied. Therefore, the purpose of this study is to examine athletic trainers' familiarity with and their attitude towards concussion biomarkers, while evaluating specific barriers preventing their use in current clinical practices. **Methods:** The design of this study was a phenomenological qualitative research design. The participants for this study were recruited from a previous survey-based study in which participants were recruited through the National Athletic Trainer's Association (NATA) research survey service. Additionally, social media and snowball sampling were used to increase recruitment efforts. From this, there were several participants that stated they would be willing to participate in follow-up research. Then, a total of 11 participants, all of which were certified athletic trainers, comprised of five females and six males, were chosen at random to be part of the research. Data was collected via Zoom (*Zoom Video Communications*. Version 5.13. San Jose, CA: Yuan, Eric; 2022) interviews. All participants were asked the same nine questions by the same interviewer. The interviews were converted from speech to text transcripts, which were then reviewed by three additional researchers. Following that review, the participants were sent their transcripts to make any changes and/or provide clarifications. The final step was to go through each transcript as a research group and code each line by a theme and subcategory. **Results:** There were four themes total that were found within the transcripts. Each theme had at least two subcategories. The specific theme that is the focus of this presentation is "barriers specific to biomarker use". Within this theme, there were four subcategories, which were setting/population specific, resources, training, and cost. The order in which they are listed is from most lines coded to the least. There were 70 total words/phrases coded under setting/population specific, 59 under resources, 34 under training, and 21 under cost. **Conclusions:** Based on the results, it can be concluded that the amount of knowledge varies among athletic trainers, but most participants have a broad idea about what biomarkers are. It can also be concluded that athletic trainers see the potential of biomarker use but have concerns due to the various barriers discussed. Overall, athletic trainers need to see improvements in budgets, specific training, and more specific resources to effectively implement biomarkers into their concussion diagnosis and management practices. Many of the participants expressed concerns regarding not having the appropriate setting for such tools to be implemented, like a secondary school that does not typically have a large budget for the sports medicine department, as well as the appropriate and/or supportive stakeholders. Add in the gray areas about the resources that are needed to implement biomarkers and what the process would look like, as well as what training outside of athletic training would be, and athletic trainers feel left in the dark. While they have a generally positive view on the future of biomarkers, they do not know how it would come to fruition with these barriers.

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Non-Operative Management of Distal and Proximal Interphalangeal Fractures Without Excessive Sport Removal

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Background: Intra-articular fracturs of the distal interphalangeal (DIP) and proximal interphalangeal (PIP) joints occur primarily from impacted shear force. With continued participation, fractures have a high possibility of nonunion or malunion. While accounting for patients' requests may not always be possible, extreme modification of activity may permit their requests. **Patient:** The patient is a college-aged female volleyball athlete who plays in the front row. The initial report showed a fracture of the right fifth phalange from incomplete range of motion (ROM), swelling, and bruising after an impacted shear force was placed on her finger from a block. She was referred to have an X-ray. The initial X-ray showed a displaced bony mallet fracture of the distal phalanx and a comminuted intra-articular volar radial fracture of the middle phalanx. **Intervention:** The initial plan was to restrict movement of DIP with intermittent PIP motion. The athlete participated in modified practice ten days after initial injury with a splint that extended DIP and flexed PIP. The day following, the hand specialist stated that there was no need for surgery as the proximal fracture was stable and the distal fracture was not warranting surgery yet. Surgical intervention would have been more effective in the long-term, yet she expressed concerns about not having surgery as well, because she did not want to be removed from her sport for a long period of time. Following this, the PIP was to be in full extension at all times with no clearance to play and active assisted ROM of PIP needed to be performed every two hours. The 2nd week follow-up x-ray shows distal phalanx is healing and middle phalanx fracture is incomplete, she is clear for return-to-play (RTP) with conditions of no blocking with injured hand and Alumafoam splint with buddy tape. Active assisted ROM rehabilitation process begins and a Stax splint is worn on DIP joint at night. The 4th week post injury, another x-ray is performed showing distal phalanx mallet fracture has widened slightly and there is healing on middle phalanx. She continues to splint in practice with modification of it being a curved splint and Stax splint when outside of practice including during sleep. Following this, she started to have pain in metacarpal phalangeal joint and "pitch count style" was implemented to limit stress on her finger of twenty-eight attempts of hits per day with no blocking of right hand. In the 7th week since initial injury, the x-ray showed healing of distal fracture with incomplete but stable fracture of middle phalanx with no change in alignment and incomplete remodeling. Without the complete removal of play, the athlete was able to finish her final season in volleyball without permanent injury. **Outcomes:** At 7 weeks since initial injury, the x-ray showed healing of distal fracture with incomplete but stable fracture of middle phalanx. At 19 weeks post-injury, she still has mild pain, swelling, and stiffness, but the finger is functional. She is cleared to return to normal activities, with low probability of reinjury. **Conclusion:** The injury is a displaced bony mallet fracture of the distal phalanx and a comminuted intra-articular volar radial fracture of the middle phalanx. In the nineteen-week time period, she was minimally removed from sport with the implementation of extreme modification of activity per the athlete's request. **Clinical Bottom Line:** This case shows the importance of her sport to her as an athlete and the modification techniques implemented by her healthcare team to allow continued participation safely. In cases similar, accounting for patient requests with precautionary measures allows for continued participation without surgical intervention. By furthering research in modifications of activity, surgical intervention and removal of play has greater potential to be eliminated.

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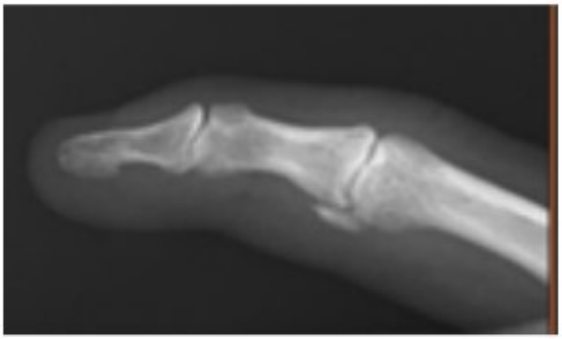
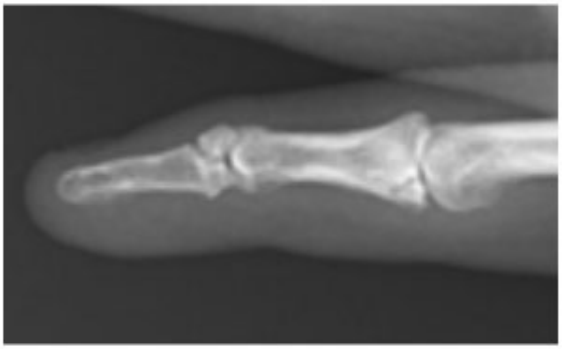
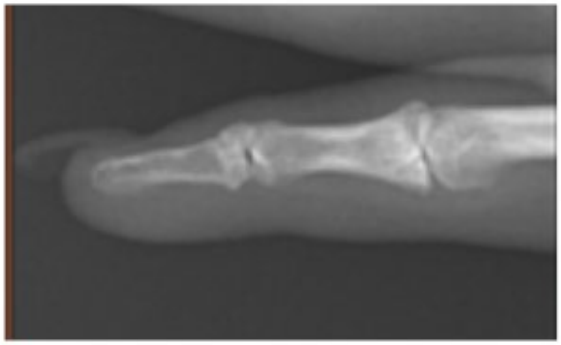


Initial injury X-ray. 8

2nd Week follow-up X-ray. 9



4th Week follow-up X-ray. 10



7th Week follow-up X-ray. 11

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Platelet-Rich-Plasma Injections vs. Corticosteroid Injections in the Reduction of Pain for Patients with Frozen Shoulder: A Critically Appraised Topic

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Focused Clinical Question: Is a platelet-rich plasma or a corticosteroid injection better for relieving pain for patients with frozen shoulder pathologies? **Data Sources:** To identify relevant research papers, Boolean searches were conducted on Google Scholar, CINAHL Ultimate, MEDLINE Ultimate, and SPORTDiscus databases from September 14th through September 25th, 2023. Key terms used were corticosteroid (CS) injection, platelet-rich-plasma (PRP) injection, frozen shoulder, and adhesive capsulitis. **Study Selection:** The inclusion criteria were: articles published from 2018-2023, Randomized Control Trials comparing PRP and CS injections, and studies that used visual analog scale (VAS). Additionally, each article selected summarized outcome measures in a table. **Data Extraction:** A VAS score was used as the main outcome measure for all three articles. Participants in each study were assessed pre-injection for PRP and CS injections for their pain levels. All articles collected VAS scores until 12 weeks post-injection and 2 studies continued to monitor patient pain levels through 24 weeks. **Summary Measures:** For statistical analyses, all studies included used a p-value of < 0.05 to determine statistical significance. P-values and mean VAS scores are used to compare articles within this CAT. **Evidence Appraisal:** The PEDro scale was used to appraise the quality of evidence included. **Search Results:** Three articles were selected for use in this CAT from the 15 articles that were screened. This process is outlined in Figure 1. **Data Synthesis:** In the study by Gupta et al., the mean VAS scores for PRP-injection were as follows: 67.4 (pre-injection), 43.23 (12 weeks), and 14.33 (24 weeks). The mean VAS scores for the CS-injection were 69.63 (pre-injection), 31.83 (12 weeks), and 31.63 (24 weeks). Statistical significance was found between groups at both 12 ($p=0.0001$) and 24 weeks ($p=0.0001$). In the study by Shahzad et al., the mean PRP-injection VAS scores were 8.9 (pre-injection) and 0.85 (12 weeks). The CS-injection had mean VAS scores of 9.5 (pre-injection) and 2.3 (12 weeks). Statistical significance was found with a p-value of 0.004. The third study by Somisetty et al., recorded mean PRP-injection VAS scores of 8.5 (pre-injection), 2 (12 weeks) and 1 (24 weeks). The mean VAS scores for the CS-injection were 8 (pre-injection), 3 (12 weeks), and 2 (24 weeks). Statistical significance was found at 12 and 24 weeks ($P=0.0011$). **Evidence Quality:** Results of article appraisal using the PEDro scale as follows: 8/10, 7/10, and 7/10. All articles lacked blinding of the participants and the therapist who administered the treatment. Two articles lacked blinding of the assessors as well. **Conclusions:** The purpose of this report was to compile the known evidence regarding the effect of PRP and CS injections on frozen shoulder. Grade A evidence found that PRP injections had significantly decreased VAS scores compared to CS for long-term results. Evidence was inconclusive for short-term benefits. Future research should be conducted to determine the best treatment for immediate relief.

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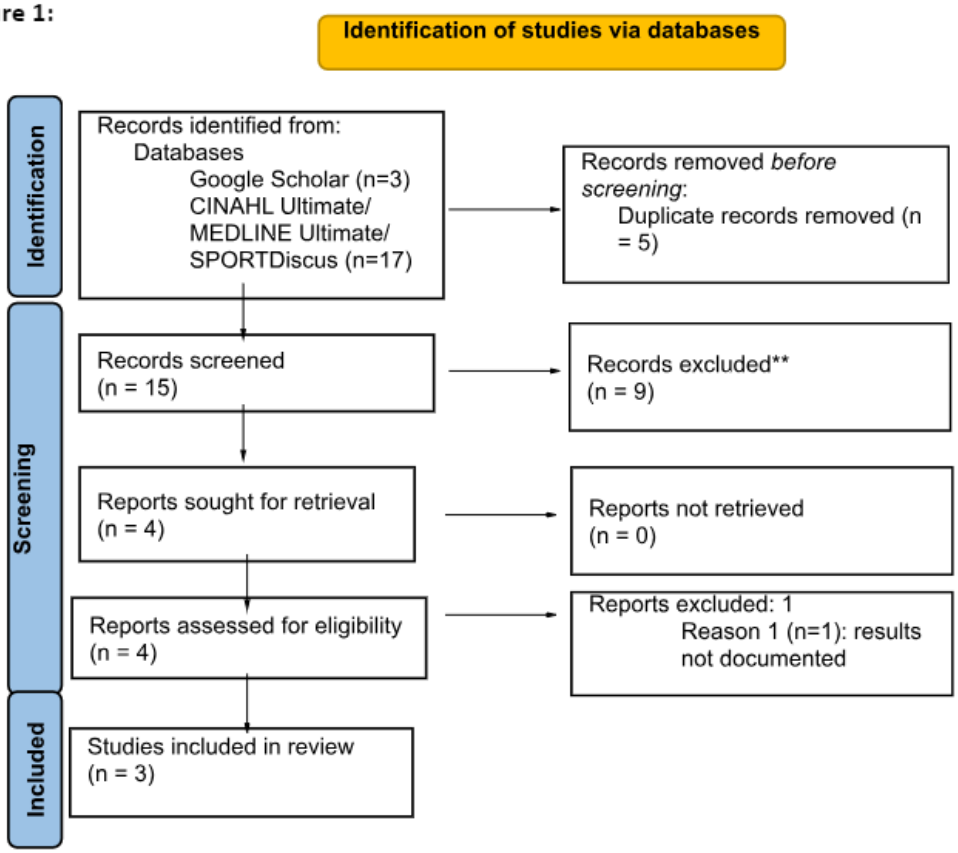
Figure 1:



From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

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Cyclops Lesion In a Collegiate Men's Lacrosse Player: A Type 4 Clinical CASE Study

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Background: In late July 2023, a 20-year-old male division I lacrosse player reported to the Athletic Training clinic with pain, swelling, and an inability to fully extend his left knee. Evaluation revealed an extension deficit of 5 – 10° during active range of motion (ROM). The patient had previously undergone a double-bundle procedure to repair a torn anterior cruciate ligament (ACL) in his left knee in November 2022. Following this surgery, the patient completed a standard but conservative ACL reconstruction (ACLR) rehabilitation program as prescribed by the sports medicine team but switched to a light strength training regimen on his own during summer break. Upon return to campus, the patient reported he had experienced lingering pain, swelling, and lack of full knee motion. Notably, the patient had a previous ACL injury in his contralateral knee and underwent single-bundle ACLR prior to beginning his collegiate career. Following this first surgery, the patient was discovered to have a cyclops lesion on the patellar tendon graft and underwent operative excision to remove the lesion. Given his present symptoms, extension deficit, and previous history, the patient was given a platelet-rich plasma (PRP) injection for his symptoms that paused his strength training program. As symptoms lingered, the patient was referred to the team physician who prescribed diagnostic imaging. MRI findings revealed the presence of a cyclops lesion on the anterolateral aspect of the tibial insertion site of the ACL graft. **Differential Diagnosis:** Radial tear of the meniscus, chronic injury of the distal ACL, excessive joint effusion, cyclops lesion. **Treatment:** Prior to the onset of postoperative symptoms following ACLR rehabilitation for his left knee, the patient performed little to no rehabilitation or exercise. Upon discovery of the cyclops lesion, the sports medicine team determined that surgery was required and delayed further rehabilitation until operative treatment was performed. In September 2023, the patient underwent left knee arthroscopy for debridement of the surrounding structures and excision of the cyclops lesion. Following this surgery, the patient completed a rehabilitation program that mimicked that of an accelerated ACLR rehabilitation plan and returned to play within two months of the cyclops lesion removal. **Uniqueness:** Cyclops lesions refer to fibrous nodules composed of granulated tissue that often present in front of a graft following ACLR. The novelty of this present case is specific to the rarity of this condition, the presence of symptoms, and the athlete's prior injury history (cyclops lesion following ACLR of right knee). Prior reports indicate that cyclops lesions present in only 1 – 10% of all ACLRs, and only 2 – 10% of these cases are symptomatic. The patient presented with a loss of knee extension and pain with activity (e.g., running), findings consistent with prior research of symptomatic cases. Roughly 90% of cyclops lesion cases are diagnosed within six months following ACLR. In this case, the patient presented with increased symptoms and an extension deficit roughly eight months following ACLR. Lastly, and related to the ACLR surgical approach, the incidence of cyclops lesions has been found to be greater following double-bundle graft reconstruction in comparison to single-bundle and hamstring graft ACLR. The patient reported having undergone a single-bundle ACLR for his prior ACL injury (pre-college), yet he underwent a double-bundle procedure for his right knee. Notably, the patient was diagnosed with cyclops lesions following both procedures. **Conclusion:** Although the incidence of cyclops lesions is rare and few are symptomatic, it can be a cause of pain and restricted motion weeks to months following ACLR. In cases where a patient presents with increasing pain and an extension deficit several months following ACLR, the athletic trainer should consider the potential involvement of a cyclops lesion.

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Influence Of Thermal Protective Gear On Rural Volunteer Firefighter Postural Stability

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Context: Firefighting is a physically demanding job. The ability to maintain and appropriately adjust postural stability is vital for the safety of firefighters, as they navigate through unpredictable terrain in various rescue situations while wearing restrictive equipment. The weight and design of thermal protective gear (TPG) may alter weight distribution causing changes to the center of gravity or restrict movement. The need for firefighters to maintain postural stability is essential for preventing falls on- duty. The purpose of this study was to assess the influence of TPG on rural volunteer firefighter (VFF) postural stability. **Methods**: Nine healthy males (mean±SD: age= 41±9.3 years; ungeared body mass= 96.47 ± 14.51kg; ungeared height=181.67 ± 4.48cm; VFF experience 8 years) participated in a cross- sectional correlation study during three visits to a university research laboratory. The TPG in this investigation included thermal pants, jacket, boots, and a standardized helmet and self-contained breathing apparatus (SCBA) with respirator. Postural stability was assessed with and without TPG using a multiaxial device consisting of a dynamic, spring-loaded platform. Assessments consisted of 3, 30s trials with participants attempting to maintain a single leg stance on the right leg, with two conditions, eyes open (EO) then eyes closed (EC). During assessment, the multiaxial stability platform started in a locked position then progressively released to 50% of the device's available dynamic capacity. Statistical analysis to determine performance differences between the ungeared and geared conditions were conducted using paired sample t-tests and Pearson's coefficient correlations to evaluate relationships between ungeared and geared condition performance. Level of significance was determined as $\alpha \leq 0.05$. **Results**: TPG added an average 25.63kg additional weight to participants (mean±SD geared weight= 122.09±15.47kg). There was a significant difference between ungeared and geared EO Anterior-Posterior Index (API) (p=0.03) that presented with a large effect size (d: -0.73). A significant difference between ungeared and geared EC Overall Stability Index (OSI) with a moderately large effect size was also found (p=0.032, d: - 0.72). Overall Stability Index and API demonstrated a positive, significant correlation in the geared condition with EO (r=0.822-0.975, p=<.001-.008), while OSI and API for the ungeared EO condition exhibited moderate to strong significant, positive relations (r= 0.576-0.780, p=<.001-.013). **Conclusions:** The results of this study indicate a strong relationship between geared conditions and higher index scores. Wearing TPG while EO negatively affected balance compared to ungeared trials. The influence of EC significantly decreased postural stability with TPG. The correlations identified between API and OSI affirm that OSI is a composite score with anterior-posterior sway as an influential factor. The additional weight from the TPG may complicate postural stability capacity of volunteer firefighters, especially in the absence of clear visual input which is often encountered during fire rescue situations.

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Weighted Ball Programs And Medial Elbow Injury In Youth Baseball Pitchers

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Introduction: Weighted ball programs have been proven to increase pitching velocity, however a combination of poor musculature and body mechanics with increased elbow valgus can heighten the incidence of medial elbow overuse injuries in the youth population. **Clinical Question:** Can youth baseball pitchers who use weighted ball programs increase their pitching velocity without causing an increased risk of medial elbow injury? **Methods:** The literature was explored to discover studies that investigated medial elbow injuries using weighted ball programs in youth baseball pitchers. Articles included weighted ball programs as an intervention, kinetics/injury mechanics, youth elbow injuries, and prevention of overuse injuries. Studies were excluded if athletes were over 18 years old, collegiate or professional athletes, or other treatment methods were used. Five key studies were ultimately selected in this critical appraisal. **Results:** In Reinold et al, the experimental group underwent a 6-week weighted ball program and displayed a statistically significant 1 m/s increase in the training group representing a 3.3% increase in ball speed. There were 4 elbow injuries in this group (24%) that required medical intervention. In Okoroha et al, medial elbow torque increased by 0.92 Nm, arm speed decreased 8.52 rpm, and pitch velocity decreased 2.0 mph per 1oz increase in ball weight. Moore et al illustrated when throwing the 3oz baseball, the pitchers decreased their elbow varus torque compared to the 5oz baseball. Mahure et al indicated that the incidence of UCL reconstruction surgeries is expected to increase remarkably for those between 15-19 years old through 2025. **Translation to Practice:** Research supports the use of weighted ball programs to increase pitch velocity, but more evidence is needed to detect how this influences injury rate. Weighted ball programs should be approached with caution and utilize proper coaching to decrease incidence of medial elbow injuries in youth athletes.

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Presentation of an Accessory Navicular Bone in a Collegiate Women's Field Hockey Player: A Type 3 Clinical CASE Study

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Background: The accessory navicular is an extra bone located posterior and medial to the navicular tuberosity. The prevalence of accessory navicular has been reported to be 4 - 21% in the general population though this anatomical variant may often be overlooked during differential diagnosis. This case presents a female collegiate field hockey patient that was initially diagnosed with a midfoot sprain but was later determined to have an accessory navicular bone which required surgical removal. **Patient:** A 19-year-old female Division I collegiate field hockey patient presented to the athletic training clinic with pain in her left medial foot. The patient could not recall a specific MOI and reported noticing the pain after an in-season game. Patient had no previous injury history to her left foot or ankle. Physical examination revealed mild edema over the left navicular bone with point tenderness on the navicular, medial cuneiform, and the anterior aspect of the deltoid ligament complex. Pain was reported with eversion during active and passive ROM. MMT of the peroneus longus and brevis, and anterior tibialis revealed 5/5 strength; posterior tibialis and peroneal tertius measured 4/5 strength. Further evaluation revealed navicular pain during metatarsal glides (1st and 2nd), Kleiger's, and Eversion Talar Tilt Tests. Results for the calcaneal bump and lower leg compression squeeze tests were negative. **Intervention & Treatment:** The patient was treated for a midfoot sprain and permitted to participate in sport-related activities as tolerated. Initial therapy focused on pain and edema control and strengthening the muscles of the foot and ankle. Prior to sport activity, a donut pad was placed over the navicular and a modified teardrop low dye arch tape was applied. At 3 weeks post-injury, the patient reported increased pain that was now present after sport-related activities and during the toe-off phase of walking. Additionally, the patient reported pain in her left Achilles tendon and stated she purposely altered her running gait to decrease impact on her medial foot. Over the next 2 weeks, rehabilitation was modified to include soft tissue therapy consisting of dry needling over the Achilles tendon and midfoot area and instrument assisted soft tissue mobilization to the posterior lower leg. Additionally, a joint decision was made by the team physician, athletic trainer, coach, and patient to allow the patient to continue play throughout the remainder of the season as tolerated. Management would include continued rehabilitation and taping prior to activity, and administration of a walking boot which was to be worn at the start each week as needed. Activity modification included having the patient routinely complete non-impact conditioning in place of practice to maximize her health for end-of-week game play. Diagnostic imaging taken at 8 weeks post-injury revealed an os supranaviculare, which would require surgical excision. Following the season, the patient underwent a modified Kidner Procedure to remove the accessory navicular. **Outcomes or other Comparison:** Due to increasing pain and unresponsiveness to conservative treatment, the patient was discovered to have an accessory navicular bone. However, the injury management plan was successful in permitting the patient to play the entire competitive season as tolerated. **Conclusion:** In this case, the patient originally presented with findings consistent with a medial midfoot sprain though the presence of an accessory navicular bone would ultimately be discovered. Following the season, the patient underwent a modified Kidner Procedure to remove the accessory navicular bone. **Clinical Bottom Line:** Symptomatic accessory naviculars have been reported to occur more frequently in young, active women though diagnosis is often missed or delayed. In cases where a patient presents with medial midfoot pain with no specific MOI, and is unresponsive to therapeutic treatment, the athletic trainer should consider the potential involvement of an accessory navicular.

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Treatment Timeline Figures:

Patient Therapeutic Intervention Program Prior to Surgical Procedure				
Therapeutic Intervention Program Dates (completed Monday - Friday)	**Therapeutic Intervention Exercise Program**	**Resistance**	**Number of Sets**	**Number of Repetitions**
Week 1	Towel scrunches	1 lb	3	1
	Towel swipes	3 lbs	3	1
	Seated heel lifts	Against gravity	3	10
	Seated toe flexion and extension (added on Day 3)	Against gravity	3	10
	Seated toe spreads (added on Day 3)	Against gravity	1	50
	Standing short foots (added on Day 3)	Body Weight	2	10
	Modified Tear Drop Arch Tape	-	-	-
	Navicular Joint Mobilization	-	-	-
Week 2	Same as week 1	Same as week 1	Same as week 1	Same as week 1
	Seated heel lift with ball squeeze	1 lb	3	10
	Long sit position - ankle inversion	Theraband Resistance Progression	2	15
Week 3	Same as week 2	Same as week 2	Same as week 2	Same as week 2
	Standing heel lift with ball squeeze	1 lb	3	10
	Long sit position - ankle inversion	Theraband Resistance Progression	2	15
Week 4	Same as week 3	Same as week 3; progressed to Theraband resistance with seated toe flexion and extension	Same as week 3	Same as week 3
	Dry needling over Achilles Tendon and Midfoot	-	-	-
	Instrument Assisted Soft Tissue Mobilization over posterior leg	-	-	-
Week 5	Same as week 4	Same as week 4	Same as week 4	Same as week 4
Week 6	Towel scrunches	4 lbs	3	1
	Towel swipes	4 lbs	3	1
	Seated toe flexion and extension	Theraband Resistance Progression	3	10
	Seated toe spreads	Against gravity	1	50
	Seated short foots	Against gravity	2	10
	Seated heel lift with ball squeeze	1 lb	1	10
	Standing heel lift with ball squeeze	1 lb	2	10
Week 7	Same as week 6	Same as week 6	Same as week 6	Same as week 6
	Instrument Assisted Soft Tissue Mobilization over posterior leg	-	-	-
Week 8	Towel scrunches	4 lbs	3	1
	Towel swipes	4 lbs	3	1
	Seated heel lifts	Against gravity	3	10
	Seated toe flexion and extension	Theraband Resistance Progression (red flexion; green extension)	3	10
	Seated toe Spreads	Theraband Resistance Progression	1	50
	Seated short foots	Against gravity	2	10
	Seated heel lift with ball squeeze	1 lb	1	10
	Seated heel press downward against ball	Foam ball	2	1 minute
	Seated inversion isometric holds (heels together)	Bodyweight	15	3 second hold
Week 9	Same as week 8	Same as week 8	Same as week 8	Same as week 8
	Gastrocnemius and Soleus stretch	Bodyweight	3	30 second hold
	At week 9 the patient underwent an x-ray and MRI which resulted in the patient wearing a boot during activities of daily living			
Week 10	Same as week 9	Same as week 9	Same as week 9	Same as week 9
Week 11	Same as week 10	Same as week 10	Same as week 10	Same as week 10
Week 12	Same as week 11	Same as week 11	Same as week 11	Same as week 11

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A Qualitative Study Evaluating Athletic Trainers' Self-Perceived Knowledge and Knowledge Acquisition of Concussion Biomarkers

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Context: Rapid movement of the brain caused by a concussion can damage brain cells and create chemical changes within the brain, which may cause lasting neurological, cognitive, and behavioral symptoms. It is suggested that following a trauma, biomarkers can be released which may be useful in accurately diagnosing concussions. Potential biomarkers being studied include β-amyloid peptide 42 [Aβ42], S100 calcium-binding protein B [S100B], glial fibrillation acidic protein [GFAB], microtubule-associated protein 2 [MAP2], and 2',3'-cyclic-nucleotide 3'- phosphodiesterase [CNPase]. This study focuses on evaluating AT knowledge and awareness of biomarkers, with sub-analyses evaluating ATs' perception of current knowledge of biomarkers, and the acquisition of current knowledge of biomarkers. These themes are derived from a larger study, titled, "Athletic Trainers Familiarity with and Their Attitudes Towards Concussion Biomarkers: A Qualitative Study." **Methods:** A phenomenological qualitative research design was used where 1 researcher separately interviewed the participants with the same series of 9 questions. Participants were recruited from the National Athletic Trainer's Association (NATA) research survey service, snowball sampling, and social media recruitment. Interviews were conducted remotely using Zoom (*Zoom Video Communications*. Version 5.13 San Jose, CA: Yuan, Eric; 2022) where the speech was converted into text, via Zoom's Automatic Transcription. There were 11 participants, all are certified ATs from a variety of settings, with 5 females and 6 males. The study process involved data analysis through a consensual qualitative research traditional process broken down into five cycles, which created a codebook. For this study, the codes being used are from Theme 1 and are codes 1A and 1B. **Results:** Out of the 11 participants, 3 of them indicated no prior knowledge of biomarkers and their use in relation to concussions, due to lack of being exposed to biomarkers and lack of necessity to research them due to their work setting, with 2 university and 1 secondary school settings. Five participants indicated minimal prior knowledge, with 1 occupational, 2 secondary school, and 2 university settings. They acquired their knowledge through research, attending conferences, and by word of mouth. They stated that they did not have a large amount of knowledge due to their work environments, are established with their concussion diagnosis/management practices, and it not in discussion in their respective settings. One participant, at a secondary school, indicated a decent amount of prior knowledge and stated that they acquired their knowledge through their research. Two participants indicated a considerable amount of prior knowledge and stated that they acquired their knowledge at work, 1 military/university/research and 1 research. **Conclusion:** This study concluded that the majority of the participants have minimal prior knowledge of biomarkers and their use with concussions. The majority did not receive any formal training or education on biomarkers and gained their knowledge through their efforts. Biomarkers are not a current discussion in the majority of work settings of ATs due to a variety of obstacles. Due to lack of knowledge, formal training, and education, it would be difficult to implement biomarkers in relation to concussions in the athletic training field in the near future. With further research on this topic, conducting more studies similar to this one, and providing opportunities for formal education and training to ATs, implementation of biomarkers for concussion diagnosis and treatment in the athletic training field may be possible in the future.

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The Food Environment of Female Athletes Attending Historically Black Colleges and Universities: A Qualitative Study on the Dimensions of Food Access and Nutrition

Uriegas NA, Winkelmann ZK, Emerson DM, Ortaglia A, Torres-McGehee TM: University of South Carolina, Columbia, SC

Context: Student-athletes are a subset of college students who face additional stressors related to the demands of their sport and academic workload. The food choices of student-athletes may be influenced by the unique food environment they are in. Further challenges may present for Historically Black Colleges and Universities (HBCUs) student-athletes as their institutions tend to be in low food access areas. We aimed to assess food security and explore the lived experiences of HBCU female student-athletes surrounding their food environment and ability to access food based on the five dimensions of food access: availability, accessibility, affordability, accommodation, and acceptability. **Methods:** This qualitative study used a semi-structured interview protocol derived from quantitative data to explore the lived experiences of 10 HBCU female athletes (age = 19 ± 1 years) living in on-campus dormitories. Participants answered the US Department of Agriculture Six-Item Short Form of the Food Security Survey Module as part of the interview. Participants were recruited after completing a quantitative study examining energy needs and availability. Interviews lasted approximately 30 minutes and were recorded and transcribed verbatim using virtual transcription services as part of a web-based conferencing platform. Data were analyzed by three coders using the consensual qualitative research tradition. Trustworthiness was established using member checking, multi-analyst triangulation, and external auditing. **Results**: Food security status varied across participants, resulting in an even split (50/50) between food security and food insecurity. Four domains emerged from the interviews: 1) on-campus living, 2) personal, 3) convenience, and 4) nutritional awareness. The participants shared available food sources on campus and within their community and the challenges of living in an on-campus dormitory with limited resources to make their meals, something they wished they could do more of. They discussed that while having various food sources, at times, it is not what they would like to eat; it may not look appealing to them, or they may perceive the food as unhealthy. Participants detailed timing conflicts as a challenge to fuel properly and rely on quick options such as frozen meals and snacks on the go to fuel during the day. Following the quantitative study, athletes reflected on their nutritional habits and detailed an understanding they do not fuel appropriately for the activities they engage in. Additionally, female athletes reported having some form of nutritional knowledge sources in the past, but these were typically informal conversations before their enrollment at their current institution. **Conclusion**: Although HBCU female student-athletes have options at school and in their community, our findings suggest they may require modifications based on timing and schedules to meet their needs. HBCU administrators, athletic trainers, and coaches should collaborate with the athletes to explore community resources and public benefits such as Supplemental Nutrition Assistance Program (SNAP) benefits and food banks, update antiquated dorm policies, and provide nutritional education resources specific to their needs.

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An Investigation of Lower Extremity Injuries in Soccer Athletes Related to their Playing Environment

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Context: The goal of this study was to investigate a connection between cleat type, surface type, and increased lower extremity injury rates in soccer athletes. Our hypothesis was that the cleat model, surface type, and facility affected the lower extremity injury rate among soccer athletes. **Methods:** A review of survey results distributed to the male and female soccer from an NCAA D-I program was completed. The survey investigated athlete injury history related to the specific shoe worn and the field surface information where the injury occurred. Measures of central tendency were calculated. Data was analyzed using a correlation analysis with the alpha level set at 0.05. **Results:** Twenty-one athletes completed the survey. Of the participants, 13 were between the ages of 18 and 20, while seven were between the ages of 21 and 23. Females were 52.38% of the respondents, while 42.86% were men. The breakdown in the type of cleat worn by the athletes is as follows: NIKE MERCURIALS (9), NIKE PHANTOMS (4), NIKE TIEMPOS (6), and NIKE PREMIER (1). Out of 50 possible respondents, 21 were completed (42%). Of the 21 respondents, 13 (61.9%) reported a soccer-related injury last season. Athletes reported 10 acute injuries and 4 chronic injuries lasting longer than 6 months. The direct mechanism of injury saw 9 non-contact mechanisms, while 5 suffered a contact injury. Nineteen injuries occurred in practice, and 8 were during a game. Injuries occurred more frequently at home (11 or 52.38%) during practice (10). Injuries occurred more frequently on artificial turf (52.38%) than on natural grass (14.28%). The multiple linear regression analysis reported no significant findings. **Conclusions:** Our study investigated the relationship between cleat type, surface type, and increased lower extremity injury rates in soccer athletes. We rejected our hypothesis based on the statistical analysis as our results found no connection to an increased lower extremity injury rate despite the cleat worn or surface. Our results contradict other published research indicating a correlation between cleat type, surface type, and lower extremity injury rates. Studies demonstrated lower extremity injury rates increase daily by 16% on artificial turf (old-generation and new-generation) with increased ankle and foot injuries. Natural and artificial surfaces are guilty of increased hip and knee injury, with females having a significant increase in anterior cruciate ligament injury risk playing on natural grass. A limitation of our study was the small number of participants, which affected the findings. The response rate was at a lower level than hoped.

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Caffeine Consumption on Sports Performance Measures in College Athletes: A Critically Appraised Topic

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Focused Clinical Question: How does caffeine (CAF) consumption affect sports performance measures in healthy college athletes? **Data Sources:** In December 2023, PubMed was utilized to search key terms, including collegiate athlete, caffeine, and performance measures. A publication time frame from 2013-2023 was established. **Study Selections:** Inclusion criteria consisted of studies investigating collegiate athletes ingesting CAF and its impact on anaerobic, agility, and speed performance measures. Exclusion criteria consisted of participants with current injuries and ingredients consumed in addition to CAF. **Data Extraction:** Outcomes included sports performance measures such as: vertical jump test, 60- and 100-meter time trials, reaction time, maximum voluntary isometric contractions (MVIC), and anaerobic muscle endurance through the submaximal voluntary isometric contractions fatigue protocol (T lim). **Summary Measures:** Statistical analyses were performed utilizing non-parametric Kruskal-Wallis tests, paired-sample t-tests, and analyses of variance (ANOVAs). **Evidence Appraisal:** All included studies were randomized-controlled trials. Quality of evidence was assessed using the PEDro Critical Appraisal Checklist. **Search Results:** The computerized search resulted in 42 studies. Thirty-seven were excluded due to not being published within the past 10 years. The remaining 5 met all inclusion criteria. **Data Synthesis:** All included studies supported that CAF has a positive effect on sports performance measures. One study found that reaction time was faster after consumption of a CAF supplement in comparison to placebo (PL) (CAF: +0.4 to 7.5%; PL: -1.4 to 1.4%, $p<0.5$). Another study found that reaction time was significantly faster ($p<0.01$) with CAF dosages of 1.5-6 $mg \cdot kg^{-1}$ (1.5 (0.7±0.02 s), 3.0 (0.71±0.02 s), and 6.0 $mg \cdot kg^{-1}$ (0.69+0.02 s) compared to placebo (0.73±0.02 s). The third study established that up to 6 mg/kg of CAF significantly increased MVIC (male: ↑5.1%; female: ↑6.7%, $p<0.05$) and T lim (male: ↑16.6%; female: ↑14.4%). The fourth study measured explosive lower body power, finding higher doses of CAF, from 3 to 6 mg/kg, significantly improved vertical jump height (57.00±6.38 vs. 60.33±5.51, $p<0.001$). The last study measured speed with a 60- and 100-meter sprint; CAF intake significantly decreased sprint time by 0.14 seconds in 100-meter test (CAF: 11.26±0.33 s, PL: 11.40±0.39 s; $p = 0.007$). The 60-meter sprint time was also decreased compared to the placebo (CAF: 7.03±0.17 s; PL: 7.12±0.20 s; $p=0.002$). **Evidence Quality:** Articles received 8/11, 9/11, 9/11, 11/11, and 9/11 on the PEDro scale. Lost points were due to a lack of establishing eligibility criteria, lack of random allocation to groups, not concealing allocation, and lack of assessor blinding. **Conclusion:** There is a moderate amount of evidence indicating that CAF intake can positively affect various athletic performance measures in the collegiate athlete population. These findings indicate a strength of recommendation A due to the high quality, consistent, and patient-oriented results. Further research should examine additional advantages and disadvantages of CAF consumption on sports performance.

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Southwest Athletic Trainers' Association Free Communications Abstract Presentations

The following abstracts were accepted and presented at the 69th Southwest Athletic Trainers' Association (SWATA) Symposium, 2024.

Individual Goal and Velocity Based Throwing Program for Collegiate Baseball Pitchers with Medial Elbow Injuries.

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Background: A 22-year-old male collegiate baseball pitcher experienced sudden pain in the medial left elbow following feeling a pop when pitching. The pitcher was removed from the competition and was evaluated with a point-of-care ultrasound at the conclusion of the competition. Ultrasound revealed an intact ulnar collateral ligament (UCL) and no edema. **Differential Diagnosis:** UCL sprain, Wrist flexor strain **Treatment:** The patient was referred to a primary care sports medicine physician for further evaluation. The physician found no tenderness or laxity at the UCL and ordered an MRI arthrogram for further diagnostic information. MRI revealed a grade II flexor digitorum superficialis strain. After consultation with the physician and athletic trainer, a return-to-play protocol involving a platelet-rich plasma (PRP) injection, therapeutic exercise, individual goal, and velocity-based interval throwing program was agreed upon. 20 days following injury, the patient received an ultrasound-guided PRP injection at the site of injury. 24 days following injury, the patient achieved a full range of motion after the injection. As such, the patient began isometric exercises. 26 days after injury, the patient began resistance exercise for the forearm extensors, flexors, pronators, supinators, and finger intrinsics with blood flow restriction. Prior to beginning the interval throwing program, the pitcher met with the athletic trainer to discuss individualized goals and milestones with the pitcher's input being taken into account. 31 days after injury, the patient began the individual goal and velocity-based throwing program shown in Table 1. 52 days after injury, the patient was able to successfully return to competitive pitching without complication. **Uniqueness:** While the flexor strains at the elbow are common injuries among baseball pitchers, the majority of throwing programs are distance based rather than velocity based. Additionally, many of these programs have been shown in previous research to be generic, and even arbitrary in some cases. This case details the use of an individual goal and velocity-based interval throwing program to progress a pitcher back to competition. By adding in individualized goals set by the patient, there was an opportunity to give the patient a greater sense of agency in his return to play process. Additionally, the velocity-based aspect of the program allowed objective data to dictate progression to the next phase of the throwing program. **Conclusions:** When attempting to return of an overhead throwing athlete to participation, it is important to incorporate individualized goals and objective measures of performance. Doing so has the potential to increase patient compliance and provides a more measurable means of progressing to the next phase of return to play. As diligent clinicians, athletic trainers should assess and reassess any return-to-play protocol a patient is completing to ensure optimal outcomes.

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Table 1. Individual Goal and Velocity Based Throwing Program

Timeframe	Throws	Percentage of Max Velocity (84 mph)	Target Velocity
Day 1-3	2x20	70%	59-61 mph
Day 4	1x20	70%	59-61 mph
Day 5	2x20 1x10	70% 75%	59-61 mph 63-65 mph
Day 6 & 7	2x20	75%	63-65 mph
Day 7	Rest	Rest	Rest
Day 8 & 9	2x20 1x10	75% 85%	63-65 mph 72-74 mph
Day 10	1x20	85%	72-74 mph
Day 11	Preparation	Preparation	Preparation
Day 12	1x20	80% Bullpen (89 mph max)	71-83 mph
Day 13	Recovery	Recovery	Recovery
Day 14	Rest	Rest	Rest
Day 15 & 16	2x20	90%	76-78 mph
Day 17	Preparation	Preparation	Preparation
Day 18	1x20	90% Bullpen (89 mph max)	80-82 mph
Day 19	Recovery	Recovery	Recovery
Day 20	Rest	Rest	Rest
Day 22	Preparation	Preparation	Preparation
Day 23	Competition	Competition	Competition
Day 33 & 34	3x20	90%	81-87 mph

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Continuing Education Seminar's Impact on Knowledge and Retention among Athletic Trainers.

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Context: The athletic training profession requires continuing education (CE) to maintain their national practice credential. Recent research has shown healthcare professionals to have knowledge and skill declines post-continuing education courses. Even with the CE mandate and available research, there is little evidence on the effectiveness of continuing education in the profession of athletic training. There is also a lack of research on the impact of a CE seminar assessing behavior change post-seminar. Therefore, the purpose of this study is to determine the impact of an educational seminar on participant knowledge gain, knowledge retention, and reported use of ES for pain management. **Methods:** An electronic survey was sent to preceptors at a CAATE accredited institution and recipients were encouraged to use snowball recruiting. A total of 48 certified athletic trainers, from two samples, with an average of seven years of experience, started this study. A web-based survey assessed educational history, current use, perceived and actual knowledge of electrical stimulation. Participants attended a 1.5-hour seminar and completed surveys pre-seminar, post-seminar, and at one-month follow-up. Basic descriptive statistics were calculated for all responses and scores. Paired t-tests were used to assess changes over time on knowledge, with significance set at $p < .05$. Independent samples t-testing, with Levene's test for equality of variance and means, was performed to ensure samples could be pooled. Related-Samples Wilcoxon signed rank test was used to assess differences between usage for acute and post-operative pain. **Results:** A total of 41 participants completed the post-seminar survey and 30 of those completed the one-month follow-up survey (62.5% response rate). Most (82.9%, $n = 34$) participants rated the seminar as excellent. Participants ($n = 41$) demonstrated a significant improvement in perceived ($t(40) = 7.03$, $p < .001$) and actual knowledge scores ($t(40)= 5.08$, $p < .001$) post-seminar. Those who completed the one-month follow-up survey ($n=30$) demonstrated a significant increase in perceived knowledge ($t(29)= 5.11$, $p < .001$) post-seminar. Perceived knowledge scores decreased significantly on the one-month follow-up survey ($t(29)= 3.17$, $p = .004$) but remained significantly higher than pre-seminar ($t(29)= 3.13$, $p = .004$). The participants also demonstrated a significant increase in actual knowledge post-seminar ($t(29)= 3.03$, $p = .003$) and remained significantly higher than pre-seminar at the one-month follow-up surveys ($t(29)= 3.69$, $p < .001$). The frequency of use for electrical stimulation showed no significant difference for acute pain ($Z = -.816$, $p = .414$) or post-operative pain usage ($Z = -.465$, $p = .642$). **Conclusion:** These findings suggest that the presentation was effective for improving both perceived and actual knowledge scores in athletic trainers and was well received by the participants. The seminar was not effective for increasing the use of electrical stimulation in the sample.

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Myositis Ossificans in a Female Sprinter with the Sickle Cell Trait

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Background: Sickle cell trait (SCT) is associated with an increase in muscle breakdown after strenuous exercise due to improper blood flow to active muscles. Evidence suggests that individuals with SCT can increase muscle breakdown during exercise by as much as 54%. This case outlines a 21-year-old African collegiate sprinter with SCT who reported feeling a "pop" in her right hamstring that caused her to stop running mid-race. She reported that no pain was associated with the "pop" but was scared by the sensation. Evaluations of strength and range of motion were all unremarkable and there were no palpable deformities. She continued in her sport for 3 months until she suffered a similar injury on the left hamstring, again with an unremarkable evaluation. Because of a history of hamstring strains, she was referred to the team physician, where inflammation and a hardened nodule on the earlier-injured right hamstring led to ordering of bilateral magnetic resonance imaging (MRI). **Differential Diagnosis:** Hamstring strain, avulsion injury, hamstring tendinitis, adductor strain, and myositis ossificans were suspected. **Treatment:** The MRI revealed bilateral Grade 2 hamstring strains with evidence of prior ruptures in the mid-belly of the right hamstring, along with myositis ossificans (MO) and hematoma. The hematoma was aspirated, and the athlete began a rehabilitation protocol to get her back to running activity. However, after 2 months, the athlete was referred for a 2nd MRI due to an inability to sprint at full speed without pain. This MRI revealed that the MO and strain were still present, warranting a platelet-rich-plasma (PRP) injection to improve healing. Following the injection, the athlete returned to running for 3 months; however, she was unable to fully sprint without pain. A subsequent ultrasound showed that the MO had grown, and the decision was made to surgically remove the MO, followed by a rehabilitation program centered around restrengthening the hamstring. After 4 months of this program and running with the athletic trainer, she returned to practicing with the team. A month following the athlete's return to sport, she felt a "pop" in her right quadricep while performing a reverse lunge. She was referred to the team physician, where a 3rd MRI scan was ordered. This scan revealed a Grade 2 strain in her rectus femoris with the presence of MO. This 2nd incidence of MO led to a consideration by her team athletic trainer that SCT might be a contributing factor to its development. Taking this into account, a PRP injection was administered to the quadriceps with the intent that the calcium deposits would resorb. The athlete began restrengthening exercises and a running progression that involved the use of an Alter-G treadmill, coupled with ample rest and hydration periods to combat a potential sickling event. Within 3 months from the PRP, she was able to fully compete. **Uniqueness:** There is scant research on myositis ossificans for athletes with SCT. The athlete in this case had repetitive tissue damage and the presence of MO, which may be related to muscle breakdown as a result of harboring SCT. Furthermore, this athlete did not initially present with common symptoms of a hamstring strain such as immediate pain, swelling, tenderness, palpable defect, and loss of function. The subsequent calcification that occurred in the rectus femoris created a potential link for MO and SCT given the 2nd incidence in a short time. **Conclusion:** This case describes a 21-year-old African sprinter with SCT, and multiple incidences of MO. Establishing if a link exists between MO and SCT could help provide better care for athletes harboring the SCT gene.

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Esophageal Candidiasis in a Baseball Athlete

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Background: Candidiasis is a yeast-based fungal infection often found in immunocompromised individuals, that can produce white patches, redness or soreness in the mouth, xerostomia, loss of taste, pain with eating and swallowing, and angular cheilitis. The patient in this case is a 21-yearold male baseball player who presented to the athletic trainer (AT) with flu-like symptoms such as fever, cough, body aches, shortness of breath, and chills. The AT referred the patient to the team physician, who prescribed Zithromax five days after the onset of symptoms for bronchitis. There was no improvement after two days, so a Medrol pack was prescribed to alleviate shortness of breath. Three days later, the patient went to the emergency department (ED) complaining of vomiting after the consumption of food for the last 24 hours and hemoptysis. A computed tomography (CT) angiogram of the patient's chest was ordered but imagining was unremarkable. He was discharged the same day with a prescription for acetaminophen, codeine-guaifenesin, and ondansetron. Two days later, he reported to the team physician with complaints of stomach pain, dark urine, dark stools, coughing, and vomiting. He was prescribed Zofran with Codeine syrup to alleviate vomiting. The next day, he returned to the ED complaining of vomiting after the consumption of fluids, stomach pain, and dark stool. The physician ordered a non-contrast CT scan of the patient's abdomen and pelvis, which was unremarkable. He was discharged the same day with a prescription for famotidine, promethazine, and sucralfate. Three days later he was referred to a gastroenterologist (GI). The GI admitted the patient into the hospital to undergo an esophagogastroduodenoscopy (EGD) due to the loss of 20 pounds in two weeks. **Differential Diagnosis:** Initial suspicions included upper respiratory infection, bronchitis, or peptic ulcer. **Treatment:** The EGD discovered that the patient had a diaphragmatic hernia and a candidiasis fungal infection inside of the esophagus. The patient was prescribed an anti-fungal medication and discharged after three days. Within a few days, the patient was able to tolerate eating and drinking. Caution had to be taken when introducing foods back into his diet, as he was at risk for developing refeeding syndrome, a potentially fatal shift in the fluids and electrolytes that occurs in malnourished patients receiving artificial refeeding. The patient consulted with a registered dietician (RD) who prescribed a multivitamin, 100mg of thiamine, and recommended a high carbohydrate and protein diet. Two weeks after the patient was discharged, he was cleared by the AT and RD to begin the return-to-play (RTP) protocol. The RTP protocol introduced activities such as riding a stationary bike and weightlifting workouts. Once light activities were tolerable, he started incorporating baseball-specific activities such as hitting, tossing, and base-running. The patient made a full recovery and returned to sport 3 months after the EGD procedure. **Uniqueness:** Candidiasis in the esophagus is typically seen in individuals with a weakened immune system, such as those living with human immunodeficiency virus/acquired immunodeficiency syndrome and those who have cancers such as leukemia and lymphoma. Since esophageal candidiasis is unique in a healthy population, there is not a protocol to follow when returning to activity. In this case, the AT treated the patient's RTP similarly to the COVID-19 RTP protocol, which focuses on light activity and slowly progresses as the patient can tolerate. **Conclusion:** The case outlines a 21-year-old baseball player who suffered from an esophageal candidiasis infection. Understanding the symptoms of candidiasis as well as how to avoid refeeding syndrome was imperative to treating this patient. The patient in this case was able to make a full recovery and returned to baseball as normal.

Citation Accuracy of Scholarly Journal Articles in Sports Medicine

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Context: Previous research has expounded on the importance of accurate use of references in scholarly manuscripts. A thorough and appropriate use of references allows authors to validate and lend credence to the position they are attempting to take on their subject matter. Reference errors have been well documented in multiple scholarly journals covering healthcare topics. To date, there does not appear to be a description of the accuracy of reference lists in sports medicine scholarly journal articles. Therefore, the purpose of this study was to describe the rate of reference errors in sports medicine literature. **Methods:** We examined four peer-reviewed sports medicine journals: *Journal of Athletic Training (JAT), Athletic Training Education Journal (ATEJ), Clinical Practice in Athletic Training (ClinAT),* and *Journal of Sports Medicine and Allied Health Sciences (JSMAHS)*. We randomly selected 10 issues each from *JAT* and *ATEJ,* and five issues each from *ClinAT and JSMAHS*. This resulted in 262 articles, containing a total of 8,686 references being reviewed. Each citation was checked for grammar errors, as well as errors in the provided DOI number when applicable. Measures of central tendency (means, frequencies, and standard deviation) were calculated where applicable. **Results:** 13.7% (n=36) of articles had minor reference errors, and 3.1% (n=8) of articles had major reference errors. Overall, *JAT* presented with the fewest average citation errors per article compared with the other journals evaluated (*JAT* = 0.05 ± 0.22; *ATEJ* = 0.10 ± 0.30; *ClinAT* = 0.24 ± 0.50; *JSMAHS* = 0.88 ± 1.18). *ClinAT and JSMAHS* were the only journals that featured the regular reporting of DOI numbers for citations. While 13.1% (n=202) DOI numbers in *ClinAT* (3.52 ± 3.55 DOI errors per article) and *JSMAHS* (2.69 ± 4.25 DOI errors per article) did not take the investigators to the corresponding article, a number of these errors appeared to be due to the number not having a linked webpage from the host journal. **Conclusion:** While each scholarly journal evaluated contained at least some articles with minor or major reference errors, the relative number of errors was similar or lower than those found in scholarly journals in other healthcare professions. Fields including general surgery, neurosurgery, and nursing have all documented concerns related to citation accuracy in scholarly journals related to their area of study. As such, these findings are not an issue faced exclusively by athletic training and sports medicine professionals. Errors in references appear to be an issue for sports medicine scholarly publications. While the rate of error appears to be similar or better than other healthcare fields, there is still a need to improve reference accuracy in sports medicine scholarly writing.

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The Analysis of Ground Kinematics in Tie-Down Ropers

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Context: Tie-down roping, an event in rodeo, occurs when the athlete ropes a calf while on horseback, quickly dismounts from the horse and ties three legs of the calf together. Injuries to the knee and lower body have occurred with athletes in the tie-down roping event. Previous research with college rodeo athletes has shown the knee to be the most frequently injured area of the body. The athlete's lower body movements during the dismount from the horse may increase the risk of injury to the knee. However, these movements have not been previously studied in the tie-down roping event. The purpose of this pilot study is to examine the lower body movements of college rodeo athletes during a practice tie-down roping run. **Methods:** Two male tie-down athletes were recruited from local college teams for this pilot study. All participants were screened for musculoskeletal injuries and provided informed consent. Movella Awinda inertial measurement units (IMU) were used to analyze joint kinematics over three trials of the tie-down roping event. Sensors were secured to the posterior pelvis, lateral thigh, and medial shank under the subject's jeans and on top of the foot inside the boot. Movella Analyze Pro software and a custom Matlab script were utilized to deduce the hip and knee joint angles at the time of contact and for the following 100ms. The results of three trials for each subject were averaged and the average of all subjects is reported. **Results:** Left foot ground contact always occurred before right foot ground contact. Hip flexion was 39° ± 15 in the right and 22° ± 3 in the left at ground contact. Both hip angles reduced by 7° toward extension over the next 100ms. Knee flexion was 38° ± 5 in the right and 31° ± 20 in the left at ground contact. Knee angle reduced by 10° over the next 100ms in the right but remained stable (within 1°) over the next 100ms for the left. The knee was slightly adducted at ground contact for the right -.2° ± 7 and -.2° ± 3 left knee. **Conclusion:** These results suggest that hip and knee flexion of tie down roping athletes is insufficient to absorb ground forces during contact with the ground. However, tie down roping athletes are able to maintain a neutral lateral knee angle during ground contact. Understanding the lower body movements during the ground mechanics portion of a tie-down roping run can contribute to the development of strength and injury prevention programs for the athletes.

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Enhancing Cultural Competency in Sports Medicine Resident and Fellowship Physicians Through the Coming Out Star Exercise.

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Context: Previous studies have reported that lesbian, gay, bisexual, transgender, queer, intersex, and asexual (LGBTQIA) healthcare providers and student-athletes encounter difficulties in their work or competition settings. Numerous medical professional associations have published statements affirming their commitment to providing equitable healthcare for patients from the LGBTQIA community. However, there is a paucity of research related to building cultural competency among healthcare professionals with regards to LGBTQIA patients. The purpose of this study was to describe the effects of the Coming Out Star exercise on giving sports medicine track resident and fellowship physicians a better understanding of the challenges faced by LGBTQIA patients. **Methods:** We recruited twelve physicians completing the sports medicine track for their residency or fellowship (30 $\pm$ 3 years old, 6 females, 6 males). Participants took part in the Coming Out Star exercise as part of their employee orientation. The exercise consisted of participants selecting a colored star and writing the name of a close friend, a family member, a community they were involved with, a job they wanted, and their life goals on the points of the star. The exercise leader then informed them that they would be read a series of scenarios as if they were a member of the LGBTQIA community who had recently come out to the people around them. Each colored star resulted in different consequences for each scenario. Upon completing the exercise, participants were led through a discussion on their experiences with the exercise, and on the importance of cultural competence for healthcare providers. Following the discussion, participants were asked to fill out a survey on the impact the exercise had on their understanding of the challenges that face members of the LGBTQIA community on a scale of 1 (Strongly Disagree) to 6 (Strongly Agree). A paired sample t-test was performed to determine if the exercise had a significant effect on participants' understanding of the challenges that face members of the LGBTQIA community with significance set at $p < .05$. **Results:** Following the Coming Out Star exercise, participants reported an increase in appreciation for the challenges faced by members of the LGBTQIA community (4.58 $\pm$ 0.40 to 5.67 $\pm$ 0.14, $p < .01$). Additionally, all participants agreed that the Coming Out Star exercise gave them new perspective on the importance of empathy in patient care (5.67 $\pm$ 0.49). **Conclusion:** The Coming Out Star exercise appeared to give resident and fellow physicians an increased understanding of the challenges faced by the LGBTQIA community. This suggests that the exercise may be a valuable component of employee training designed to improve delivery of equitable healthcare. Further studies should be conducted to determine the long-term impact of the Coming Out Star exercise.

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Use of an External Dynamic Arm Stabilizer in a Collegiate Baseball Player with Valgus Extension Overload: A Case Report.

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Background: A 21-year-old, male, collegiate baseball player reported to the athletic training staff complaining of pain along the posteromedial aspect of the right elbow. The patient reported a previous history of a grade I ulnar collateral ligament sprain that had been rehabilitated until he was able to return to full pain free activities. The patient could not recall a specific mechanism of injury. Physical examination revealed a loss of terminal elbow extension, and pain along the posteromedial aspect of the elbow. The patient reported no neurological symptoms during or after throwing. Valgus Stress, Milking, and Posterolateral Rotary Drawer tests were all negative for pain or laxity. **Differential Diagnosis:** Triceps Tendinopathy, Osteophyte, Ulnar Collateral Ligament Sprain, Ulnar Nerve Irritation. **Treatment:** The patient began treatment and rehabilitation with a working diagnosis of triceps tendinopathy. The rehabilitation protocol consisted for forearm and elbow resistance exercises with 50% blood flow restriction. Treatment consisted of cupping therapy and dry needling to address adhesions in the triceps muscle belly. Following two weeks of treatment, the patient reported no significant improvement in symptoms. At this time, the patient was referred to the team physician for further evaluation. Point of care ultrasound findings were consistent with valgus extension overload, leading to the patient discontinuing throwing while continuing rehabilitation and treatment. 10 days after discontinuing throwing, the patient was experiencing no pain when moving suddenly into terminal elbow extension. At this time, the patient began a return to throwing program while wearing an external dynamic arm stabilizer (K2 Sleeve, Kinetic Arm, Chamblee, GA) as pictured in. Over the next two months, the patient progressed his throwing program in terms of frequency, volume, and intensity, while continuing to hit and field with no limitations. At the end of the two-month period, the patient was able to return to full team activities without the external dynamic arm stabilizer. **Uniqueness:** While valgus extension overload has been described in the currently available literature, the overall prevalence is unknown. This appears to be the first case study describing the use of an external dynamic arm stabilizer during rehabilitation for a baseball player suffering from valgus extension overload. While surgery may be indicated for valgus extension overload presenting with prolonged symptoms, current surgical outcomes are mixed. This places an increased emphasis on exhausting all nonoperative interventions prior to surgery. **Conclusions:** While there is a need for further research, this case describes the use of an external dynamic arm stabilizer in a baseball player to allow the patient to throw with reduced discomfort during the return to play process. When caring for patients with musculoskeletal injuries, it is crucial to exhaust all nonoperative interventions prior to recommending surgery. Further research is needed to determine the magnitude of effect for the use of an external dynamic arm stabilizer for decreasing forces at the elbow.

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