

Athletes, Opioids and the Athletic Therapist

Introduction

Elite athletes are competitors and as a result they will naturally develop a “win at all cost” mentality. This mentality can come from within or as a result of pressure from coaches, teammates and/or other key stakeholders.¹ When asked of an injury, any elite athlete will share stories of how the injury impacted them physically and if probed, psychosocially as well. For elite athletes, their sport will often form their identity; removing the athlete from the sport will remove their core being.

Elite athletes understand that pain is a part of the game.¹ As the athlete progresses through their career, they will learn pain management techniques that will allow them to continue playing when injured and experiencing pain. These management techniques are as multifaceted as the athletes themselves and may come directly from health care practitioners such as Athletic Therapists, and/or physicians or other non-health care sources such as teammates, coaches, or the internet.^{1,2} To support their pain management, athletes will often use either pharmacological and/or non-pharmacological techniques to assist them to silence their pain; to help them play at their highest level. Pain and injury can impact performance and as a result, eliminating pain will help to mitigate its negative effects on athletic performance. In an effort to quickly manage pain, elite athletes will commonly use prescription and over-the-counter (OTC) analgesics to prevent or relieve pain.^{3,4} Pharmacological interventions typically used by athletes include oral and injectable non-steroidal anti-inflammatory drugs (NSAIDs), other non-opioid analgesics, opioid analgesics, injectable and transdermal anaesthetics and other medications and OTC supplements to manage their pain.³⁻⁷ Reports vary on the frequency of use of medications by athletes to alleviate pain, however, Harle *et al.*, found that NSAIDs are the most commonly used pain medication with reports on prevalence from 2.4% detected in urine samples to 100% use in non-traumatic injuries.³ The differences in reported use may be attributed to differences in the sports studied (i.e. collision versus non-contact) as well as sex of the individual.⁸

Opioids are a group of medications used to treat moderate to severe pain.^{5,9} These medications work by altering the way the brain and nervous system respond to pain. Generally, they come in tablets and may be crushed, snorted, chewed, or injected for a heroin-like high. Although opioids are typically prescribed for the management of moderate to severe pain, research reports that many individuals will use opioids in a non-prescribed fashion.^{4,8,10} Non prescribed opioid use in athletes has been reported to be as low as 1% to as high as 18% of collegiate athletes.^{3,5,11}

The purpose of this paper is to inform the reader of athlete's use of pain-relieving medications, in particular the use of opioids. This paper will discuss the opioid pandemic in general and relate that information directly to athletes. It will discuss the history of opioid use, the role that the Athletic Therapist plays with regards to opioid use and misuse by athletes and provide recommendations to prevent an athlete's misuse of opioids geared specifically to the Athletic Therapist, institutions and associations.

The Opioid Pandemic

There is currently a hidden pandemic that is impacting all individuals in some way, whether it is direct or indirect. In the early 2000's, headlines began to surface regarding overdoses and warnings of opioid misuse. In 2015, something happened in the US that hasn't happened since the influenza pandemic of 1918; life expectancy entered a period of sustained decline with the culprit being a surge in drug overdoses and suicides with both linked to opioids.¹² News organizations were warning individuals about the growing numbers associated with opioid use with recent reports indicating that the current COVID-19 pandemic is flaming the fire of opioid overdoses.¹³ Current reports indicate that the current implementation of restrictions due to the COVID-19 pandemic is triggering increases in opioid overdoses.¹³

In June 2020, the chief coroner of Ontario announced a 25% increase in suspected drug related deaths with similar trends seen in other provinces.¹³ As reported in the *Ontario Opioid Report* and other research, opioid use is increasing as well as deaths due to overdoses particularly among the 25-44 year old population.^{13,14} The opioid pandemic is not new, and its roots can be traced back to the 1980's when health care practitioners (namely physicians) began looking at pain management strategies more closely. In 1995, the American Pain Society launched a campaign that framed pain as the "fifth vital sign" and indicated that pain should be monitored and managed in a similar fashion as other vital signs.¹² Pharmaceutical companies dived into research investigating pharmacological options to manage pain and as a result, these companies began utilizing paid physicians to expound the safety and benefits of prescribing opioids; providing support that the prescription of opioids is the humane approach to pain management.¹⁵ Physicians became pressured to continue to prescribe these medications over using non-pharmacological treatments and were guilted into believing that allowing individuals to live with pain and not provide pharmacological management was both unethical and inhumane.¹⁵ As a result, pharmaceutical companies began expediting research into drugs which they marketed as optimal pain control with little or no addictive qualities.^{12,15} However, longer term studies soon

discovered the exact opposite occurred and as a result found that these medications were in fact, highly addictive and that they were frequently misused.^{12,15} As a result, Pandora's box had been opened, paving the way for the initial stage of the opioid pandemic.

The opioid pandemic has highlighted cracks within the health care system in both the US and Canada. In the US, due to doctors being part of private practice, physicians can benefit financially by increasing the volume of patients they see as well as ensuring patient satisfaction which can incentivize over prescription of pain medication.¹² US insurance plans often cover pain medication, but not other pain management strategies such as physical therapy.¹² Unfortunately, Canada is not immune and physicians are also paid by the number of patients seen which may help to explain why Canada is experiencing a similar crisis as the US with non-pharmacological options (such as Athletic Therapy) covered by private insurance plans only. Since the time that opioids were introduced, overdoses have increased with research finding 66.4% of all current drug overdoses reported are due to opioids.¹⁴

Opioids were originally prescribed for the management of cancer pain, but in the 1990's researchers began to question why they weren't used for the management of chronic pain and thus began the prescription of opioids for a multitude of conditions.¹⁵ Marginalized populations are at the greatest risk of opioid use, misuse and overdoses for a myriad of reasons.¹³ As a result of this information, stigma developed, painting individuals who misuse opioids as being part of marginalized populations only.¹⁶ Unfortunately, this portrayal is inaccurate and misuse and addictions are not isolated to marginalized populations but are seen in athletes often resulting from pain management strategies that arose from injuries or surgical procedures.^{3,17,18} Therefore, it is important to recognize that although marginalized populations may represent greater numbers of those addicted to opioids, athletes are not immune.

Public response to the opioid crisis has been mixed, most likely due to the stigma attached to those who rely on opioids to manage their pain. Athletes have frequently engaged in pain-relieving medication (PRM) to continue to play/practice which is often an accepted practice by those directly involved with athletes.³ In this culture of sport, athletes are frequently praised for their strength in being able to play after injury, however, athletes will often rely on medications to quash their pain to allow them to continue to play. Research has demonstrated that athletes frequently begin use of PRM including opioids in adolescence, believing that their actions have few consequences other than allowing them to continue to play.^{1,4,11}

The National Athletic Trainers Association (NATA) has responded to this concern with information posted on their public resource page to provide the public with links related to information on opioid abuse.¹⁹ NATA has recognized that the opioid pandemic has indeed effected the general public, but also impacts athletes. Recent media sources have highlighted athletes and their use of opioids and other PRM as well as informing on the negative consequences associated with their use.²⁰ The opioid pandemic is real and is not just found within the marginalized populations; it is found directly on the fields, clinics, and arenas that Athletic Therapists work at.

In response to the current pandemic, governments are increasing resources and educational campaigns to mitigate the issues that have developed as a result. Pharmaceutical companies have been strongly reprimanded with increases in the number of lawsuits brought against them.^{12,15} Government educational strategies have been developed to reign in the problems that have resulted. Maintaining adequate pain control is still a priority, however, a refocus has begun including governmental/institutional policy changes in the US to meet the growing concerns surrounding opioid use with university/college institutions mandating policy changes and educational initiatives on the use of an overdose antidote, naloxone (Narcan™).^{13,21} However, the question remains; if many recognize that the opioid pandemic is real and athletes are not immune, what information is being relayed to Canadian athletes, Athletic Therapists (ATs) and other health care providers who work directly with athletes to protect their health?

Athletes and PRM

Athletes know the risk of playing a sport and understand that one of the risks is becoming injured which will result in experiencing pain. The International Association of the Study of Pain (IASP) has recently updated their definition in 2019 to better reflect that pain carries an emotional component and is individualized.²² As a result, the IASP has defined pain as, “*An aversive sensory and emotional experience typically caused by, or resembling that caused by, actual or potential tissue injury.*”²² Therefore, pain is not just a biological event; it is multifaceted and is wrapped up in the psychological and sociological context which is situation dependent.⁹ To understand athletes’ pain, it is important that a complete picture of the athlete is presented and understood by the health care practitioner to best help an athlete manage their pain.⁹ Given the complexities associated with pain, it is often difficult to establish guidelines for pain management, especially considering that elite athletes often are unable to “take time off to heal” from their injuries.

In comparison to the public, elite athletes will most likely experience pain differently. Elite athletes often have added pressures to continue to train and compete and as such may experience a heightened need to continue to play even though they are injured and currently experiencing pain.¹ As a result, many athletes will engage in using PRM in an attempt to minimize pain in order to effectively play.^{1,3,11,23} Elite athletes often have access to a multidisciplinary team to assist in their health care management. Unfortunately these health care providers report feeling tremendous pressure to assist athletes so they do not miss games due to injuries.^{3,16} As cited in Harle *et al.*, health care practitioners have provided analgesics to athletes due to their personal guilt related to athletes missing matches, their fear of athletes losing a roster spot and a desire to assist athletes in reaching minimum game appearance thresholds to achieve additional pay.³ However, often those involved with athletes report feeling uneducated and uncomfortable discussing the misuse of opioids.^{16,24} Therefore, athletes may be a higher risk to misuse PRM due to the lack of education of their therapists not to mention the personal guilt the therapist may feel to manage athletes' pain.

Youth athletes in contact and collision sports (i.e. wrestling, football and ice hockey) are at the greatest risk to engage in non-prescribed use of prescription opioids (NUPO) in comparison to non-participants or participants in other sports.^{4,6,8,10,11} Research reports that the greatest risk factors for opioid misuse are associated with males, who are under the age of 20 and are involved in contact and collision sports.^{10,17} Results from previous research has found those involved with NUPO had also higher rates of associated heroin use.⁴ It has often been touted that sport participation offers a protective effect against the use of recreational drugs however that protective effect may prevent the true picture from emerging. If sport participation is broken into further categories of sex, type of sport and level of play, sport may heighten certain types of drug use; specifically, NUPO with the greatest risks associated with males, having an injury and playing varsity collision sports.^{4,6,7} McDuff *et al.*, discovered in their comprehensive review that binge alcohol, oral tobacco, NUPO and anabolic-androgenic steroid use are higher among athletes especially in power and collision sports.¹¹ Cottler *et al.*, revealed that predictors of misuse in former National Football League (NFL) athletes related to moderate to significant pain, undiagnosed concussions (believing if they reported concussions, they would be pulled from play) and heavy drinking.²⁵

Unfortunately, NUPO can begin as early as adolescence. As cited in Outlaw *et al.*, 20% of student athletes will sustain an injury during play with just short of 50% requiring surgery and concurrent prescription of opioids as a form of a pain reliever.⁶ Bates wrote that 8.7% of 12th graders indicated NUPO during the past year which was associated with a 33% increase

in future opioid use after high school.²⁴ Unpublished research has found that athletes trust their AT for advice related to PRM and would take medication if recommended by their AT.¹ Research has revealed that athletes have very little knowledge when it comes to PRM and will often consult unreliable sources such as peers, internet and coaches for information if a health care practitioner is not available.^{1,2}

There are a multitude of reasons as to why an athlete would engage in NUPO, however, a prevailing theme is pain management. Athletes are at a higher risk of experiencing pain due to injury when compared to less active populations; with this problem of pain in athletes persisting even after retirement. Reports indicate that approximately 15% of NFL players suffered an injury within 2 weeks of beginning play with 68% injured in any given year.²⁵ Research has unveiled that almost half of retired NFL players have used opioids during their careers and that within a surveyed group, almost 70% have reported opioid misuse.^{25,26} Therefore, the long term implications of injury may be related to the continuation of opioid use and impact the athlete's ability to continue to earn a wage and have a good quality of life.²⁶ Studies have reported that physicians will often write prescriptions for more pain medication than used by patients with patients routinely not knowing how to properly dispose of such medication.²⁷ Anterior cruciate ligament reconstructions (ACLR) are one of the most frequently performed surgeries of athletes with increasing rates of tears seen in the adolescent population. Research has found that the largest number of individuals undergoing ACLR are under 20 years of age with 25.5% of all patients having a preoperative opioid prescription.¹⁷ These numbers are concerning considering that previous opioid prescription increases the risk for future NUPO use.²⁸ Overwhelmingly, most athletes will receive opioid prescriptions from physicians for pain management of injuries, however, research has found that athletes will engage in NUPO of the same prescription for other injuries and/or will divert their prescription to other athletes who request their use.^{1,10}

Opioid physical dependence develops quickly. Opioids are prescribed for the management of pain especially post-operative pain. As with any medication, side effects such as constipation are common, however, what is more concerning to the health care practitioners are the role that opioids play in decreasing cognitive function as well as impair judgement not to mention their highly addictive qualities.²⁹ These effects are especially pronounced during the first few days of using an opioid, before tolerance develops.²⁹ Ultimately impairments of cognitive functioning will impact the athletes ability to make appropriate judgements, potentially increasing the likelihood of injury. As well, given that the medication will diminish cognitive abilities as well as pain, ATs will not be able to appropriately

recognize injury and injury severity due to the lack of pain experienced by the athlete. To heighten the reality of the situation with elite athletes, research has found that 81% of NFL athletes with undiagnosed concussions were strongly associated with opioid misuse.²⁵ The authors of this study speculated that these athletes did not want to be pulled from play and therefore chose to manage their pain on their own.²⁵ As a result, ATs may inadvertently deem an athlete fit to play; even though the athlete may be suffering significant injuries such as concussions.

Many athletes have reported resorting to Tramadol to decrease pain perception as well as the touted less addictive properties offered by this medication.³⁰ Although the World Anti-Doping Association (WADA) prohibits opioid use, the benefit of Tramadol is that it is not currently banned by WADA.³⁰ However, Tramadol use is not without issues: use of Tramadol has been found to produce several drawbacks including dizziness, loss of alertness, drowsiness and physical dependency which could affect the safety of the athlete.³⁰ As seen in the TNS documentary, *The Problem of Pain*, Rick Westhead discussed how hockey players were provided medication in an order to continue to play. He described in his film how athletes are venerated for their “toughness” and “strength of character” when they are able to play through pain highlighting how these athletes feel the pressure to play in order to keep their spot on the roster.³¹ Although, the medication Torodol is not an opioid, the use of this medication is for short term usage (recommendation is that it is not to be taken for longer than 5 days) with misuse linked to many complications.³¹ In this documentary, retired National Hockey League hockey player Ryan Kesler reported regularly using anti-inflammatories as well as Torodol when the pain was too severe.³¹ Kesler also reports that his current colitis is a result of Torodol use which has led to lifelong disabilities.³¹

Opioid use in professional sport is not new and the consequences of such use can be severe. In 2011, Derek Boogaard (28 years age) died from mixing alcohol with the opioid Oxycodone. *The New York Times* reported Boogaard received large amounts of prescription drugs from team doctors before and after his entry into the league’s substance abuse program with an ex hockey player eventually charged with selling him pills leading to his untimely death.³² Professional hockey and football are not alone with regards to professional athletes and addiction/overdose issues. Professional athletes who’ve died as a result of misuse of prescription medication includes but is not limited to: Erica Blasberg, golfer aged 25; Scott Charles “Bam, Bam” Bigelow, professional wrestler aged 45; Christopher Wiley Antley, horse racing aged 34.

State of pain management in elite athletes

Athletic Therapists have a wide and varied approach to the management of pain using non-pharmacological options. Providing medications to athletes is not within the purview of an AT, however, knowledge of medications and their interactions will assist the AT to provide a comprehensive management plan for their athletes to prevent and manage injuries. Although, ATs have a vast arsenal of non-pharmacological options to manage pain, many teams provide *carte blanche* to the AT to provide medications to their athletes.¹⁶ As such, ATs should be well informed of medications, however, research has found that they report a lack sufficient knowledge to be able to recognize and counsel athletes with regards to pharmacological options.^{16,24}

In 2016, a group was struck by the International Olympic Committee (IOC) to provide guidelines for the management of pain in elite athletes.⁵ Prior to this paper, there was a lack of evidence based or consensus-based guidelines that health care providers could refer to. The IOC guidelines highlighted that non-pharmacological pain management should be considered in the earliest stages of pain and beyond.⁵ Factoring into the management was an emphasis on individualizing the treatment options; adopting an approach that focused not solely on the biological indications of pain, but also the psychosocial and other contextual factors.⁵ The IOC emphasized the importance of education to better help individuals understand their options for pain management.^{5,9} Research has demonstrated that education can allow individuals of all ages to make better decisions regarding their health care management.³³ Concerning the IOCs recommendations for prescription opioids, indications were provided that opioids should only be provided if the athlete was experiencing severe pain with the initial prescription not exceeding 5 days and no opioid prescription given beyond 10 days.⁵ Unfortunately, routine prescriptions for longer than 10 days have been reported in the literature with many individuals having left over prescriptions.^{17,18}

The role of the Athletic Therapist

Athletic Therapists wear many hats with their roles being targeted under the domains of prevention, assessment, intervention, practice management, and professional responsibility as reflected in the scope of practice of an Athletic Therapist.³⁴ This scope of practice states that Certified Athletic Therapists “...in cooperation with performance enhancement personnel and members of the health care delivery team, is an integral part of a total service to maximize the performance and welfare of all Canadians. Concomitant with the execution of this role, the Athletic Therapist nurtures an attitude of positive health.” As such, this can be interpreted that the AT must be aware of all aspects of an athlete’s health and work as part of a

multidisciplinary team to prevent and manage situations including the use/misuse of medications.

Pharmacology courses are embedded within Athletic Therapy curriculum either as a stand-alone course or as a module within curriculum at accredited Athletic Therapy programs in Canada. It is unknown the extent to which curriculum instructs on PRM particularly opioids. The research makes it clear that athletes are engaging in PRM including opioids and are often misusing them to prevent or manage their pain. As a result of this and the impact on an athlete's health, ATs should be aware of the effects and consequences of such medication to abide by their scope of practice and protect the athlete from harm. American data provides an indication that both high school and collegiate level athletes use opioids and as such a greater emphasis has been provided to Athletic Trainers on the recognition and management of athletes NUPO with public resources provided on opioid abuse on the NATA website.¹⁹

In 2020, Bates conducted a qualitative study to investigate Athletic Trainers' awareness of opioids. This study highlighted 3 common themes among participants; 1) Athletic Trainers felt a responsibility to educate patients regarding opioids; 2) Athletic Trainers must communicate to patients about opioids and; 3) Athletic Trainers perceived they lacked education with regards to opioids.²⁴ Many authors have discussed the need for a multidisciplinary approach that incorporates effective prevention and intervention programs for athletes with authors advocating for policy changes at the school/team level.^{6,21,27,35} Research has found that preoperative filling of opioid prescriptions and a lack of education regarding disposing of opioids as a strong risk factor for continual opioid use.^{18,28} As cited in Merrill *et al.*, opioid misuse can begin at an early age, with an average age of first use at 12.6 years.¹⁸ Many elementary and middle schools have Drug Abuse Resistance Education (D.A.R.E.) programs within their curriculum that are offered throughout all years, however, many schools only offer core curriculum and do not provide enhanced programs that focus on opioids and OTC medications. Implementing these programs are critical to educating students and athletes on PRM so they may be accountable and advocate for their health. Adding drug awareness programs (including PRM, opioids and alcohol) at the collegiate level will also create an awareness and enhance knowledge so athletes can be informed of the benefits and drawbacks of PRM use. It would be prudent for governing athletic associations or institutions with athletic teams to look at their current policies regarding the management of medications and institute educational campaigns to athletes with regards to medications. In 2018, NATA released a position statement on the management of medications by the sports medicine team.³⁶ The authors of this position statement differentiated the roles that physicians and

Athletic Trainers play with regards to administering and dispensing medications.³⁶ Information was provided on various types of medication including OTC medications, prescription medications, as well as suggestions on judicious use of opioids and reliance on non-addictive drugs such as NSAIDs to manage pain.³⁶ Within those guidelines, recommendations were provided in that Athletic Trainers are required to act as a resource for questions or answer athletes concerns regarding medication as well as possessing a working knowledge of OTC medications.³⁶ Arming health care providers such as ATs with information related to PRM, especially opioids, can ultimately assist athletes and the general public to make informed decisions regarding their personal PRM use.⁹

Conclusion

We are currently experiencing an opioid pandemic with overdoses occurring with much greater regularity among the general population with our athletes not being immune to this. Currently, there is no known research regarding athletes and how they are faring during this current COVID and opioid pandemic. Athlete opioid addictions and deaths due to overdoses is not unheard of and must be addressed. ATs are the eyes and ears within the athletic environment with their role incorporating not just assessment and management of injuries, but prevention of injuries, including recognition of medication use and misuse. Education is a key force in mitigating the effects of the opioid pandemic and that education should be directed to all personnel associated with teams. ATs who are responsible for pain management need to work in collaboration with other health care providers.⁹ Implementing policies by athletic teams, the Canadian Athletic Therapists Association (CATA) and its provincial associations as well as at institutional levels to prevent ambiguity among key stakeholders with regards to medication management can prevent guilt and distress among ATs. As such, this author is in complete agreement with Leone *et al.*, in that ATs need to have a working knowledge of how analgesics are used to treat pain, understand their common side effects and have readily available interventions for the misuse of prescribed medications.²¹ It is imperative that continuing education of ATs and other health care professionals be mandated in the field of medication in particular related to PRM.⁹ Providing Athletic Therapists opportunities to learn about PRM will have a trickle down effect with information passed from the AT to the athletes/coaches and other key stakeholders, especially considering most athletes gain much of their knowledge from internet sources, peers, teammates and members of the coaching staff.^{1,2} This is an opportunity for CATA to delve deeper into the complexities associated with pain management, be a leader in Canada and mirror their NATA counterparts. Misuse of

medication has been a problem for a significant amount of time; now is the time to address it and put policies into place to better serve athletes.

References

1. Vandertuin J, Abdulla D, Lowther S, Collins J. Athlete's knowledge level of pain-relieving medications. 2021. *unpublished research*.
2. Scheer BV, Burgos EV. The hidden danger of endurance races: Analgesic use among ultramarathon runners. *Br J Sports Med*. 2013;47(10):8.
3. Harle CA, Danielson EC, Derman W, et al. Analgesic management of pain in elite athletes: A systematic review. *Clinical J Sports Med*. 2018;28(5):417-426.
4. Veliz P, Boyd CJ, McCabe SE. Nonmedical use of prescription opioids and heroin use among adolescents involved in competitive sports. *J Adolescent Health*. 2017;60(3):346-349.
5. Hainline B, Derman W, Vernec A, et al. International olympic committee consensus statement on pain management in elite athletes. *Br J Sports Med*. 2017;51:1245-1258.
6. Outlaw KR, Carpenter-Aeby T, Aeby VG. Opioids and athletes: A growing problem and a deadly combination. *Sports Ex Med*. 2018;4(3):63-65. doi:
<https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.17140%2FSEMOJ-4-163>.
7. Ford JA. Nonmedical prescription drug use among college students: A comparison between athletes and nonathletes. *J Am College Health*. 2008;57(2):211-220.

8. Ford JA, Pomykacz C, Veliz P, McCabe SE, Boyd CJ. Sports involvement, injury history, and non-medical use of prescription opioids among college students: An analysis with a national sample. *Am J Addict.* 2018;27(1):15-22. doi: 10.1111/ajad.12657.
9. Chronic pain in Canada: Laying a foundation for action. *Health Canada.* 2019:1-48.
10. Veliz PT, Boyd C, McCabe SE. Playing through pain: Sports participation and nonmedical use of opioid medications among adolescents. *Am J Public Health.* 2013;103(5):e28-e30. doi: 10.2105/AJPH.2013.301242.
11. McDuff D, Stull T, Castaldelli-Maia J, Hitchcock ME, Hainline B, Reardon CL. Recreational and ergogenic substance use and substance use disorders in elite athletes: A narrative review. *Br J Sports Med.* 2019;53(12):754-760. doi: 10.1136/bjsports-2019-100669.
12. Deweerdt S. The natural history of an epidemic. *Nature.* 2019;573:S10-S12.
13. A report prepared by: The Ontario drug policy research network public health Ontario centre on drug policy evaluation. 2020.
14. Hedegaard H, Miniño AM, Warner M. Drug overdose death in the US 1999-2017. *NCHS Data Brief.* 2018(329):1-8.
15. Jones MR, Viswanath O, Peck J, Kaye AD, Gill JS, Simopoulos TT. A brief history of the opioid epidemic and strategies for pain medicine. *Pain Ther.* 2018;7:13-21.
16. Vandertuin JF, Abdulla D, Lowther Stephanie. Student athletic therapists' knowledge of opioids and other pain-relieving medications. *Athletic Training Education Journal.* in press;16(1).

17. Rao AG, Prentice HA, Chan PH, Paxton LW, Funahashi TT, Maletis GB. Risk factors for opioid use following anterior cruciate ligament reconstruction (ACLR) in a cohort of 21,202 ACLR. *Ortho J Sports Med.* 2020.

18. Merrill HM, Dean DM, Mottla JL, Neufeld SK, Cuttica DJ, Buchanan MM. Opioid consumption following foot and ankle surgery. *Foot Ankle Intern.* 2018;39(6):649-656.

19. Opioid abuse NATA. <https://www.nata.org/practice-patient-care/health-issues/opiod-abuse#:~:text=The%20United%20States%20has%20been,heroin%20develop%20an%20opioid%20addiction>. Accessed January 15, 2021.

20. Wertheim LJ Rodriguez K. How painkillers are turning young athletes into heroin addicts. *Sports Illustrated.* 2015.

21. Leone JE, Maurer-Starks S, Wise KA, Muse DA. Opioids, acute pain management, athletes, and policy. *Bridgewater Review.* 2019;38(2):4-9. https://vc.bridgew.edu/br_rev/vol38/iss2/4/.

22. Raja S. IASP's proposed new definition of pain released for comment. <https://www.iasp-pain.org/PublicationsNews/NewsDetail.aspx?ItemNumber=9218>. Updated 2019. Accessed January 17, 2021.

23. Ford JA, Pomykacz C, Veliz P, McCabe SE, Boyd CJ. Sports involvement, injury history, and non-medical use of prescription opioids among college students: An analysis with a national sample. *Am J Addictions.* 2018;27(1):15-22.

24. Bates DK. Opioids and an active population: Athletic trainers' perceptions. *Internet J Allied Health Sci Pract.* 2020;18(1):1-7.

25. Cottler LB, Ben Abdallah A, Cummings SM, Barr J, Banks R, Forchheimer R. Injury, pain, and prescription opioid use among former national football league (NFL) players. *Drug Alcohol Depend.* 2011;116(1):188-194. doi: <https://doi.org/10.1016/j.drugalcdep.2010.12.003>.
26. Collier R. A place for pot in sports? *CMAJ* 2017;189(11):E448-E449.
27. Reider B. Opioid epidemic. *Am J Sports Med.* 2019;47(5):1039-1042.
28. Khazi ZM, Lu Y, Patel BH, Cancienne JM, Werner B, Forsythe B. Risk factors for opioid use after total shoulder arthroplasty. *J Shoulder Elbow Surg.* 2020;29(2):235-243. doi: 10.1016/j.jse.2019.06.020.
29. Strassels SA. Cognitive effects of opioids. *Curr Pain Headache Rep.* 2008;12(1):32-36.
30. Baltazar-Martins J, Plata MDM, Muñoz-Guerra J, Muñoz G, Carreras D, Del Coso J. Infographic. tramadol: Should it be banned in athletes while competing, particularly in road cycling? *Br J Sports Med.* 2020;54(2):120-121. doi: 10.1136/bjsports-2018-100473.
31. Westhead R. *TSN original: The problem of pain.* TSN; 2020. <https://www.tsn.ca/video/tsn-original-the-problem-of-pain~2040291>. Accessed Dec 18, 2020.
32. Branch J, Weiser, Benjamin. Ex-player charged in sale of pills to derek boogaard. *New York Times.* September 9, 2014:9. Available from: <https://www.nytimes.com/2014/09/10/sports/hockey/man-indicted-on-charges-of-selling-prescription-pills-to-derek-boogaard.html>. Accessed January 28, 2021.
33. Louw A, Podalak J, Zimney K, Schmidt S, Puentedura EJ. Can pain beliefs change in middle school students? A study of the effectiveness of pain neuroscience education. *Physio Theory Pract.* 2018;34(7):542-550. doi: 10.1080/09593985.2017.1423142.

34. Scope of practice. <https://athletictherapy.org/en/about-athletic-therapy/scope-of-practice/>.

Accessed January 18, 2021.

35. Ford JA, Pomykacz C, Veliz P, McCabe SE, Boyd CJ. Sports involvement, injury history, and non-medical use of prescription opioids among college students: An analysis with a national sample. *Am J Addictions*. 2018;27(1):15-22.

36. Chang CJ, Weston T, Higgs JD, et al. Inter-association consensus statement: The management of medications by the sports medicine team. *JAT*. 2018;11:1103-1112.