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FOR YOUNG ATHLETES**

Management of Acute Musculoskeletal Pain

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Very little high quality data on the management of acute pain in the athlete, both recreational and elite

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Disclosures

Board Member, PRISM

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Comparative Effectiveness Review
Number 240

**Treatments for Acute Pain:
A Systematic Review**

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Objectives

- Understand the pathophysiology of acute pain in the athlete
- Recognize the short and long term implications of pain control in the athlete
- Implement pharmacologic and non-pharmacologic modalities

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Key Points

- Opioid vs. [NSAID](#)
 - Insufficient evidence from four poor quality trials ([SOE](#): insufficient).
- Opioid agonist vs. mixed agent
 - Inconsistent effects on pain intensity at <1 day (3 trials), no difference in pain intensity at 1 day to <1 week (1 trial) or improvement in function at 1 day to <1 week based on one trial ([SOE](#): low for outcomes at 1 day to <1 week).
- [NSAID](#) vs. acetaminophen, acute musculoskeletal injury
 - Similar effects on pain intensity at <1 day (4 trials), 1 day to <1 week (8 trials), 1 to <2 weeks (6 trials), and ≥2 weeks (2 trials) ([SOE](#): moderate).
- Non-aspirin [NSAID](#) vs. NSAID
 - Insufficient evidence from four poor quality trials ([SOE](#): insufficient).
- Ultrasound vs. sham ultrasound, ankle sprain
 - No difference in pain or other outcomes at 1 day to <1 week or ≥4 weeks, based on three trials ([SOE](#): low).
- Acupressure vs. sham acupressure or usual care
 - Acupressure associated with moderate to large decrease in pain intensity versus sham acupressure or standard treatment at 1 day to <1 week, with small effects at 4 weeks ([SOE](#): low).
- Cold therapy, transcutaneous electrical nerve stimulation, or relaxation
 - Insufficient evidence from poor quality trials ([SOE](#): insufficient).

What Is Pain?

Pain = “unpleasant sensory and emotional experience associated with actual or potential tissue damage”



Types of Pain

- Important to remember that acute pain *can* become chronic pain if not treated appropriately
- Clinician’s goal is to identify the root cause of pain, address tissue damage, and prevent development of chronic pain and/or altered function

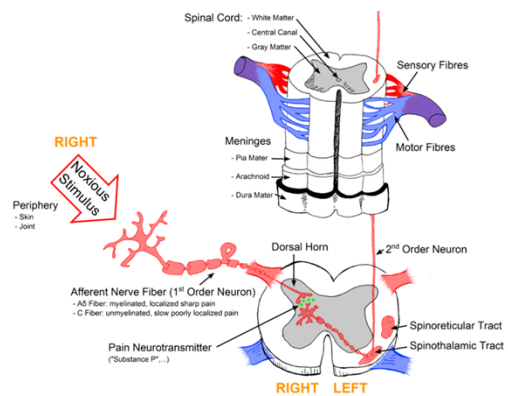
Types of Pain

Nociceptive = associated with tissue damage or inflammation

Inflammatory = type of above that is due to nociceptor activation by inflammatory mediators

Neuropathic = pain due to disorder / lesion in the nervous system (i.e. athletes with spinal cord injury)

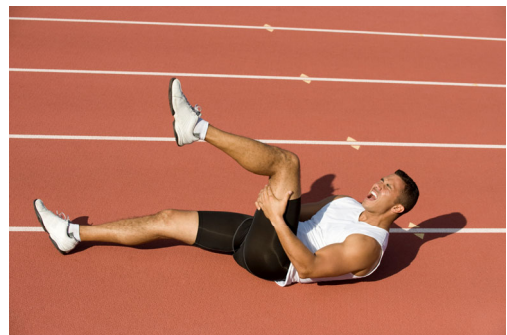
Nociplastic / Algopathic = chronic pain associated with clinical and psychopathologic findings that suggested altered nociceptive functioning (i.e. fibromyalgia)



Types of Pain

Nociceptive = associated with tissue damage or inflammation

Inflammatory = type of above that is due to nociceptor activation by inflammatory mediators



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Step 1: Identify The Type and Location of Tissue Damage

- Acute / Traumatic
- Over-Use
- Degenerative



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Step 3: Choose Appropriate Pain Management Modality

PAIN MEASUREMENT SCALE

0	1	2	3	4	5	6	7	8	9	10
NO PAIN	MILD PAIN	MODERATE PAIN	SEVERE PAIN	VERY SEVERE PAIN	WORST PAIN IMAGINABLE					
NO HURT	HURTS A LITTLE BIT	HURTS A BIT MORE	HURTS EVEN MORE	HURTS A LOT	HURTS WORST					

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Key Point

“Injury can occur without pain and pain can occur without an injury”

Clinician must utilize history, physical exam, and imaging to rule in / out structural issues

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Non-Pharmacologic Modalities



can't run away from pain...

so change your relationship to it

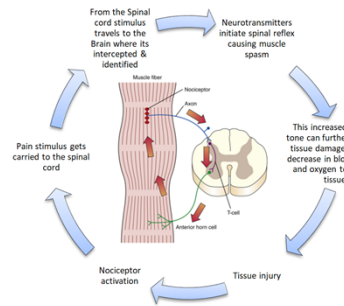
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Step 2: Provide Appropriate Care For The Acute Tissue Damage



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Non-Pharmacologic Modalities: Ice



Pain Spasm Pain Cycle

(Diagram credit: From Cameron MK: Physical agents in rehabilitation: from research to practice, ed 3, St Louis, 2009, Saunders.)

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Non-Pharmacologic Modalities: Ice

CRYOTHERAPY

CWI WBC ICE APPLICATION OTHER

Analgesia: Decreased perception of pain. Likely due to decreased neural conduction velocity.

Temperature: Reduced core and tissue temperature.

Recovery: Wellness, tissue damage, performance.

Blood flow: Alterations in skin and muscle blood flow.

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Non-Pharmacologic Modalities: Ice

World J Clin Cases, 2021 Jun 16; 9(17): 4116-4122 PMID: PMC8173427
 Published online 2021 Jun 16. doi: 10.12999/wjcc.v9.i17.4116 PMID: 34141774

Is it time to put traditional cold therapy in rehabilitation of soft-tissue injuries out to pasture?

Zi-Bu Wang and Guo-Xin Ni

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RE-THINKING THE USE OF TRADITIONAL COLD THERAPY Go to »

Most injured patients report that cold therapy makes them “feel less painful”. However, this subjective impression of symptomatic pain relief is only experienced in the short-term, and the actual impact of immediate icing on the mid-to-long-term healing process may not remain the same. Moreover, although cold therapy has been widely and empirically used in practice, the way we clinically treat those injuries must continually change based on the most up-to-date and evidence-based research. However, the evidence for the use of cryotherapy is relatively low. There is significant heterogeneity between studies, making it difficult to compare them, and the number of controlled randomized controlled trials (RCTs) remains low[1,3-16].

We have to keep in mind that anything that reduces inflammation also delays healing since the process of inflammation is an essential aspect of recovery itself. Although cold therapy typically slows the soft tissue swelling to some extent, it does not hasten the recovery process. Ice could be a useful option when our treatment goal is to limit the extent of the edema[12], since too much or prolonged swelling has been proved to impede the healing process during the recovery period[18], which is typically seen in severe joint sprains. However, when the edema level is not severe (e.g., muscle tear), cold therapy may not be helpful but rather act as a barrier to recovery.

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Non-Pharmacologic Modalities: Ice

Knee | Published: 01 October 2016

The efficacy of post-operative devices following knee arthroscopic surgery: a systematic review

Corev T, Gatewood Andrew A, Tran N, Jason L, Dragoos

Knee Surgery, Sports Traumatology, Arthroscopy 25, 501-516 (2017) | Cite this article

4024 Accesses | 19 Citations | 4 Altmetric | Metrics

Conclusion

Cryotherapy, NMES and sEMG are recommended for inclusion into rehabilitation protocols following arthroscopic knee surgery to assist with pain relief, recovery of muscle strength and knee function, which are all essential to accelerate recovery. CPM is not warranted in post-operative protocols following arthroscopic knee surgery because of its limited effectiveness in returning knee range of motion, and additional studies are required to investigate the effects of ESWT.

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Non-Pharmacologic Modalities: Ice

Acute Phase, Edema Control

Ice

- For acute injuries
- Use on joints, bones and to reduce swelling
- During first 72 hours after injury
- Apply for 20-30 minutes (break at least 30 minutes between applications)
- Repeat at least four times per day

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Non-Pharmacologic Modalities: Ice

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Is it time to put traditional cold therapy in rehabilitation of soft-tissue injuries out to pasture?

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MECHANISMS OF COLD APPLICATION AND PHYSIOLOGICAL RESPONSES Go to »

By decreasing the number of leucocytes and granulocytes as well as reducing macrophage infiltration following soft tissue injury, cryotherapy has been proved to reduce inflammation in different body parts[12]. Nevertheless, although applying cold on the surface of the injured site may be effective in pain management or swelling, it could lengthen the recovery process. This is because, when we are injured, our body sends signals to our inflammatory cells (macrophages), which release the hormone-insulin-like growth factor (IGF-1). These factors initiate healing by killing damaged tissue. However, when ice is applied topically, the cold will act as a vasoconstrictor and impede the transport of those inflammatory chemicals and cells to the injured site[20,21]. We may prevent the body's natural release of IGF-1 and, therefore, delay the start of the healing and recovery process. A prolonged period of cold on the skin will lead to a reduction of the blood flow, resulting in tissue death or even permanent nerve damage[22].

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Non-Pharmacologic Modalities: Heat

Review

Mechanisms and efficacy of heat and cold therapies for musculoskeletal injury

Gerard A. Malanga, Ning Yan and Jill Stark


Pages 57-65 | Received 17 Sep 2014, Accepted 30 Oct 2014, Published online: 15 Dec 2014

musculoskeletal injury and delayed-onset muscle soreness (DOMS). The physiological effects of heat therapy include pain relief and increases in blood flow, metabolism, and elasticity of connective tissues. There is limited overall evidence to support the use of topical heat in general; however, RCTs have shown that heat-wrap therapy provides short-term reductions in pain and disability in patients with acute low back pain and provides significantly greater pain relief of DOMS than does cold therapy. There remains an ongoing need for more sufficiently powered high-quality RCTs on the effects of cold and heat therapy on recovery from acute musculoskeletal injury and DOMS.

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Non-Pharmacologic Modalities: Heat

Sub-Acute Phase, Muscle / Soft Tissue Mobility



Heat

- For muscle and soft tissue pain and tightness
- Start 72 hours or more after injury
- Apply for 15-20 minutes
- Use before physical activity

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Non-Pharmacologic Modalities: Acupuncture



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Non-Pharmacologic Modalities: Thermal Ultrasound

Promotes pain relief by generating heat which increased blood flow and relaxation of muscle / connective tissue leading to healing



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Non-Pharmacologic Modalities: Acupuncture



Treatments for Acute Pain: A Systematic Review
Comparative Effectiveness Review, No. 240
Investigators: Roger Chou, M.D., Jesse Wagner, M.A., Anshu Y. Ahmed, B.A., Ian Bannin, M.P.H., Erik Brook, B.S., David J. Buckley, M.D., M.P.H., Tamara P. Chertay, M.D., Esther Choo, M.D., M.P.H., Tracy Dana, M.L.S., Debra Gordon, N.N., D.N.P., FRAC, Shariq Khattak, M.D., Shelby Korman, B.A., Marisa S. McDonagh, Pharm.D., Christine Seidley, M.D.S., M.D.Sc., FRACDS, MRACCS (EDUC), FRACS, Ph.D., and Andrea C. Shelly, Ph.D., M.P.H.
Rockville (MD), Agency for Healthcare Research and Quality (AHRQ), ©2020 Dec.
Report No.: 2020-EHC006

Acupuncture Versus Sham Acupuncture or Usual Care

One fair quality trial (n=62) compared a single session of acupuncture versus sham acupuncture or standard treatment without acupuncture (rest ice, compression, and evaluation) for ankle sprain (Table 16).¹⁰⁴ It found acupuncture associated with a moderate decrease in pain intensity at 3 days versus sham acupuncture (difference -1.7 points on a 0 to 10 scale, p<0.01) and large decrease versus standard treatment (difference -2.1 points, p<.01). At 4 weeks, effects also favored acupuncture but were smaller (differences -0.79 and -0.90, p<0.01), with no statistically significant differences at 8 weeks (differences -0.16 and -0.31). Acupuncture was also associated with small beneficial effects on the SF-36 physical and mental component summary scores at 4 weeks that were not statistically significant (differences 7.22 to 8.43 points on a 0 to 100 scale), with little difference on these summary scores at 8 weeks (differences 0.9 to 3.9 points).

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Non-Pharmacologic Modalities: Ultrasound

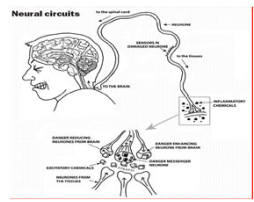
The Role of Ultrasound Therapy in the Management of Musculoskeletal Soft Tissue Pain

Emmanuel S. Papadopoulos, MSc, PhD, SRP (UK), Raj Mani, DSc, PhD, FACA, FIPEM, CCSci
First Published August 28, 2020 | Review Article | Find in PubMed | Check for updates

tissue injury healing. Based on the evidence presented, TUS is clinically effective in some musculoskeletal soft tissue pain conditions, but due to conflicting results in some studies, no specific positive recommendations can be made, nor does it permit exclusion of TUS from clinical practice. In phonophoresis, TUS plays a significant role, without reported adverse effects. There is scope for improving the evidence base with better designed studies.

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Sports Psychology – Don't Forget



- New research shows the brain and central nervous system are wholly involved in the processing of pain signals in the body;
- The pain you experience is hugely influenced by your individual psychological, biological and sociological make-up;
- The amount of pain you experience when injured may be quite unrelated to the extent of your injury;

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Sleep and Nutrition Also!!!

Contents lists available at ScienceDirect
Sleep Medicine Reviews
journal homepage: www.elsevier.com/locate/smrv

CLINICAL REVIEW

Effects of sleep changes on pain-related health outcomes in the general population: A systematic review of longitudinal studies with exploratory meta-analysis

Esther F. Afolalu ^{a,*}, Fatanah Ramlee ^{a,b}, Nicole K.Y. Tang ^{a,**}

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^b Department of Psychology and Counselling, Sultan Idris Education University, Malaysia

status. An exploratory meta-analysis further revealed that deterioration in sleep was associated with worse self-reported physical functioning (medium effect size), whilst improvement in sleep was associated with better physical functioning (small effect size). The review consolidates evidence that changes in sleep are prospectively associated with pain-related outcomes and highlights the need for further longitudinal investigations on the long-term impact of sleep improvements.

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Pharmacologic Modalities

- Individualized to the athlete
- Shared decision making
- Understand medical history of the athlete

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Surgery Is NOT The Always The Answer For Pain; Especially Chronic



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Consensus statement

International Olympic Committee consensus statement on pain management in elite athletes

Brian Hainline,¹ Wayne Derman,² Alan Vermece,³ Richard Budgett,⁴ Masataka Dele,⁵ Jiří Dvořák,⁶ Chris Harle,⁷ Stanley A Herring,⁸ Mike McNamee,⁹ Willem Meeuwisse,¹⁰ G Lorimer Moseley,¹¹ Bade Omololu,¹² John Orchard,¹³ Andrew Pipe,¹⁴ Babette M Plum,¹⁵ Johan Røder,¹⁶ Christian Siebert,¹⁷ Mike Stewart,¹⁸ Mark Stuart,¹⁹ Judith A Turner,²⁰ Mark Ware,²¹ David Zideman,²² Lars Engebretsen⁴



INTERNATIONAL OLYMPIC COMMITTEE

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Pharmacologic Modalities



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- Medication prescription should be only **one** component of managing pain. Combining medication use with appropriate non-pharmacological measures limits disability and optimises probability of improvement.
- Medications should be prescribed at the lowest effective dose for the shortest period of time. They should be discontinued if they are ineffective or not tolerated, and as the pain from the injury resolves.
- Medications should be prescribed in a manner consistent with established, recognised pharmacological and pharmacodynamic principles, including route of administration, time of onset of action, effectiveness for pain relief and potential side effects and complications. Consideration of an athlete's medical and medication history is essential.
- Physicians prescribing analgesic medications to athletes should possess a complete understanding of the prevailing rules and regulations regarding prohibited substances and Therapeutic Use Exemptions specific to the governing body that controls the athlete's sport.
- Recording athlete-reported severity of pain (eg, with a numerical rating scale) can be useful in monitoring the effectiveness of a medication.

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- Recording athlete-reported severity of pain (eg, with a numerical rating scale) can be useful in monitoring the effectiveness of a medication.
- Prescription medications should only be provided to athletes by licensed healthcare providers who understand potential side effects or misuse of medications, and whose licensure includes this scope of practice. Written documentation of each assessment and prescription is a basic standard of care.
- Informed consent is fundamental in medical care, including those situations in which medication is prescribed. This is also true for care of the elite athlete; however, obtaining such consent can be challenging in competitive situations when an athlete seeks same-day RTP. At a minimum, any substantial risk of short-term or long-term worsening of an injury should be discussed and documented.
- Medications should not be prescribed to athletes for pain or injury prevention.

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Severe Pain (7-8)

Possible Same Day RTP

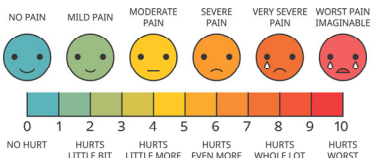
Moderate to severe pain

NSAIDs (injection)	Ketorolac: 15–30 mg IM or IV up to 4x/day, at least 6 hours apart, or a single 60 mg injection
Local anaesthetic injections	

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Differentiate Treatment Modalities In Terms of Severity of Pain

PAIN MEASUREMENT SCALE




NO PAIN MILD PAIN MODERATE PAIN SEVERE PAIN VERY SEVERE PAIN WORST PAIN IMAGINABLE

0 1 2 3 4 5 6 7 8 9 10

NO HURT HURTS LITTLE BIT HURTS LITTLE MORE HURTS EVEN MORE HURTS WHOA LOT HURTS WORST

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Injected local anaesthetics have also been used for moderate to severe pain and same-day RTP in elite athletes, either pregame or during competition.^{172,173} There are some limited data from a case series of National Rugby League players.¹⁷⁴ Most governing bodies, including the World Anti-Doping Agency (WADA), have not banned these injections.¹⁶⁷ Intra-articular injections of local anaesthetic should be avoided into weight-bearing joints or as intratendon or intraligament injections.^{171,175} Corticosteroid injections have no role for same-day RTP. They do not provide pain relief superior to that of local anaesthetics^{168,169} and can cause acute muscle/tendon weakening, thereby increasing the chance of injury.^{168,175} Other injections, such as platelet-rich plasma (PRP) and intra-articular viscosupplementation, are not useful for same-day RTP.¹⁷²⁻¹⁷⁵



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Severe Pain (7-10)

Table 1 Medications for managing acute, severe pain from a severe injury that does not allow same-day return to play

Intravenous	<ul style="list-style-type: none"> Morphine (10 mg) Fentanyl (100 mcg, titrated to effect)
Inhalation	<ul style="list-style-type: none"> Entonox/Nitronox (inhaled 50:50 oxygen and nitrous oxide mixture) Methoxyflurane/pentrox
Intranasal	<ul style="list-style-type: none"> Diamorphine (1600 mcg in commercially available administrator) Fentanyl (100 mcg administered via nasal syringe adapter)

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Injectable Ketorolac and Corticosteroid Use in Athletes: A Systematic Review

Timothy R. Jelsema, MD,[†] Anthony C. Tam, MD,[†] and James L. Moeller, MD[†]

Context: The use of injectable medications to help athletes quickly return to the field of play after injury is common. Understanding the effects and risks of these medications will help providers make informed decisions regarding their use in this patient population.

Objective: To evaluate the utilization, efficacy, and adverse effects of injectable ketorolac and corticosteroids in athletes.

Data Sources: This systematic review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. A systematic search of the literature was performed using multiple databases (PubMed, Embase, Cochrane, Web of Science, and ClinicalTrials.gov). Secondary references were appraised for relevant articles. No randomized controlled trials or other prospective studies were identified. Articles included retrospective database reviews and physician survey studies.

Study Selection: A total of 6 studies met the inclusion and exclusion criteria and were reviewed by 2 independent reviewers with a third consulted in the case of disagreement, which was not needed.

Study Design: Systematic review.

Level of Evidence: Level 5.

Data Extraction: Two reviewers recorded rate of use, effectiveness of treatment, and reported side effect data.

Results: Most studies centered around the football athlete, either professional or collegiate. Professional football game day use of intramuscular ketorolac declined from 93.8% (28/30) in 2002 to 68% in 2016. Collegiate football game day use of intramuscular ketorolac declined from 62% in 2008 to 20% in 2016. Game day corticosteroid injection was far lower than ketorolac usage. Both medications were reported to be effective with few adverse events.

Conclusion: Use of injectable ketorolac is common but declining in professional and college football. Pain control efficacy is good, and risk of adverse events is low. The incidence of injectable corticosteroid use in athletes is unknown. Use of injectable corticosteroids in athletes allows for early return to sport activities with no reported complications.

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Table 1. Recommendations from the NFL Physician Society task force on the use of ketorolac in the NFL that are more specific to the NFL (and general sports medicine) patient population

1	Ketorolac should not be used prophylactically as a means of reducing anticipated pain either during or after participation in NFL games or practices.
2	Ketorolac use should be limited to those players diagnosed with an injury or condition and listed on the teams' latest injury report or after a physician diagnosed injury or condition that occurs after the last injury report has been submitted to the NFL prior to competition.
3	Ketorolac should be given in its oral preparation under typical circumstances, as it is recognized that the oral preparation (1) has faster onset of action on the IM preparation, (2) has a duration of action that is equivalent to the IM and IV forms, and (3) has a plasma concentration-time curve that is nearly identical to the IM and IV preparations.
4	IM and IV injection of ketorolac should not be used except after an acute, game-related injury where significant visceral or central nervous system bleeding is not expected and where other oral or IM pain medications are inadequate or not tolerated. If IM or IV ketorolac is felt to be appropriate by the treating physician, the lowest possible dose should be used.

IM, Intramuscular; IV, Intravenous; NFL, National Football League.

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Mild to Moderate Pain: NSAID's

Non-steroidal Anti-inflammatory Drugs - Mechanism of Action

The diagram illustrates the mechanism of action of NSAIDs. It shows the conversion of Arachidonic acid (a component of the phospholipid of the cell membrane) to Prostaglandins by the enzymes COX-1 and COX-2. NSAIDs inhibit these enzymes. This leads to several effects:

- Inhibit gastric acid secretion** and **stimulate synthesis of GI mucus**, leading to **Epigastric distress, Ulceration, Hemorrhage**.
- inhibit platelet aggregation**, leading to **Na & water retention, Edema & Hypertension, Intervertebral degeneration**.
- enhances platelet aggregation**, leading to **Anti-coagulant** effects.
- inflammation (pain, fever, & edema)**, leading to **Anti-inflammatory, Analgesic, Antipyretic** effects.

 Additionally, NSAIDs cause **Topical irritation of the gastric epithelium**, which is **decreased by the use of enteric-coated tablets**.

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Corticosteroid injection treatment also appears effective. When used in the treatment of hamstring strain in NFL players, 49 players (84.5%) missed no game time, 8 players missed 1 game, and 1 player missed 2 games.¹³ Overall treatment of these athletes still averaged 24 days (range, 6-65 days).¹³ When considering corticosteroid injection for treatment of a variety of injuries, Drakos et al⁷ reported that all players were able to return to play at some time after their injection (mean, 10.4 days), with 55% of players not missing a single game. Athletes injected for quadriceps strains missed an average of 4 games (mean, 36.5 days), and those injected for hamstring strains missed an average of 3 games (mean, 28 days).⁷

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Mild to Moderate Pain: NSAID's

In sport, NSAID use is widely advocated to manage the inflammation, pain and swelling associated with acute muscle strain injuries. Within the first 24 to 48 hours following injury, a constellation of symptoms develops, which includes pain with muscle use, stiffness and swelling. These symptoms normally peak between 24 and 72 hours following the injury, typically resolving after five to seven days⁽⁷⁾. It is during this period that NSAID use is frequently recommended by doctors and clinicians.

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Mild to Moderate Pain (3-6)

Table 2 Medication management for acute pain and same-day return to play

Mild to moderate pain	
Paracetamol (oral)	Loading dose up to 2g, then 325-1000mg PO every 4-6 hours, up to 4g per 24 hours
NSAIDs (oral)	
	<ul style="list-style-type: none"> Ibuprofen: 400-800mg every 4-6 hours with food, up to 3200mg per 24 hours Naproxen: 250-500mg 2x daily with food Ketorolac: 10mg every 4-6 hours with food, up to 40mg per 24 hours Celecoxib: 200-400mg 2x daily Etoricoxib: 90-120mg once daily
Topical analgesics	
	<ul style="list-style-type: none"> Rubefacients: methyl salicylate; turpentine oil; ammonia water Cooling sensation: camphor; menthol Vasodilation: histamine dihydrochloride; methyl nicotinate Irritation without rubefaction: capsaicin; capsiicum oleoresin

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Mild to Moderate Pain: NSAID's

However, recent evidence suggests that the inflammatory response to injury is a necessary phase of soft tissue healing, and its inhibition with NSAIDs can significantly delay muscle regeneration and decrease muscle strength after repair⁽⁸⁾. These undesirable effects of NSAID use on muscle repair have been attributed to their ability to block COX-2-derived prostaglandins which are known to stimulate muscle progenitor cell (satellite cell) responses to exercise (see figures 1 and 2)⁽⁹⁻¹¹⁾.

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Mild to Moderate Pain: NSAID's

The diagram illustrates the biological processes of muscle repair and inflammation. It is divided into several stages: Proliferation, Differentiation, Growth, Inflammation, Early regeneration, and Regeneration and muscle growth. Key components include satellite cells, myoblasts, myotubes, and myofibers. It also shows the activation of M1 and M2 macrophages and the impact of chronic disease or injury on the inflammatory response.

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Mild to Moderate Pain: Paracetamol

Emerg Med J. 2019 Aug;36(8):493-500. doi: 10.1136/emmermed-2019-208439. Epub 2019 Jun 22.

Paracetamol versus other analgesia in adult patients with minor musculoskeletal injuries: a systematic review

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Affiliations + expand PMID: 31230039 DOI: 10.1136/emmermed-2019-208439

Conclusions Based on available evidence, paracetamol is as effective as NSAIDs or the combination of both in treating pain in adult patients with minor musculoskeletal injuries in the acute setting. The quality of evidence is low.

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Table1: Age-related risk of problems with NSAIDs(6)

Age range (years)	Chance of GI bleed in any one year due to NSAID use	Chance of dying from GI bleed in any one year due to NSAID use
16-45	2,100	12,353
45-64	646	3,800
65-74	570	3,353
≥ 75	110	647

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Mild to Moderate – After Injury

Keep Usage ~ 5 days

2022

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Mild to Moderate Pain: Topical NSAID's

Authors' conclusions

Topical NSAIDs provided good levels of pain relief in acute conditions such as sprains, strains and overuse injuries, probably similar to that provided by oral NSAIDs. Gel formulations of diclofenac (as Emugel[®]), ibuprofen, and ketoprofen, and some diclofenac patches, provided the best effects. Adverse events were usually minimal.

Since the last version of this review, the new included studies have provided additional information. In particular, information on topical diclofenac is greatly expanded. The present review supports the previous review in concluding that topical NSAIDs are effective in providing pain relief, and goes further to demonstrate that certain formulations, mainly gel formulations of diclofenac, ibuprofen, and ketoprofen, provide the best results. Large amounts of unpublished data have been identified, and this could influence results in updates of this review.

Cochrane Database of Systematic Reviews. Review - Intervention
Topical NSAIDs for acute musculoskeletal pain in adults
 Sheena Derry, R Andrew Moore, Helen Gaskell, Maïnaad McIntyre, Philip J Wiffen. Authors' declarations of interest
 Version published 12 June 2015. Version history
<https://doi.org/10.1002/14651858.CD007402.pub31?>

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Severe Pain– After Injury / Opioids

The diagram shows the neural pathway of pain. It starts with an injury that stimulates afferent neurons, releasing Substance P. This signal travels through the dorsal horn to the brain. The brain then sends descending inhibitory pathways back to the spinal cord to modulate the pain signal. Opioids are shown to inhibit transmission at the afferent neuron level.

- make a diagnosis that includes assessment of pain and its relationship to the injury, including whether the athlete's pain seems appropriate for the injury
- establish and measure goals for pain relief and improved function
- assess current status and personal history with respect to mental health and alcohol and other substance use, validate such history with other health professionals involved in the patient's care if necessary and incorporate strategies to mitigate risks of opioid use
- Begin first-line non-opioid therapy and evaluate adherence to and effectiveness of the treatment before considering initiation of opioid therapy unless pain is severe and clearly associated with an injury consistent with that level of pain
- prescribe the lowest effective dose and limit prescription of opioids to 5 days. Ongoing use can be reconsidered but should rarely exceed 10 days and should be accompanied by informed consent regarding the risks of opioid dependence or addiction as well as overdose, especially if used in combination with alcohol or benzodiazepines.

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Severe Pain— After Injury / Opioids

► opioid use beyond 10 days should be considered with caution. Opioid therapy is rarely appropriate for longer than 10 days after an acute painful injury. Risks increase substantially with the number of days opioids are used. Opioid use for more than 7 days after painful musculoskeletal work injury has been associated with increased odds of disability 1 year later.²¹⁴ The likelihood of chronic opioid use increases with each additional day of medication supplied starting with the third day, with the sharpest increase in chronic opioid use observed after the 5th day on therapy, a second prescription or refill and an initial 10-day or 30-day supply.²¹⁵ If opioids are prescribed for more than 10 days, it is essential to have a plan in place for limiting risk of diversion and a plan and timeline for discontinuing opioid use.

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Racial and Ethnic Disparities in Pain Management

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inclusion in this review. Even when the source of pain is the same, research indicates management may differ between racial or ethnic groups. While the treatment of objectively painful conditions remains relatively constant among races and ethnicities, inequities in pain management become more apparent in the treatment of conditions characterized by only subjective pain indicators. Further disparities were identified in the dosage, dosage reduction, and oversight of opioid analgesics between groups. Inequities in prescribing patterns widen existing healthcare disparities by contributing to undertreatment of pain in ethnic minorities and overtreatment of pain and subsequent risk of opioid abuse in Whites. Health care providers must use a patient-centered and evidence-based approach to combat the ambiguity of clinical decision-making regarding pain. When knowledgeable of appropriate standard of care for pain management, athletic trainers can identify when a patient's pain needs are unmet or when substance abuse interventions may be necessary.

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Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between blacks and whites

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Edited by Susan T. Fiske, Princeton University, Princeton, NJ, and approved March 1, 2016 (received for review August 18, 2015)

Significance

The present work examines beliefs associated with racial bias in pain management, a critical health care domain with well-documented racial disparities. Specifically, this work reveals that a substantial number of white laypeople and medical students and residents hold false beliefs about biological differences between blacks and whites and demonstrates that these beliefs predict racial bias in pain perception and treatment recommendation accuracy. It also provides the first evidence that racial bias in pain perception is associated with racial bias in pain treatment recommendations. Taken together, this work provides evidence that false beliefs about biological differences between blacks and whites continue to shape the way we perceive and treat black people—they are associated with racial disparities in pain assessment and treatment recommendations.

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Can I Play Through the Pain?

- No swelling, full motion, full strength, complete functional activities
- *No structural damage but pain will last longer*
- *Minor risk of structural damage*
- *Major risk of structural damage*

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The Journal of Social Psychology

Racial bias in sport medical staff's perceptions of others' pain

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ABSTRACT

Unequal treatment based on race is well documented in higher education and healthcare settings. In the present work, we examine racial bias at the intersection of these domains: racial bias in pain-related perceptions among National Collegiate Athletic Association (NCAA) Division I sport medical staff. Using experimental vignettes about a student-athlete who injured his/her anterior cruciate ligament (ACL), we find, like prior work, that respondents perceived Black (vs. White) targets as having higher initial pain tolerance. Moreover, this bias was mediated by perceptions of social class. We extend prior work by showing racial bias was not evident on other outcome measures, including perception of recovery process pain, likelihood of over-reporting pain, and over-use of drugs to combat pain. This suggests stricter boundary conditions on bias in pain perceptions than had been previously recognized.

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Can I Play Through the Pain?

- No structural damage but pain will last longer
 - *Dull pain at the beginning or end of activity; none during activity; no limp*
 - *PF syndrome*
 - *IT Band Tendonitis*
 - *Jumpers Knee*
- Minor risk of structural damage
- *Sharp pain at the beginning or end of activity; none during activity; no limp*
- *Small meniscal tears*
- *MCL / LCL sprains*
- Major risk of structural damage
 - *Sharp pain, limping all the time*
 - *ACL tears and large meniscal tears / OCD Lesions*

Thank You!

