

**Top 10 MSK and Sports Medicine Injuries in Primary Care: Diagnosis and Management**  
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 OAAPP Conference 2025

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I have no disclosures

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**Learning Objectives**

1. Learners will be able to evaluate common MSK/Sports injuries
2. Learners will be able to diagnose common MSK/Sports injuries
3. Learners will be able to treat common MSK/Sports injuries

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**Agenda**

- Why are MSK injuries important to PCPs
- What is Sports Medicine
- What are some of the most common injuries seen by PCPs
- What tools can be used by PCPs to confidently diagnose injuries
- What initial steps can be made by PCP for treatment
- When to refer
- Who to refer to

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**MSK Injuries in the PCP office**

- Musculoskeletal complaints account for approximately 21-25% of all primary care visits in the United States
- Musculoskeletal injuries accounted for more than 65 million healthcare visits in the United States in 2020
- Estimated annual treatment cost of \$376.1 billion in primary care

• Maresk, Koster, & deGroot. The prevalence of musculoskeletal presentations in general practice: an epidemiological study. Fam Pract. 2013; 35(4):405-10.  
 • CDC. Musculoskeletal Injuries. 2020.  
 • National Institute of Occupational Safety and Health. Department of Labor. Bureau of Occupational Safety and Health. Musculoskeletal Disorders in the Workplace. 2011. Available from: <https://www.cdc.gov/niosh/publications/musculoskeletal-disorders-in-the-workplace/>

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**MSK Injuries**

Musculoskeletal disorders represent the top driver of healthcare spending in the United States, with an estimated direct annual cost of \$380.3 billion in 2018. MSK disorders are the single most expensive category of health conditions across the entire healthcare system.

- Low back and neck pain: \$136 billion (the single highest spending condition among all 154 health conditions analyzed)
- Other musculoskeletal disorders (joint/limb pain, myalgia, osteoporosis): \$129.8 billion
- Osteoarthritis: \$80.0 billion

Combined, these three MSK categories alone accounted for 43% of total US healthcare spending in 2018. For comparison, heart conditions in the United States—excluding diabetes (\$111.2 billion), ischemic heart disease (\$89.3 billion), and all other major disease categories.

DeStefano, Cox, & Chappell, et al. US Health Care Spending by Pain and Health Condition, 1998-2018. JAMA. 2019;321(22):2182-91. doi:10.1001/jama.2019.10724

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**Sports Medicine**

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**Sports Medicine Training**

COMPLETE RESIDENCY IN FAMILY MEDICINE, INTERNAL MEDICINE, NEUROLOGY, ANATOMY, MEDICAL PHYSIOLOGY, MEDICINE AND REHABILITATION

1 YEAR FELLOWSHIP

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**Sports Medicine: What we treat**

- Non-Surgical MSK injuries**
- Acute injuries**
  - Sprains
  - Fractures
  - Joint injuries
  - Sports hernia and tears
  - Tendinitis
- Overuse/Overtraining injuries**
  - Overtraining syndrome
  - Stress fractures
  - Tendinopathy
- Overweight/obesity conditions**
  - Acute stress in athletes
  - Sports concussions
  - Reduced Energy Efficiency in Sprint (RED-E)
  - Priority Injury Athlete Trial

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### Sports medicine: What we can do

- **Diagnosis (aka History)**
- **Physical Exam**
- **Imaging and Clinical Guidelines (see below for the link)**
- **Conservative Management (Evidence, NICE)**
- **Pharmacologic Management**
- **Integrative**
- **Integrative**
- **Conservative (Chiropractic Therapy (CST))**

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## Low Back Pain

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### Low Back Pain -History -

- **Age**: 50-60 y/o (most common)
- **Onset**: Gradual
- **Duration**: Acute (less than 6 weeks), Chronic (6 weeks)
- **Character**: Local
- **Alleviating/Aggravating factors**: None
- **Red Flag Symptoms**: Bowel/bladder dysfunction, saddle anesthesia, progressive motor deficits

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### Low Back Pain -Exam -

- assess range of motion
- palpate for muscle vs paraspinal tenderness
- perform straight-leg raise testing bilaterally
- complete neurologic examination
  - strength
    - hip flexion L4
    - knee extension L4, L5
    - ankle dorsiflexion L4, L5
  - great toe extension L5
  - ankle plantar flexion S1
- sensation in dermatomal distribution
  - peroneal L4
  - Achilles S1

Complete Physical Exam Review

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### Low Back Pain -Work Up -

- **No imaging**
- **Red flag symptom**
  - MRI lumbar spine
  - Plain radiographs
  - Labs (CBC, ESR, CRP)

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### Low Back Pain -Treatment -

Intervention	Evidence
Use activity with no restriction	Small improvement in pain and function in nonradicular pain
Heat therapy	Small improvement in pain and function in nonradicular pain
Acupuncture	Small improvement in pain and function in nonradicular pain
Tricyclic antidepressants	Small improvement in pain and function in nonradicular pain
Topical NSAIDs	Small improvement in pain and function in nonradicular pain
Topical capsaicin	Small improvement in pain and function in nonradicular pain
Spinal manipulation	Small improvement in pain and function in nonradicular pain
Yoga	Small improvement in pain and function in nonradicular pain
Chiropractic	Small improvement in pain and function in nonradicular pain
Massage	Small improvement in pain and function in nonradicular pain
Physical therapy	Small improvement in pain and function in nonradicular pain
Exercise	Small improvement in pain and function in nonradicular pain
Pharmacologic	Small improvement in pain and function in nonradicular pain
Integrative	Small improvement in pain and function in nonradicular pain

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### Low Back Pain -Treatment -

Intervention	Evidence
NSAIDs	Small improvement in pain and function in nonradicular pain
Acetaminophen	Small improvement in pain and function in nonradicular pain
Tricyclic antidepressants	Small improvement in pain and function in nonradicular pain
Topical NSAIDs	Small improvement in pain and function in nonradicular pain
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Chiropractic	Small improvement in pain and function in nonradicular pain
Massage	Small improvement in pain and function in nonradicular pain
Physical therapy	Small improvement in pain and function in nonradicular pain
Exercise	Small improvement in pain and function in nonradicular pain
Pharmacologic	Small improvement in pain and function in nonradicular pain
Integrative	Small improvement in pain and function in nonradicular pain

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### Low Back Pain -Treatment -6 weeks later-

- **Work-up**
  - Imaging
    - Lumbar Xray
    - Lumbar MRI without contrast
  - Physical therapy, if not already done
- **Referral**
  - Pain Medicine
  - Injections
  - Neurosurgery or Orthopedic Spine Surgeon
  - Injections or surgery
  - No need to refer to Sports Medicine
    - unless PMH trained and does spinal injections

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## Neck Pain

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### Neck Pain -History -

Age	• typically 50 years • 1st half 40-year-old to 60-year-old
Onset	• gradual • insidious
Duration	• acute-onset • duration 6 to weeks • chronic-onset
Character	• focal • radicular
Alleviating/Aggravating factors	• flexion, extension, rotation, lateral flexion, force • hyperextension • prolonged sitting • prolonged driving • prolonged computer use • prolonged reading
Red Flag Symptoms	• progressive neurologic deficit • instability • night pain

EBLAK, Ponsky M, Hertzberg  
ACCP Appropriateness Criteria® Cervical Pain or Cervical Radiculopathy, 4th Edition  
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### Neck Pain -Exam -

- assess range of motion
- palpate for midline vs paraspinal tenderness
- perform Spurling testing bilaterally
- complete neurologic examination
- strength
  - deltoid/shoulder abduction, C5
  - biceps/shoulder extension, C6
  - supinator/biceps, C7
  - finger flexion, C8
  - finger extension, T1
- sensation in dermatomal distribution
- reflexes
  - biceps reflex, C5
  - brachioradialis reflex, C6
  - triceps reflex, C7

Complete Physical Exam Review

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### Neck Pain -Work Up -

- No imaging**
- Red flag symptom**
  - MRI cervical spine
  - Plain radiographs
  - Labs (CBC, ESR, CRP)

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### Neck Pain -Treatment-

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- Topical NSAIDs with or without methyl gel as first-line therapy (strong recommendation, moderate-certainty evidence)
- Topical NSAIDs were the only intervention that improved all outcomes
  - pain reduction at less than 2 hours
  - Pain reduction at 1 to 7 days
  - physical function
  - symptom relief
  - treatment satisfaction
- They are among the most effective interventions for treatment satisfaction (high-certainty evidence) and are not associated with a statistically significant increase in adverse effects.

ACCP/AAFP Management of Acute Pain from Neck Pain: Best Medical Practice Guidelines  
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### Neck Pain -Treatment-

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- Oral NSAIDs—reduce pain and improve physical function
  - reduced pain at less than 2 hours and at 1 to 7 days
  - associated with greater likelihood of symptom relief
  - associated with increased risk for gastrointestinal adverse events including GI bleeding, abdominal pain, constipation, diarrhea, dyspepsia, nausea, and vomiting (moderate-certainty evidence)
- Acetaminophen—reduce pain
  - reduced pain at less than 2 hours and at 1 to 7 days on VAS (gastrointestinal and renal) and treatment preferences when choosing between oral NSAIDs and acetaminophen.

ACCP/AAFP Management of Acute Pain from Neck Pain: Best Medical Practice Guidelines  
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### Neck Pain -Treatment-

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- Opioids should be avoided
- Acetaminophen plus opioids improved intermediate pain at 1 to 7 days (high-certainty evidence)
- tramadol was ineffective
- opioids increased the risk for gastrointestinal and neurologic harms (moderate-certainty evidence)
- Six percent of individuals at low risk for opioid abuse develop prolonged opioid use after receiving opioid therapy for short-term pain, with higher risk in cases of physical comorbidity, increased age, and opioid prescriptions for longer than seven days.

ACCP/AAFP Management of Acute Pain from Neck Pain: Best Medical Practice Guidelines  
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### Neck Pain -Treatment-

Other pharmacologic treatments

- Muscle relaxants for acute neck pain—useful
- Oral steroids for radicular pain—useful
- Trigger point injections with local anesthetic (lidocaine, bupivacaine) for myofascial pain

Hartley MT, et al. Cochrane practice guideline on interventions for cervical spine (neck) pain  
© 2019 American College of Physicians, American Academy of Family Physicians

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### Neck Pain -Treatment-

Non-pharmacologic treatments

- Physical Therapy—moderate quality evidence
  - Motor control exercises: yoga, pilates, tai chi, qigong—very low quality evidence
  - Combining motor control with segmental exercises provided moderate to very large pain reduction
- Manual Therapy—low-certainty evidence
- Acupuncture—systematic review significantly reduces pain intensity
- TENS—very low certainty

Chen J, et al. Evidence-based treatment guidelines for cervical spine (neck) pain  
© 2019 American College of Physicians, American Academy of Family Physicians

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### Neck Pain -Treatment--6 weeks later-

- Work-up
  - Imaging
    - Cervical X-ray
    - Cervical MRI without contrast
  - Physical therapy, if not already done
- Referral
  - Pain Medicine
    - Injections
    - Neurosurgery or Orthopedic Spine Surgeon
    - Injections or surgery
  - No need to refer to Sports Medicine
    - unless MRI showed disc space stenosis

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## Knee Pain

Acute injury, age <40  
-ACL, Meniscus, PFS-

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### Things to consider

- Trauma or not?
- Effusion or not?
- Location of pain (medial, lateral, anterior, posterior)

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### Most common knee complaints

- Patellofemoral pain syndrome (PFPS)– poor patellar tracking
- Meniscus
- ACL

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### Patellofemoral pain syndrome -presentation-

- Anterior knee pain
- Pain with knee flexion
- Squats
- Stairs
- Prolonged sitting
- There can be a patellar pop, catching, grinding, giving away or instability
- Physical Exam
  - Patellar facet tenderness
  - sign
  - Pain with patellar grind test
  - Pain with double leg squat
  - Weakness with single leg squat

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### Patellofemoral pain syndrome -workup- & -treatment-

- Workup
  - None
  - X-rays?
    - Weight bearing AP and lateral, lateral view, and axial patellar view at 30° or 45° of knee flexion (yes, Medial 2nd surface view)
- Treatment
  - Physical Therapy
- Referral
  - Sports Medicine
    - after no improvement with 6 weeks of PT
    - cannot tolerate PT or it is too painful

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### Meniscus Tear

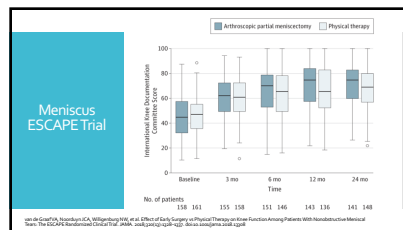
- Presentation
  - Acute onset
  - Often a twist mechanism present
  - Flare and taut
  - Patient may describe a pop
  - Clicking or locking
- Physical Exam
  - Effusion present
  - Mediolateral joint line tenderness: 83% sensitivity, 83% specificity
  - McMurray test: 61% sensitivity and 64% specificity
  - Thessaly test: 64% sensitivity and 53% specificity when performed alone

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### Meniscus -workup- & -treatment-

- Workup
  - X-rays?
  - Rule out osteoarthritis
  - MRI?
  - Traumatic tear that cannot be confirmed clinically by an orthopedist
  - Persistent symptoms without clear diagnosis
  - Preoperative planning to specify tear type and evaluate ligaments
  - Coexisting symptoms (unexplained weight loss, night sweats to exclude malignancy)
- Treatment
  - Physical Therapy –FIRST LINE
    - 3 months or longer as first line treatment
    - At least 4-6 week trial period of non-operative management
- Referral
  - Sports Medicine –if wanting to continue non-operative approach
  - Orthopedic Surgery –if wanting to pursue surgery

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Blood volume (mL)	Concentrated volume (mL)	Processing time (min)	PRP (mL)	Leukocyte concentration (10 <sup>6</sup> /mL)	Platelet concentration (10 <sup>6</sup> /mL)
52	1-20	17	+	10	56-75

Table 1. Commercially available PRP systems and their PRP preparation

System	Company	Blood volume (mL)	Concentrated volume (mL)	Processing time (min)	PRP (mL)	Increase in platelets (times/haemocrit)	Platelet capture efficiency (%) yield
<b>Leukocyte-rich PRP</b>							
Angel	Athrex	52 [0]	1-20 <sup>a</sup>	17 [0]	+	10 <sup>a</sup>	56-75 [0]
ConcentCS	EmCyte	52 [0]	4 [0]	10 [0]	+	4-7 [0]	61-120 [0]
CPX III	Bioss	54 [0]	4 [0]	15 [0]	+	3-10 [0]	70-100 [0]
Magellan	San Bioprocess/Vericel	52 [0]	3.5-7 [0]	17 [0]	+	3-10 [0]	80-110 [0]
StemPRP 2	Harvie	54 [0]	7 [0]	14 [0]	+	5-8 [0]	84-120 [0]
<b>Leukocyte-poor PRP</b>							
Autologous conditioned serum (ACS)	Athrex	11 [0]	4 [0]	5 [0]	-	1-3 [0]	40-70 [0]
Concent	MTF	10 [0]	7.5 [0]	6 [0]	-	1-4 [0]	60-80 [0]
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<sup>a</sup> Data obtained from manufacturer's promotional literature or internal studies.

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51	4	5	-	1-3	40-77

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**Cost of PRP**

- Kits range \$100-\$350
- Charge in Oregon \$600-\$1,200
- Out of Pocket
- Providence-Texasbourne
- Arthrex ACP
- Charge \$600


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### Ankle sprain -Presentation-


- Most common injury
- Lateral vs medial
- Grade 1-3
  - Grade 1: sprain, minor tearing (3 weeks recovery)
  - Grade 2: moderate partial tearing (4-6 week recovery)
  - Grade 3: complete ligament tear (8-12 week recovery)



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### Lateral ankle sprain

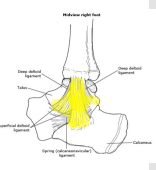
- Most common 84% of sprain
- Anterior talofibular ligament (ATFL)
- Weakest ligament and most susceptible to over-inverted plantar flexion ankle
- Calcaneofibular (CF)
- Posterior talofibular (PTF)



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### Medial ankle sprain


- Medial ankle or deltoid ligament sprain
- Rare as common
- Need a greater force
- Eversion mechanism
- Longer to recover



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### High ankle sprain

- High ankle sprain of syndesmosis sprain
- 1/3 of ankle sprains
- More with contact sports
- External rotation with hyper-dorsiflexion



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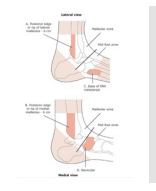
### Ankle exam

<https://www.youtube.com/watch?v=25U-CeTqg>

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### Ottawa ankle rules

- Pain in malleolar zone AND
- Have bony tenderness at distal end of fibula (lateral malleolus) or medial malleolus
- Unable to bear weight
- Bony tenderness at base of the 5<sup>th</sup> met or navicular



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### Treatment

- Early Functional Rehab
- Grade 1-2: compression/functional bracing, ice, elevation modified activity, weight bearing as tolerated
- Grade 3: brief period of immobilization (1-2 weeks) in boot or stirrup brace
- Comprehensive rehabilitation program including range of motion exercises, stretching, strengthening, neuromuscular proprioceptive training, and sport-specific exercises

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### Hip Pain

OA

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### Hip OA -Presentation-

- Age >60
- Grin or anterior hip pain
- Worsens with weight bearing
- Morning stiffness <30 minutes
- "C-sign"
- Described as stabbing, sharp, dull
- Worse with stairs, squats, prolonged sitting
- Patient may lean away from affected side when seated to reduce hip flexion


The Hip Surgical Management of Hip & Knee Osteoarthritis (HSA) is a Department of Veterans Affairs Health Care System (VHA) program. For more information, visit www.hsa.va.gov.

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### Medial and Lateral Epicondylitis -Treatment-

- Education
  - Majority of cases resolves in 3-6 months without intervention
- Physiotherapy
  - eccentric stretching, strengthening, ultrasonography, postural work, and deep tissue massage
- Tennis Elbow Strap
  - Short term symptom relief
- Acupuncture
  - Short term symptom relief
- Flex Bar
  - Most robust evidence



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### Medial and Lateral Epicondylitis -Referral-

- Sports Medicine
  - Injections
  - Tenotomy
- Orthopedic Surgery
  - 6-12 months of conservative treatment with persistent symptoms
  - Open debridement
  - 2-4% of patients



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### Medial and Lateral Epicondylitis -Injections-

- Corticosteroid Injections — Recommended Against
  - short-term relief (92% success at 6 weeks)
  - long-term outcomes are worse than a wait-and-see approach — at 33 weeks
  - success rates were 61% after corticosteroid injection
  - Success rates were 61% with wait and see
  - Increased stability in tendons, tissue repair, and increased vascularity suggested a mechanism for these adverse long-term outcomes
  - Repeated injections also pose a risk of skin thinning and atrophy
- PRP Injections
  - A meta-analysis of 13 RCTs (790 patients) found PRP provided significantly better long-term VAS pain scores (MD -3.38) and DASH scores (MD -8.3) compared with corticosteroids at 48 months
  - Cochrane reviews have shown no significant differences in patient outcome measures, function, or pain scores with glucocorticoid injections

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### Concussion

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### Changes to Concussion Management: Exercise is good

- Reduce screen time in the first 24 hours after injury
- Light intensity aerobic and physical activity, same day, and moderate intensity aerobic activity 2-3 days after injury
- After athletes, encourage return to school and home activities as soon as possible. Increase symptoms may then progress to a concussion
- How much exercise?
  - Exercise is considered appropriate if a patient is able to complete a 30-minute aerobic activity without any return of symptoms
- A referral for rehabilitation is indicated if symptoms are not resolving or are not progressing

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### Concussion Management: Referrals

- Initial Referrals
  - Physical Therapy
  - Occupational Therapy
  - Speech Therapy
  - Behavioral Therapy
- Consider if not improving
  - Neuro-optometry
  - Neuro-psych

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### Consensus statement

Table 2 Return to sport (RTS) strategies— reach step typically takes a minimum of 24 hours

Step	Exercise strategy	Activity at each step	Goal
1	Symptom limited activity	Daily activities that do not exacerbate symptoms (eg, walking)	Gradual reintroduction of ambulatory walking
2	Aerobic exercise 20–30 min to approximately 50% maxHR then 20–30 min to approximately 70% maxHR	Stationary cycling or walking on a slow to medium pace. May use light resistance training that does not result in more than mild and brief exacerbation of symptoms	Increase heart rate
3	Individual sport specific activities. Note: If sport specific training involves any risk of head/neck/head impact, medical clearance should occur prior to Step 3	Sport specific training using specific team environment. Light training, change of direction and/or individual training skills. Avoid contact with other athletes. No activities at risk of head impact.	Add movement, change of direction, change of direction
4	Non-contact training drills	Exercise to high intensity including more challenging training drills (eg, passing drills, netball game training) can integrate into a team environment	Return usual intensity of training, coordination and increased thinking skills by walking staff
5	Full contact practice	Participate in normal training activities	Return confidence and assess functional skills by walking staff
6	Return to sport	Normal game play	Return confidence and assess functional skills by walking staff

Note: All physical exertion activities must begin Step 1. An asymptomatic athlete should wait 24 hours of sleep, with progression through the subsequent steps typically taking a minimum of 24 hours. If more than mild exacerbation of symptoms (ie, more than 2 points on a 0–10 scale) occurs during Steps 1–3, the athlete should stop and return to baseline for 24 hours. Athletes experiencing symptoms should return to Step 1. A final return to Step 2 is indicated for resolution of symptoms with minimal before engaging in at-risk activities. Written documentation of readiness to RTS should be provided by an NP before contact RTS is directed by local laws and/or sporting regulations.

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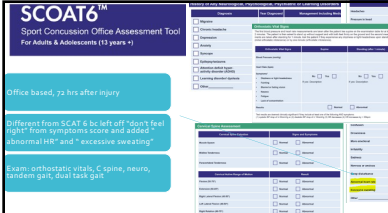
### SCOAT6™ Sport Concussion Office Assessment Tool

For Adults & Adolescents (13 years +)

Office based, 72 hrs after injury

Different from SCAT 6 as it is left off "don't feel right" from symptoms score and added "abnormal HR" and "excessive sweating"

Exam: orthostatic vitals, C spine, neuro, tandem gait, dual task gait



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### Questions?

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