Many sporting injuries are not serious enough to require treatment by a doctor or at a hospital and can be successfully treated at home. Pharmacists can play an important role in the treatment of sports injuries, through carrying out preliminary diagnosis, suggesting appropriate treatment and referring to a medical practitioner or physiotherapist if required. They can also give advice on strategies to help prevent sports injuries.

Sports injuries may be acute (caused by trauma) or chronic (as a result of overuse). It is also possible to have an acute flare-up of a chronic injury.1,2 (See Table 1)

**Soft tissue injuries**

Muscle injuries such as lacerations, contusions and strains are the most common sporting injuries. It is important to differentiate between a strain, tear or rupture in order to treat the injury appropriately and avoid long-term complications.1

Bruises and contusions, e.g. a corked thigh, are usually caused by a direct blow, producing local damage to the blood vessels in the muscle without damaging the integrity of the skin, resulting in bleeding, bruising and sometimes clotting.1 Heparinoid creams such as Hirudoid and Lasonil may be massaged into the bruise to help disperse the blood clot, although there is limited evidence for their effectiveness.2

A possible complication following a contusion is myositis ossificans – the formation of bone plaques within the muscle. Inappropriate initial treatment such as heat or massage may increase the risk of this complication. Symptoms include increasing pain and a gradual reduction in movement range. After six or seven weeks a ‘woody’ lump can often be felt. Treatment involves initial rest for up to several weeks, followed by gentle exercises and physiotherapy. Protective padding should be worn when the athlete returns to sport.1,2,4

Sprains refer to injuries to connective tissue such as ligaments or capsular tissue. Moderate or severe sprains can have complications e.g.:

- Capsular sprains often present with marked oedema, which may be an indication of internal injury to the joint.
- Neural damage related to the sprain may cause ongoing symptoms of pain and neuralgia, which can sometimes be relieved by a local anaesthetic.
- Dislocation or subluxation (incomplete dislocation, with some degree of contact between the articular surfaces) of the joint may occur.1,2

(For more information on sprains and strains, see Sports injuries – sprains and strains; inPHARMation, June 2005.)

Tendinopathies such as tendinitis (inflammation and scarring of the tendon) and tenosynovitis (inflammation of the gliding surfaces of the tendon and its protective sheath) and tendinosis (collagen degeneration due to overuse, e.g. ‘tennis elbow’) are common and often difficult to resolve. Pathological features of tenosynovitis are similar to those seen in rheumatoid arthritis. Tendons may also undergo partial or complete (less common) rupture, major tendons such as the Achilles tendon being most commonly affected. Treatment includes initial immobilisation and ice therapy, followed by electrotherapy, heat therapy, appropriate exercises and physiotherapy. Acute tendon rupture usually requires surgical treatment.1,2,4
**Practice Points**

**Practice Point 1**

**Crutches**

It is important that crutches be properly fitted and that the person be taught how to use them safely. The most commonly used crutch is the axillary crutch, which reaches from the ground almost to the axilla (armpit). To correctly fit axillary crutches:

- The person stands up straight and is measured from their armpit to the floor. To establish the required length for the crutches, deduct approximately 5cm from this measurement.
- Adjust the handgrips so there is a slight bend at the elbow when standing relaxed.

To ensure safety:

- Check that the wing nuts are tight.
- Check that the crutch tips (rubber stoppers) are securely attached and not worn.

Using the crutches:

- The top of each crutch should be 2-3 finger widths below the armpit. Lean on the hands not the armpits; the elbows should remain slightly bent while walking.
- Stand up straight and balanced with the feet slightly apart and the crutches out to the side (10-15cm) and slightly in front of the feet.
- Grip the crutches firmly to the sides by pressing the upper arms against the trunk.
- Move both crutches out in front of the body.
- Balance the weight on the hands and push down onto the crutch handle.
- Bring the good leg up to or just past the crutches and move forward.

**Table 1: Most common injuries**

<table>
<thead>
<tr>
<th>Injury</th>
<th>Symptoms</th>
<th>Possible causes</th>
<th>Initial management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft tissue injuries</td>
<td>Pain, Swelling</td>
<td>Blow, Collision</td>
<td>RICER*</td>
</tr>
<tr>
<td>Bumps</td>
<td>Tenderness</td>
<td>Overstretching</td>
<td></td>
</tr>
<tr>
<td>Sprains</td>
<td>Discoloration</td>
<td>Uncontrolled movement</td>
<td></td>
</tr>
<tr>
<td>Strains</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bruises</td>
<td>Tenderness, Pain</td>
<td>Fall, Knock</td>
<td>RICER*</td>
</tr>
<tr>
<td>Contusions</td>
<td>Discoloration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cuts</td>
<td>Bleeding, Pain</td>
<td>Distress, Blow</td>
<td></td>
</tr>
<tr>
<td>Blisters</td>
<td>Local pocket of fluid, Pain</td>
<td>Friction from shoes, clothing, equipment</td>
<td>Clean; relieve pressure and friction with appropriate padding.</td>
</tr>
<tr>
<td>Cramps and stitches</td>
<td>Involuntary muscle spasm</td>
<td>Dehydration, Low fitness, Muscle fatigue</td>
<td>Fluid intake, Stretching program, Gradual conditioning</td>
</tr>
<tr>
<td>Winded player</td>
<td>Pain, Breathing difficulty, Unable to straighten up</td>
<td>Blow to abdomen, Collision</td>
<td>Rest in comfortable position. Do not push knees to chest.</td>
</tr>
<tr>
<td>Nosebleed</td>
<td>Bleeding, Heat</td>
<td>Spontaneous</td>
<td>Sit with head forward. Pinch soft part of nose. Seek medical help if bleeding persists for more than 20 minutes.</td>
</tr>
</tbody>
</table>

*R=referral; if pain is severe or not improving after 24 hours, see a doctor or physiotherapist.

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Bursae are small fluid-filled sacs which act as cushions to reduce friction between bones and tendons. Most cases of bursitis are associated with overuse, but occasionally a direct fall onto a bursa may cause bleeding into the bursa, resulting in acute traumatic bursitis. The management of acute bursitis involves the application of ice and compression. Acute pain may be treated with NSAIDs or a corticosteroid injection. Chronic bursitis can be treated with electrotherapy, soft tissue massage and rest, followed by appropriate mobilisation and strengthening exercises. Aspiration may be carried out if the condition does not resolve.

**Management of acute soft tissue injury**

As early as 12-24 hours after an injury, new scar tissue and blood vessels start to develop. Inflammation may continue for three to five days. The inflammatory response requires early and appropriate treatment to enhance the recovery process. For all acute soft tissue injuries the immediate treatment is Rest Ice Compression Elevation (see box on page 9).

Depending on the nature of the injury, the repair and remodelling process can take from three weeks to 12 months. It is important to introduce gentle, pain-free movement as soon as possible to minimise pain, stiffness and weakness. Movements that gently stretch the scar tissue along the lines of force of the injured tissue will lead to a stronger, more flexible result. Therefore, after approximately 48 hours, RICE should become MICE – rest should be replaced with gentle movement. The movement may cause some discomfort, but should not cause pain. If there is pain on movement or constant pain after exercising, RICE should be continued for another 24 hours and movement then tried again.

Heat therapy should not be used in the acute phase of an injury, but thereafter it is helpful to increase the local cutaneous circulation and metabolic rate for optimal healing. Alternating...
Practice Points

Practice Point 2

**Blisters**

Blisters are very common in sport. Pressure or friction causes the epidermal layer to separate from the underlying tissue and the resulting ‘pocket’ becomes filled with lymphatic fluid, exposing nerve endings to pressure and causing pain.

Management of blisters:
- Closed blister – clean with antiseptic solution and apply a protective dressing.
- If the blister is large, clear and fluid-filled it may be aspirated using a sterile needle introduced into the side of the blister sac, then cleaned with antiseptic solution and covered with a sterile dressing.
- Torn/open blister – clean the area with a diluted antiseptic and apply a sterile protective dressing.
- If a blister is blood-filled, it should not be aspirated as this risks infection.
- To relieve the pressure on a blister, a specialised dressing or donut dressing can be applied. To make a donut dressing:
  - cut a hole slightly larger than the blister in the middle of a piece of foam
  - cover the blister with a dressing to protect or absorb any exudate
  - apply the foam with the hole centralised over the blister
  - other tape may be applied to secure it in place.

For blisters should:
- be sterile
- be not bulky
- contain an absorbent pad.

Specialised dressings include:
- BDF Cutinova Thin
- BDF Blister pack
- Cutinova Hydro
- Leukofoam

Practice Point 3

**Topical NSAIDs**

Topically applied NSAIDs penetrate the skin to produce therapeutic concentrations in underlying inflamed soft tissues, joints and synovial fluid. They produce low plasma concentrations and are less likely to cause the systemic side effects associated with oral NSAIDs. Side effects may include local skin reactions and photosensitivity. Systemic effects including asthma and bronchospasm have rarely been reported after application of large quantities. They should be avoided or used with extreme caution by people who are taking warfarin or methotrexate. They should not be applied to open wounds and broken skin. For maximum efficacy the preparation should be massaged into the skin until it is completely absorbed.

It is unlikely that using a topical NSAID in addition to oral NSAIDs will provide any additional benefit. If oral NSAIDs are ineffective, the drug, dose and frequency of administration should be reviewed rather than adding a topical NSAID to the treatment. A topical NSAID as sole therapy may be useful if a person cannot tolerate oral NSAIDs.

Cold and warm water baths with gentle exercise can be an effective method of gently increasing the range of movement.

**Strapping and bracing**

Strapping (taping) or bracing is used extensively both in the treatment and the prevention of sports injuries, to limit movement and provide support. It should be used in conjunction with, not instead of, other rehabilitative strategies such as appropriate exercise and physiotherapy. Strapping is a highly skilled procedure and, if done incorrectly, can cause further damage.

Athletic tape is available in various sizes and textures and can be elastic or non-elastic. Good quality tape should adhere readily and maintain adhesion despite perspiration and activity.

**Non-elastic tape** (e.g. Elastoplast Rigid Strapping Tape, Leukotape, Nexcare Sports tape Rigid) has a non-yielding cloth backing and restricts abnormal joint range-of-motion, providing optimal joint support. It is used to:
- support non-contractile structures, e.g. ligaments, joint capsule
- limit joint movement
- prevent injury (e.g. excessive ankle inversion)
- secure the ends of elastic tape
- reinforce elastic tape
- enhance proprioception (the ability to sense the spatial position and movements of the body).

Most non-elastic tapes are backed with a strong zinc oxide adhesive which is air-permeable.

**The NO HARM protocol for soft tissue injuries**

For the first 48-72 hours:

**NO Heat** – hot baths, heat rubs, spas, hot water bottles

**NO Alcohol** – as it increases swelling

**NO Running** – stop all vigorous activity

**NO Massage** – it may increase swelling and bleeding
**The R.I.C.E.R. Protocol**

- **Rest:** Stop the activity and place the athlete in a comfortable position.
- **Ice:** Apply ice pack (crushed ice, frozen peas, reusable pack) to reduce pain and swelling. Do not place directly onto the skin—wrap in a damp cloth. Apply for 20 minutes every 2 hours for 48-72 hours. Check for cold burns/sensitivity. Where possible, combine ice with compression.
- **Compression:** Apply a firm, elastic, non-adhesive bandage to reduce swelling and bleeding at the injury site. If using an ice pack, the compression bandage is applied over the ice pack and above and below the injury site to hold it in place and provide compression. When not icing, the compression bandage should remain directly over the injury site, above and below. Release the compression prior to sleep. Check circulation.
- **Elevation:** Raise the injured area above the level of the heart whenever possible to decrease bleeding, swelling, and pain.
- **Referral:** If pain is severe or injury shows no sign of improvement after 48 hours, refer to an appropriate health care professional for definitive diagnosis and continuing management.

**Table 3: Life-threatening Injuries**

<table>
<thead>
<tr>
<th>Injury</th>
<th>Symptoms</th>
<th>Possible causes</th>
<th>Initial Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head Injuries</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Concussion</td>
<td>Unconscious, Confused</td>
<td>Blow to head</td>
<td>DR ABC† Seek medical help Call ambulance Phone 000</td>
</tr>
<tr>
<td>Brain damage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fractured skull</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck injuries</td>
<td>Pain in neck, Loss of power or sensation in arms or legs</td>
<td>High tackle, Diving accident, Fall, Collision</td>
<td>Stop the activity Ensure victim’s safety Do not move victim Call ambulance; Phone 000</td>
</tr>
<tr>
<td>Abdominal injuries</td>
<td>Pain, Pallor, Fainting, Breathing difficulty; coughing up blood, Blood in urine</td>
<td>Collision, Blow to abdomen, Fall</td>
<td>Stop the activity Ensure victim’s safety Seek medical help Call ambulance; Phone 000 Rest in pain-free position</td>
</tr>
<tr>
<td>Spleen</td>
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<tr>
<td>Liver</td>
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<tr>
<td>Lungs</td>
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<tr>
<td>Kidney</td>
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</tr>
</tbody>
</table>

† DR ABC = Danger–Response → Airway–Breathing–Circulation

**Practice Points**

**Practice Point 4**

**Other topical analgesics**

Topical analgesic preparations are widely used in the treatment of musculoskeletal injuries. Many of these preparations contain ingredients which are known as counterirritants. These may be:

- Rubefacients such as methyl salicylate (e.g. Methyl Salicylate), which produce increased cutaneous blood flow, redness, irritation, and warmth upon initial application, with the warmth intensifying if the person continues to apply friction to the site of application. Topical application can lead to systemic absorption, thus they should be used with caution by people at risk of salicylate sensitivity.
- Those that directly dilate superficial vessels such as methyl nicotinate (e.g. Deep Heat Sport Spray) and butoxyethyl nicotinate (e.g. Finalon), As vasodilators, they have the remote possibility of causing fainting if applied over large sections of the body.
- Those that produce cooling upon initial application; yet, with continued friction or rubbing, the cooling changes to warmth. This group includes camphor and menthol (e.g. Dencorub Pain Relieving Cream, Rubesa).
- Capsaicin and capscium, which produce an analgesic effect by producing a depletion of the neurotransmitter substance P, resulting in reduced pain signal transmission from the injured area. These ingredients are generally used for postherpetic neuralgia rather than musculoskeletal pain (e.g. Goanna Heat Cream, Radian-B).

A limitation of counterirritant use is their superficial action. An FDA review found that counterirritants do not penetrate to muscles or joints, but work by helping to mask the underlying discomfort. Their use in conjunction with a heating pad, hot water bottle, heat lamp, or heated gel pack can cause severe burns. Counterirritants have also been implicated in contact dermatitis, systemic absorption of active ingredients and foetal problems in pregnant patients. Their use should be limited to the acute situation; if symptoms have not resolved within seven days the condition should be reassessed.
**Practice Points**

**Practice Point 5**

**Mouthguards**

Mouthguards:
- Prevent the tongue, lips and cheeks from being lacerated against the sharp edges of the teeth
- Reduce the risk of injury to the teeth due to a blow
- Reduce the risk of concussion after a heavy blow to the lower jaw.

There are three main types of mouthguards:
- **Stock mouthguards** – these are a bulky gutter of rigid plastic. They can be uncomfortable and interfere with speech and breathing and, because they are not firmly secured, may be easily dislodged.
- **Boil-and-bite mouthguards** – they are made from a thermostatic material which is softened in hot water and then placed in the mouth to mould to the teeth as the guard is bitten.
- **Custom fitted mouthguards** – These are made from special shock absorbing plastic by a dental professional, using an impression of the teeth. The accurate fit and control of the thickness maximize the shock absorbing effect.

Fitting a boil-and-bite mouthguard:
- Buy the mouthguard that seems likely to offer the best fit.
- Test the guard in the mouth; it should fit snugly in front of and behind the top teeth. It should not sit uncomfortably over the gums at the back of the jaw, but should cover all the teeth. If necessary, trim the ends.
- Immerse the guard in boiling water for the specified time. Do not leave it in for too long or it will lose its shape altogether.
- Carefully fit the softened guard over the teeth, and bite gently.
- Use both hands to make sure it fits properly up around the teeth.
- While it is still quite soft, suck hard – it is sucking, rather than hard biting, that gives a good moulded fit.
- Some final trimming of the ends may need to be done. The final result should be firm and well shaped, thick across the front and with teeth markings along the inside at the base.

**Caring for a mouthguard**
- Wash it after each use with soap and warm (not hot) water.
- Keep it in the container provided, which should have ventilation holes.
- Do not wear or handle someone else’s mouthguard.

- Reduce the risk of injury to the teeth due to a blow
- Reduce the risk of concussion after a heavy blow to the lower jaw.

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Facts Behind the Fact Card – Sports injuries

References
14. eTherapeutic Guidelines April 2006; Analgesic (revised March 2002).

Facts Behind The Fact Card – assessment

For Pharmacy Self Care members only

Questions
Select one correct answer from each of the following questions.

Answers due 31 August 2006

Please answer the following multiple choice questions using the information in Facts Behind the Fact Card and Practice Points. This activity is recognised under the PSA CPD & PI Program. ONE credit point will be awarded to pharmacists with five out of six answers correct.

To receive your credit remove the answer card provided. Complete the contact details section and your answers and fax the card to 02 6285 2869.

1. With regard to soft tissue injuries:
   a) Bursitis is usually an acute trauma-related injury.
   b) Complete tendon rupture is a common sporting injury.
   c) The development of myositis ossificans may be prevented by quickly applying gentle massage to a contusion.
   d) Incomplete dislocation of a joint is known as subluxation.
   
2. Which of the following statements is CORRECT?
   a) A blood-filled blister should be aspirated as soon as possible to reduce the risk of infection.
   b) An athlete with a nosebleed should be advised to lie flat on his or her back to prevent excessive blood loss from the nose.
   c) A player who loses sensation in the arms following a collision may have a neck injury and should receive urgent medical attention.
   d) When strapping an injured muscle, the wrap should start proximal to the injury and wrap away from the heart to encourage the return of fluid to the peripheral circulation.
   
3. When advising an athlete on strapping, the following may be a useful consideration:
   a) Strapping an injured joint with elastic tape is thought to improve proprioception.
   b) Elastic tape may be used in conjunction with non-elastic tape to give added support to an injured joint.
   c) Elastic tape should be pre-stretched before being applied.
   d) Zinc oxide is applied to the back of non-elastic tape to make it waterproof.
   
4. Counterirritants
   a) such as methyl salicylate produce vasodilation and should be used with caution by people on antihypertensive medication.
   b) which work by producing a depletion of the neurotransmitter substance P are the preferred topical treatment for musculoskeletal pain.
   c) in the nicotinate category have been shown to reach therapeutic concentrations in inflamed joints
   d) should not be used in conjunction with other heating methods as this may increase the risk of burns.
   
5. Which of the following statements is INCORRECT?
   a) When fitting a boil-and-bite mouthguard, it is important to bite down firmly to ensure a good moulded fit.
   b) With properly fitted axillary crutches, the user's elbows will remain slightly bent while walking.
   c) Neoprene braces are generally more useful for relieving inflammation than for supporting injured joints.
   d) When managing a soft tissue injury, gentle exercises that stretch the scar tissue along the lines of force of the injured tissue should be initiated after 48 hours.
   
6. Topical NSAIDs
   a) Do not penetrate muscle or joints to any useful extent, but act superficially on peripheral nerve fibres.
   b) Should be used in conjunction with oral NSAIDs for enhanced pain relief and anti-inflammatory effect.
   c) Produce lower plasma concentrations than oral NSAIDs and are therefore less likely to cause systemic side effects.
   d) Are commonly associated with side effects such as asthma and bronchospasm.