

Sprains and strains

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About this topic

Have I got the right topic?

Age from 5 years onwards

This guidance covers the immediate management of the common acute sprains and strains. A brief overview of prevention strategies is given.

This guidance does not cover the management of completely ruptured tendons or ligaments, or soft-tissue problems that are chronic or recurrent, or problems associated with a strain or sprain such as fracture or dislocation. It also does not cover the management of back strains.

There are separate CKS topics on cervical and lumbar strains covered in *Neck pain* and in *Back pain – lower*.

The target audience for this guidance is healthcare professionals working within the NHS in England, and providing first contact or primary health care. *Patient information from NHS Direct* is intended to be printed and given to people with this condition, and the *Shared decision making* sections are designed to provide a focus for discussion during the consultation about the treatment options.

Changes

Version 1.0.0, revision planned in 2008.

Last revised in July 2005

October 2006 — minor update. Analgesia prescriptions updated because new doses of ibuprofen for children are recommended by the British National Formulary. Issued in October 2006.

Previous changes

July 2006 — minor update to drug rationales. Issued in July 2006.

October 2005 — minor technical update. Issued in November 2005.

July 2005 — update to text discussing nonsteroidal anti-inflammatory drugs (NSAIDs) in the *Medicines management* and *Prescribing points* sections. Issued in July 2005.

January 2005 — reviewed. Validated in March 2005 and issued in April 2005.

September 2001 — rewritten, with previous guidance on different types of sprains consolidated into one guidance on sprains in general. Validated in November 2001 and issued in April 2002.

June 1998 — written.

Update

New evidence

Evidence-based guidelines

No new evidence-based guidelines since 1 March 2007.

HTAs (Health Technology Assessments)

No new HTAs since 1 March 2007.

Economic appraisals

No new economic appraisals relevant to England since 1 March 2007.

Systematic reviews and meta-analyses

No new systematic review or meta-analysis since 1 March 2007.

Primary evidence

No new high quality randomized controlled trials since 1 March 2007.

New policies

No new national policies or guidelines since 1 March 2007.

New safety alerts

No new safety alerts since 1 March 2007.

Changes in product availability

No changes in product availability since 1 March 2007.

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Concise knowledge for clinical scenarios

Which therapy?

- **Severe sprain or strain (e.g. suspected complete rupture)**
 - Refer immediately.
- **Mild to moderate sprain or strain**
 - Advise rest, ice, compression, and elevation ('RICE') for the first 24–48 hours, then start active mobilization.
 - **Rest** for up to 2 days, then start active movement; movement should be within the limits of pain.
 - **Ice:** for 10–30 minutes, not directly to skin (avoid cold injury). A bag of frozen peas is ideal; allow adequate time for warming between applications. Repeat as often as desired (e.g. every 2 hours).
 - **Compression** with an elastic bandage provides comfort and support without constricting nerves or blood flow. A compression bandage may be helpful well beyond the period of acute swelling.
 - **Elevation** minimizes swelling.
 - **Early mobilization**
 - Advise the person to exercise into the range of discomfort, aiming to improve the range of movement a little every day.
 - **Sprained ankle:** advise that balance is likely to be affected and that, once the pain has settled, practising balancing on the injured leg, with the eyes shut, is useful.
- **Options for the management of symptomatic relief include:**
 - **Paracetamol** — the preferred option for pain relief.
 - **An NSAID** — the preferred option if rapid return to work or sport is important.
 - **Paracetamol combined with an NSAID** — an option if either drug alone does not provide adequate pain relief.
 - **Paracetamol combined with codeine** — if paracetamol alone is insufficient.
 - **Elasticated tubular bandage** — may be preferred if firm compression is needed.
 - Other products marketed as providing additional comfort, support, and compression may be preferred by the person, but are not available on an F10 prescription.
- **Domestic violence**
 - Be alert to the possibility of domestic violence.
 - If suspected, see the victim alone so that the relevant history, examination, and consultation can be done in a supportive manner.

Practical prescribing points

For further information please see the *Medicines Compendium* (www.medicines.org.uk) or the *British National Formulary* (www.bnf.org).

Nonsteroidal anti-inflammatory drugs

- **Only one NSAID should be prescribed at a time.**
- **NSAIDs may worsen asthma, hypertension, renal impairment, or heart failure.**
- Do not give oral ibuprofen, diclofenac, or naproxen without gastroprotection if there is a history of peptic ulceration.
- **Pregnancy and breastfeeding:** use paracetamol if possible. If an NSAID is essential, ibuprofen may be used during breastfeeding and before 30 weeks of pregnancy.
- **People with cardiovascular disease:** ibuprofen may reduce the cardiovascular protective effect of low-dose aspirin.
- **In people with risk factors for gastrointestinal NSAID complications:**
 - Use paracetamol (with or without codeine) instead of a NSAID if possible.
 - Or, use gastroprotection (a PPI or full-dose misoprostol) combined with a standard NSAID.
 - Or, consider using a topical nonsteroidal anti-inflammatory drug.
- **Risk factors for gastrointestinal NSAID complications include:**
 - Age of 65 years and over.
 - Previous history of gastroduodenal ulcer, gastrointestinal (GI) bleeding, or gastroduodenal perforation.
 - Concomitant use of medications that are known to increase the likelihood of upper-GI adverse events, e.g. anticoagulants, aspirin (even a low dose), and corticosteroids.

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- o Presence of serious comorbidity, such as cardiovascular disease, renal or hepatic impairment, diabetes, or hypertension.
- o Requirement for prolonged duration of NSAID use.
- o Use of maximum recommended doses of NSAIDs.

Codeine

- Codeine may cause nausea, vomiting, and drowsiness. Constipation is also another common adverse effect, although, with short-term use, there may not be a need for additional laxative use.

Misoprostol

- Diarrhoea and abdominal pain are common. Advise women of childbearing age to use adequate contraception, since misoprostol increases the risk of miscarriage.

Should I refer or investigate?

Refer?

Referral criteria vary according to local service provision. Follow local guidelines where these exist; otherwise consider the following criteria.

- **Red flags** indicate a need for immediate referral:
 - o Unexplained deformity or swelling
 - o Significant weakness not due to pain
 - o Fever, chills, malaise
 - o Unexplained neurological deficit (sensory or motor)
 - o Pulmonary or vascular compromise
 - o Suspected malignancy or bleeding diathesis
- **Physiotherapy**
 - o Severe injuries requiring intensive/prolonged rehabilitation
 - o Major soft-tissue swelling
 - o Functional deficit
 - o Where GP feels specific expertise will accelerate recovery
- **Orthopaedic specialist**
 - o Severe sprain with joint laxity (i.e. probable complete rupture of joint ligament)
 - o Severe muscle strain (i.e. probable complete rupture of muscle)
 - o Fracture (definite or suspected)
 - o Swelling of a joint persisting more than 10 days — may have intra-articular pathology
 - o A sprain or strain that seriously impedes ability to function at work or competitive sport
 - o Recurrent sprains or strains
- **Sports medicine specialist**
 - o For people involved in professional or competitive sport
 - o If diagnosis in doubt
 - o Slow progress of recovery or rehabilitation
 - o Deteriorating symptoms
 - o To discuss appropriate imaging
- **Domestic violence.**
 - o People subjected to domestic violence should be referred to the appropriate service(s) with an urgency appropriate to the situation.

Investigate?

- **If a fracture is suspected, an X-ray is indicated.**
- Use the Ottawa ankle and knee rules to help decide if the likelihood of a fracture in the ankle or knee is high enough to order X-rays.
- **Ottawa ankle rules:**
 - o **An ankle X-ray series** is indicated for someone with an ankle injury and either:
 - Bone tenderness at the posterior edge or tip of either the lateral or medial malleolus, *or*
 - Inability to bear weight both immediately after the injury, and for at least four steps when examined
 - o **A foot X-ray series** is indicated for someone with an ankle injury and pain in the midfoot and any of the following:
 - Bone tenderness at the base of the fifth metatarsal
 - Bone tenderness at the navicular

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- Inability to bear weight, both immediately and when examined
- **Ottawa knee rules:**
 - o **A knee X-ray series** is indicated for people with a knee injury and any of the following:
 - Age 55 or older
 - Isolated tenderness of patella (no bone tenderness of knee other than patella)
 - Tenderness of head of fibula
 - Inability to flex to 90 degrees
 - Inability to bear weight both immediately and in the emergency department for four steps

Follow-up advice

- Follow up people with moderately severe sprains and strains when the swelling has largely gone (after about 7–10 days) to assess if referral for further treatment is indicated.

Prescriptions

Paracetamol s/f susp: 120mg to 240mg up to four times a day

Age from 5 years to 5 years 11 months

- Paracetamol 120mg/5ml oral suspension paediatric sugar free. Take one to two 5ml spoonfuls every 4 to 6 hours when required for pain relief. Maximum of 4 doses in 24 hours. Supply 300 ml.
- NHS Cost £1.30
- OTC Cost £2.29
- Licensed use: yes

Paracetamol s/f susp: 250mg to 500mg up to four times a day

Age from 6 years to 11 years 11 months

- Paracetamol 250mg/5ml oral suspension sugar free. Take one to two 5ml spoonfuls every 4 to 6 hours when required for pain relief. Maximum of 4 doses in 24 hours. Supply 300 ml.
- NHS Cost £1.70
- OTC Cost £3.00
- Licensed use: yes

Paracetamol tablets: 500mg to 1g up to four times a day

Age from 12 years to 17 years 11 months

- Paracetamol 500mg tablets. Take one to two tablets every 4 to 6 hours when required for pain relief. Maximum of 8 tablets in 24 hours. Supply 56 tablets.
- NHS Cost £1.05
- Licensed use: yes

Paracetamol tablets: 1g up to four times a day

Age from 18 years onwards

- Paracetamol 500mg tablets. Take two tablets every 4 to 6 hours when required for pain relief. Maximum of 8 tablets in 24 hours. Supply 56 tablets.
- NHS Cost £1.05
- Licensed use: yes

Codeine 30mg tablets: add on to paracetamol if required

Age from 18 years onwards

- Codeine 30mg tablets. Take one to two tablets every 4 to 6 hours when required for pain relief. Maximum of 8 tablets in 24 hours. Supply 28 tablets.
- NHS Cost £1.81
- Licensed use: yes

Multi-therapy: Paracetamol 500mg tablets + codeine 30mg tablets

Paracetamol tablets: 1g up to four times a day

Age from 18 years onwards

- Paracetamol 500mg tablets. Take two tablets every 4 to 6 hours when required for pain relief. Maximum of 8 tablets in 24 hours. Supply 56 tablets.
- NHS Cost £1.05
- Licensed use: yes

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Codeine 30mg tablets: add on to paracetamol if required

Age from 18 years onwards

- Codeine 30mg tablets. Take one to two tablets every 4 to 6 hours when required for pain relief. Maximum of 8 tablets in 24 hours. Supply 28 tablets.
- NHS Cost £1.81
- Licensed use: yes

Ibuprofen s/f susp: 150mg three times a day

Age from 5 years to 6 years 11 months

- Ibuprofen 100mg/5ml oral suspension sugar free. Take 7.5ml three times a day when required for pain relief. Do not exceed the stated dose. Supply 150 ml.
- NHS Cost £2.71
- OTC Cost £4.78
- Licensed use: yes

Ibuprofen s/f susp: 200mg three times a day

Age from 7 years to 9 years 11 months

- Ibuprofen 100mg/5ml oral suspension sugar free. Take two 5ml spoonfuls three times a day when required for pain relief. Do not exceed the stated dose. Supply 150 ml.
- NHS Cost £2.71
- OTC Cost £4.77
- Licensed use: yes

Ibuprofen s/f susp: 300mg three times a day

Age from 10 years to 11 years 11 months

- Ibuprofen 100mg/5ml oral suspension sugar free. Take three 5ml spoonfuls three times a day when required for pain relief. Do not exceed the stated dose. Supply 300 ml.
- NHS Cost £5.42
- OTC Cost £9.54
- Licensed use: yes

Ibuprofen tablets: 200mg to 400mg three to four times a day

Age from 12 years to 17 years 11 months

- Ibuprofen 200mg tablets. Take one to two tablets three or four times a day when required for pain relief. Do not exceed the stated dose. Supply 56 tablets.
- NHS Cost £1.68
- OTC Cost £2.96
- Licensed use: yes

Ibuprofen tablets: 400mg three or four times a day

Age from 18 years onwards

- Ibuprofen 400mg tablets. Take one tablet three or four times a day when required for pain relief. Do not exceed the stated dose. Supply 28 tablets.
- NHS Cost £1.05
- OTC Cost £1.85
- Licensed use: yes

Diclofenac sodium e/c tablets: 50mg three times a day

Age from 16 years onwards

- Diclofenac sodium 50mg gastro-resistant tablets. Take one tablet three times a day. Supply 42 tablets.
- NHS Cost £1.78
- Licensed use: yes
- Patient Information: You should take your diclofenac regularly for the full anti-inflammatory effect.

Naproxen tablets: 500mg twice a day

Age from 16 years onwards

- Naproxen 500mg tablets. Take one tablet twice a day. Supply 28 tablets.
- NHS Cost £1.83
- Licensed use: yes

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- Patient Information: You should take your naproxen regularly for the full anti-inflammatory effect.

Omeprazole capsules: 20mg once a day

Age from 16 years onwards

- Omeprazole 20mg gastro-resistant capsules. Take one capsule once a day. Supply 14 capsules.
- NHS Cost £6.38
- Licensed use: yes

Omeprazole tablets: 20mg once a day

Age from 16 years onwards

- Omeprazole 20mg gastro-resistant tablets. Take one tablet once a day. Supply 14 tablets.
- NHS Cost £6.38
- Licensed use: yes

Lansoprazole capsules: 15mg each morning

Age from 16 years onwards

- Lansoprazole 15mg gastro-resistant capsules. Take one capsule each morning (on an empty stomach). Supply 14 capsules.
- NHS Cost £6.46
- Licensed use: yes

Lansoprazole capsules: 30mg each morning

Age from 16 years onwards

- Lansoprazole 30mg gastro-resistant capsules. Take one capsule each morning (on an empty stomach). Supply 14 capsules.
- NHS Cost £11.82
- Licensed use: yes

Pantoprazole e/c tablets: 20mg once a day

Age from 16 years onwards

- Pantoprazole 20mg gastro-resistant tablets. Take one tablet once a day. Supply 14 tablets.
- NHS Cost £6.16
- Licensed use: yes

Esomeprazole tablets: 20mg once a day

Age from 16 years onwards

- Esomeprazole 20mg tablets. Take one tablet once a day. Supply 14 tablets.
- NHS Cost £9.25
- Licensed use: yes

Lansoprazole orodispersible tablets: 15mg each morning

Age from 16 years onwards

- Lansoprazole 15mg orodispersible gastro-resistant tablets. Take one tablet each morning (on an empty stomach). Supply 14 tablets.
- NHS Cost £5.43
- Licensed use: yes
- Patient Information: Place one tablet on the tongue and allow to dissolve before swallowing, or swallow whole with a glass of water. Do not crush or chew tablets.

Lansoprazole orodispersible tablets: 30mg each morning

Age from 16 years onwards

- Lansoprazole 30mg orodispersible gastro-resistant tablets. Take one tablet each morning (on an empty stomach). Supply 14 tablets.
- NHS Cost £9.94
- Licensed use: yes
- Patient Information: Place one tablet on the tongue and allow to dissolve before swallowing, or swallow whole with a glass of water. Do not crush or chew tablets.

Misoprostol tablets: 200micrograms four times a day

Age from 16 years onwards

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- Misoprostol 200microgram tablets. Take one tablet four times a day. Supply 60 tablets.
- NHS Cost £10.03
- Licensed use: yes
- Patient Information: Women who might become pregnant should not take this medicine unless using an effective contraceptive.

Diclofenac 1% gel

Age from 12 years onwards

- Diclofenac 1% gel. Apply 2 to 2.5 cm (1 inch) to the affected area 3 to 4 times a day for up to 2 weeks. Supply 100 grams.
- NHS Cost £7.00
- Licensed use: yes

Felbinac 3% gel

Age from 12 years onwards

- Felbinac 3% gel. Apply 2.5cm (1 inch) to the affected area 2 to 4 times a day for up to 2 weeks. Supply 100 grams.
- NHS Cost £7.00
- Licensed use: yes

Felbinac 3.17% foam

Age from 12 years onwards

- Felbinac 3.17% foam. Apply 2.5cm (1 inch) to the affected area 2 to 4 times a day for up to 2 weeks. Supply 100 grams.
- NHS Cost £7.00
- Licensed use: yes

Ibuprofen 5% cream

Age from 12 years onwards

- Ibuprofen 5% cream. Apply 4 to 10cm (1.5 to 4 inches) to the affected area 3 to 4 times a day for up to 2 weeks. Supply 100 grams.
- NHS Cost £6.21
- OTC Cost £10.95
- Licensed use: yes

Ibuprofen 5% gel

Age from 12 years onwards

- Ibuprofen 5% gel. Apply 4 to 10cm (1.5 to 4 inches) to the affected joint 3 to 4 times a day for up to 2 weeks. Supply 100 grams.
- NHS Cost £5.31
- OTC Cost £7.97
- Licensed use: yes

Ibuprofen 5% mousse

Age from 12 years onwards

- Ibuprofen 5% foam. Shake the container and then apply 1 to 2g (1 to 2 golf-ball sized amounts of mousse in the hand) to the affected area 3 to 4 times a day for 2 weeks. Supply 125 grams.
- NHS Cost £6.12
- OTC Cost £10.79
- Licensed use: yes
- Patient Information: This product is flammable. Do not spray near flames, burning cigarettes, electric heaters or similar objects.

Ketoprofen 2.5% gel

Age from 12 years onwards

- Ketoprofen 2.5% gel. Apply 4 to 7cm (2 to 3 inches) to the affected area 2 to 4 times a day for up to 10 days. Supply 100 grams.
- NHS Cost £5.89
- Licensed use: yes

Piroxicam 0.5% gel

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Age from 12 years onwards

- Piroxicam 0.5% gel. Apply 3cm (about 1 and 1/4 inches) to the affected area 3 to 4 times a day for up to 2 weeks. Supply 112 grams.
- NHS Cost £6.01
- Licensed use: yes

Elasticated tubular bandage: size C (6.75cm x 1m)

Age from 5 years onwards

- Elasticated tubular bandage BP 6.75cm size C. Use as directed. Supply 1 1m bandage.
- NHS Cost £1.09
- OTC Cost £1.92
- Licensed use: no

Elasticated tubular bandage: size D (7.5cm x 1m)

Age from 5 years onwards

- Elasticated tubular bandage BP 7.5cm size D. Use as directed. Supply 1 1m bandage.
- NHS Cost £1.09
- OTC Cost £1.92
- Licensed use: no

Elasticated tubular bandage: size E (8.75cm x 1m)

Age from 5 years onwards

- Elasticated tubular bandage BP 8.75cm size E. Use as directed. Supply 1 1m bandage.
- NHS Cost £1.14
- OTC Cost £1.94
- Licensed use: no

Elasticated tubular bandage: size F (10cm x 1m)

Age from 5 years onwards

- Elasticated tubular bandage BP 10cm size F. Use as directed. Supply 1 1m bandage.
- NHS Cost £1.14
- OTC Cost £1.94
- Licensed use: no

Elasticated tubular bandage: size G (12cm x 1m)

Age from 5 years onwards

- Elasticated tubular bandage BP 12cm size G. Use as directed. Supply 1 1m bandage.
- NHS Cost £1.40
- OTC Cost £2.30
- Licensed use: no

Drug rationale

Drugs not included

- **Standard nonsteroidal anti-inflammatory drugs (NSAIDs) other than ibuprofen, diclofenac and naproxen** are excluded, because they are associated with a higher risk of gastrointestinal adverse events [[CSM, 1994](#); [Henry et al, 1996](#); [CSM, 2002](#)].
- **Cyclo-oxygenase (COX)-2 inhibitors**: they are not included, although they may have a role in people at increased risk of adverse gastrointestinal events. They are not specifically licensed for use in sprains or strains, and international regulatory authorities are currently reviewing the cardiovascular safety and cardio-renal events for all coxib NSAIDs [[EMEA, 2004](#)], precipitated by the withdrawal of rofecoxib.
- **Rubefacients**: no randomized controlled trials (RCTs) have compared a topical rubefacient with another active treatment and there is therefore little evidence to support their efficacy in soft-tissue injuries [[Mason et al, 2004a](#)].
- **Weak opioids other than codeine** have either not been shown to be more effective than higher-dose codeine, or are more expensive.
- **Modified-release NSAIDs** are relatively expensive, and there is no evidence that they show an improvement in efficacy or safety over standard NSAID treatment.
- **Strong opioid analgesics** are unsuitable. It is unlikely that the pain of a simple sprain will not be controlled by other measures, and inappropriate use of these drugs may risk dependence [[BNF 48, 2004](#)].

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- **Low-dose weak opioids with paracetamol (combination products)** — e.g. co-codamol 8/500 and co-dydramol 10/500 — do not allow flexible titration of analgesic effect. There is no evidence that these offer any clinical benefit over paracetamol alone. They have sub-therapeutic doses of opioid, but may cause opioid adverse effects (e.g. constipation) [[MeReC, 2000](#); [BNF 48, 2004](#)].
- **High-dose weak opioids with paracetamol (combination products)** — e.g. co-codamol 30/500 — should only be used when the need for analgesia has been carefully titrated, and the combined product exactly matches the person's requirements [[de Craen et al, 1996](#); [MeReC, 2000](#)].
- **Co-proxamol** (dextropropoxyphene 32.5 mg/paracetamol 325 mg) has been withdrawn by the CSM because of its unfavourable risk/benefit ratio; it is associated with an unacceptable risk of overdose [[CSM, 2005](#)].
- **Light support compression bandages** such as crepe bandages are used to provide support for mild sprains and joints, but they have unproven benefit and people may not find them easy to use.

Drugs included

- **Paracetamol** is an effective and preferred analgesia if used regularly. It is generally well tolerated (but is dangerous in overdose) and is inexpensive whether prescribed or purchased over the counter. Regular analgesia is preferable to 'as required'.
- **Standard nonsteroidal anti-inflammatory drugs (NSAIDs): ibuprofen, diclofenac, and naproxen** have a good balance of efficacy against adverse effect profile [[CSM, 1994](#); [Henry et al, 1996](#); [CSM, 2002](#)].
 - o Consider prescribing an NSAID for someone who needs to return as soon as possible to full function at work or competitive sport, as the NSAID may hasten the healing process.
 - o NSAIDs must be taken regularly for optimal analgesic and anti-inflammatory effect.
 - o Ibuprofen is recommended as first choice, as it has the lowest risk of adverse effects.
 - o Naproxen and diclofenac have intermediate risk and should be considered if ibuprofen is ineffective.
 - o NSAIDs can be combined with paracetamol if required.
- **Codeine (in combination with regular paracetamol)** can be helpful when paracetamol alone is insufficient [[de Craen et al, 1996](#)]. Paracetamol and codeine should be prescribed as two separate medicines and the doses of each drug individually titrated to the person's needs.
- **Topical NSAIDs: diclofenac, felbinac, ibuprofen, ketoprofen, and piroxicam are available as topical formulations.** Topical NSAIDs have been found to be no more effective than oral NSAIDs [[Mason et al, 2004b](#)], but a short course could be considered if an NSAID is required and someone is at high risk of peptic ulceration or bleeding with an oral NSAID, and therefore needs gastroprotection.
- **Elasticated tubular compression bandages** are convenient for people to use and are popular. Elasticated tubular bandaging may be more convenient for people to use. A range of different-sized bandages available on the NHS are included, and can also be purchased over the counter.
- **Proton pump inhibitors (PPIs): esomeprazole, lansoprazole, omeprazole, and pantoprazole** are licensed for prevention of NSAID-induced gastroduodenal ulceration [[BNF 48, 2004](#)]. PPIs reduce the risk of endoscopic ulcers, but there is a lack of data on prevention of ulcer complications [[Rostom et al, 2002](#)]. However, they are generally considered to be the preferred choice for gastroprotection, as they are well tolerated compared with misoprostol.
- **Misoprostol** (a prostaglandin analogue): this is licensed for prevention of NSAID-induced gastroduodenal ulceration [[BNF 48, 2004](#)]. It reduces the risk of endoscopic ulcers and has also been shown to reduce the risk of ulcer complications [[Rostom et al, 2002](#); [North of England Dyspepsia Guideline Development Group, 2004](#)]. It is less well tolerated than PPIs because of GI adverse effects, particularly diarrhoea.

Shared decision making

- A sprain is an injury to a ligament. It heals usually within 1 to 6 weeks, but complete healing may take several months.
- **Painkillers** taken regularly, such as paracetamol, will usually ease the pain.
- **Additional painkillers**, such as codeine, may be needed if pain is severe.
- **An anti-inflammatory medicine**, such as ibuprofen, may be useful for 1–2 weeks. It helps ease pain and reduce inflammation if taken regularly.
- Adverse effects sometimes occur with anti-inflammatory medicines. Stomach pain and bleeding from the stomach are the most serious. Some people with asthma, high blood

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pressure, kidney failure, or heart failure may not be able to take anti-inflammatory medication.

- **Remember RICE**, straight after a sprain to reduce inflammation and swelling:
 - o **Rest** the joint for 2 days. Then gradually get it moving and as active as possible.
 - o **Ice**: press it on for 10–30 minutes as soon as possible after injury. Wrap ice cubes in a plastic bag to make an ice pack. A bag of frozen peas is an alternative. (Do not put ice directly next to skin, as it may cause an 'ice-burn'.)
 - o **Compression**: an elastic bandage is useful for 2 days.
 - o **Elevation**: rest a swollen ankle or knee at or above hip level as much as possible. A swollen hand or wrist can be elevated in a sling.
- **Physiotherapy** is an option if symptoms do not improve quickly.

Detailed knowledge about this topic

Goals and outcome measures

Goals

- To ease pain, reduce swelling, and allow the person to return to pre-injury level of joint function in the shortest possible time
- To minimize the need for drug therapy
- To promptly refer people who need special assessment or treatment

Outcome measures

- Return to pre-injury level of participation in sport and function at work
- Pain
- Swelling
- Subjective instability; objective instability
- Joint mobility
- Complications
- Recurrent injury
- Satisfaction with process of care and outcome

[Struijs and Kerkhoffs, 2004]

Background information

What is it?

Sprains and strains are soft-tissue injuries of ligaments and muscles.

What is a sprain?

A sprain is an injury to a ligament.

- The degree of the sprain is graded according to the extent of damage to, and integrity of, the ligament.
- **American Medical Association classification of sprains:**
 - o **Grade 1 sprain**: no gross damage to collagen fibres; therefore no laxity is present.
 - o **Grade 2 sprain**: partial tear of ligament; some degree of laxity, but without discontinuity of the ligament.
 - o **Grade 3 sprain**: complete tear of ligament; abnormal joint laxity, and no discernible end-point to this laxity.
- Classification of sprains, although widely quoted, can be hard to apply in practice, particularly in the first few days when pain, swelling, and muscle tension make clinical examination difficult [Dutch College of General Practitioners, 2000]. This guidance thus uses the terms 'severe' and 'mild to moderate' to classify sprains that, on examination in primary care, are likely to involve complete or incomplete ligamentous rupture.
- [Table !!Link!!](#) below lists common sprains and the associated ligaments that are usually injured.

Table 1. Ligaments injured in sprains of commonly affected joints.

Sprain	Ligament
Ankle sprain	Lateral ligaments of the ankle: <ul style="list-style-type: none">• Anterior talofibular ligament — usually involved• Fibulocalcaneal ligament — sometimes involved• Posterior talofibular ligament — rarely involved

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High ankle sprain	The ligament that joins the distal tibia and fibula (the syndesmosis)
Knee sprain	Anterior cruciate ligament (most common) Posterior cruciate ligament Medial collateral ligament Lateral collateral ligament (least common)
Thumb	Ulnar collateral ligament

What is a strain?

A strain is an injury to a muscle.

- A muscle strain (or 'pull') is a stretching or tearing of muscle fibres. Most muscle strains happen for one of two reasons: either the muscle has been stretched beyond its limits or it has been forced to contract too strongly. Muscle strains are graded depending on the severity of muscle fibre damage [Jarvinen et al, 2000]:
 - **Grade 1 strain.** This is a mild strain; only a few muscle fibres are stretched or torn. Although the injured muscle is tender and painful, it has normal strength.
 - **Grade 2 strain.** This is a moderate strain, with a greater number of injured fibres and more severe muscle pain and tenderness. There is also mild swelling, noticeable loss of strength, and sometimes a bruise.
 - **Grade 3 strain.** This strain tears the muscle all the way through, sometimes producing a 'pop' sensation as the muscle rips into two separate pieces or shears away from its tendon.
- Classification of strains can be hard to apply in practice when pain, swelling, and muscle tension make clinical examination difficult. This guidance thus uses the terms 'severe' and 'mild to moderate' to classify strains that, on examination in primary care, are likely to involve complete or incomplete muscle rupture.

[Garrick and Webb, 1999; Schenck, 1999]

How common is it?

Ankle sprains

- **Ankle sprains are the most common form of soft-tissue injury treated in primary care.** About 50% of ankle sprains occur while participating in sport [Dutch College of General Practitioners, 2000].
- The annual incidence rate of people in England presenting to Accident and Emergency (A&E) departments with a sprained ankle is about 6 per 1000. About 14% of these were classed as severe [Bridgman et al, 2003].
- More than three-quarters of ankle injuries are sprained ankles [Dutch College of General Practitioners, 2000].
- The proportion of sprained ankles with ruptured ligaments varied from 10% to 20% in Dutch casualty departments [Dutch College of General Practitioners, 2000].

Strains

- **Muscle strains are the most common injury sustained in sport**, accounting for up to 55% of such injuries. They are especially common in sports that require sprinting or jumping [Jarvinen et al, 2000].
- The muscles most commonly strained are the hamstring, rectus femoris, gastrocnemius, and adductor longus (groin) muscles [Garrett, 1996].

How do I assess someone with a sprain or strain?

History

Ask about:

- **The time, circumstances, and kind of trauma experienced**, including its force and direction.
- **Onset and development of symptoms** such as pain, swelling, bruising, loss of function, heat, a sense of instability — instability can indicate a significant sprain.
- **Experiencing a pop or snap at the time of the injury** — can signify a ruptured ligament or fractured bone.
- **Any predisposing or aggravating conditions** such as epilepsy, anti-coagulant treatment, haemophilia.
- **Previous episodes**, their management, and outcomes.
 - **Domestic violence** — if this is a possibility (for further information see the section on [Domestic violence](#)).

Examination

Look for:

- **Asymmetry, deformity, or wasting** — compare the affected limb with the other.
 - o A strain with complete rupture usually produces a sharp break in the normal outline of the muscle, with a 'dent' under the skin where the ripped pieces of muscle have come apart.
- **Signs of heat** over the site of the injury, and, with time, spreading to adjoining areas
- **Tenderness** localized to the site of the damaged ligament or muscle
- **Swelling and bruising:**
 - o The amount of swelling and bruising depends partly on severity and partly on the time since the injury, as it can take up to 24 hours for the full extent of bruising to become apparent.
 - o Muscle strain often results in a large haematoma.
 - Intramuscular haematoma: bleeding is contained within the muscle sheath, resulting in pain and localized swelling.
 - Extramuscular haematoma: bleeding spreads through the intermuscular spaces; pain is less than that due to an intramuscular haematoma, and swelling is more diffuse.
- **Loss of function** — initially worsens over the first few days as swelling increases
 - o Range of movement, active and passive
 - o Instability in affected joints — check all directions of movement for laxity
 - o Complete loss of muscle function — suggests a severe strain with complete rupture
- **Absence of:**
 - o Bone tenderness
 - o Deformity, swelling, or asymmetry not due to the presenting sprain or strain
 - o Neurological deficit, sensory or motor

Repeating the physical examination a few days later, when the pain and swelling have subsided, can be helpful in ascertaining the presence of a ruptured ligament [[Dutch College of General Practitioners, 2000](#)].

- **Ankle sprain:**
 - o Rupture of the lateral ligament complex should be considered if there is:
 - Pain during palpation of the anterior side of the lateral malleolus, *and*
 - Visible bruising *or* laxity on pulling heel forward

Investigations

- X-rays — arrange only if a fracture needing specific treatment is suspected or needs to be excluded.
- The 'Ottawa ankle rules' and 'Ottawa knee rules' are widely used to guide the decision on whether or not to order X-rays of an injured ankle or knee.
- **Ottawa ankle rules**
 - o **An ankle X-ray series** is indicated for someone with an ankle injury and either:
 - Bone tenderness at the posterior edge or tip of either the lateral or medial malleolus, *or*
 - Inability to bear weight both immediately after the injury and for four steps when examined
 - o **A foot X-ray series** is indicated for someone with an ankle injury, pain in the midfoot, and any of the following:
 - Bone tenderness at the base of the fifth metatarsal
 - Bone tenderness of the navicular (palpate the 'N spot' on the dorsum of the foot, about 3–4 cm distal and anterior to the medial malleolus, in line with the great toe)
 - Inability to bear weight, both immediately and when examined
 - o **Tips for accurate usage of the ankle rules:**
 - When assessing a person with ankle injury, the clinician has to decide whether to order an ankle series, a foot series, or both.
 - Begin by palpating away from tender areas. For example, the proximal fibula and the forefoot, are usually non-painful.
 - Next, assess swollen areas, such as over the anterior talofibular ligament.
 - Finally, palpate the posterior edge of the distal 6 cm of the fibula and the posterior edge of the distal medial malleolus. If the person has no bone tenderness, then assess ability to bear weight. Ask the person to stand up and attempt to take four

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steps, transferring weight twice onto each foot. If they can transfer weight they are regarded as being able to bear weight even if they limp.

o *Evidence for the Ottawa ankle rules* is reviewed below.

- **Ottawa knee rules**

o **A knee X-ray series** is indicated for people with a substantial knee injury and any of the following:

- Age 55 years or older
- Isolated tenderness of patella (no bone tenderness of knee other than patella)
- Tenderness of head of fibula
- Inability to flex to 90 degrees
- Inability to bear weight, both immediately and in the emergency department, for four steps

o **Tips for accurate usage of Ottawa knee rules:**

- Tenderness of the patella only counts if it is the only area of the bone tenderness in the knee
- Inability to bear weight means the person is unable to transfer weight twice onto each leg, regardless of limping

o *Evidence for the Ottawa knee rules* is reviewed below.

[Ottawa Health Research Institute, 1999a; Ottawa Health Research Institute, 1999b; Schenck, 1999]

Domestic violence

- **Be alert to the possibility of domestic violence.** Markers for undisclosed domestic violence include:
 - o Delay in presenting
 - o Frequent appointments for vague complaints; missed appointments
 - o Attempts to conceal injuries, or to minimize the extent of injuries
 - o Excessive fear, anxiety, depression, distress
 - o History of psychiatric illness or alcohol/drug dependency
 - o Person is always accompanied by partner; person is passive or afraid of partner; partner is aggressive, overly-dominant
 - o History of loss of consciousness
 - o Injuries inconsistent with the explanation; injuries to the face, hands, or abdomen; multiple injuries; fractures
 - o Pregnancy
- If domestic violence is suspected, see the victim alone so that the relevant history, examination, and consultation can be done in as supportive a manner as possible.
- It is not easy to ask (or to be asked) about domestic violence. Helpful guidance on recognizing and managing domestic violence can be found in the Department of Health's guideline: Domestic violence: A resource manual for health care professionals [DH, 2000].

What else might it be?

- **Fracture** — bone tenderness, inability to bear weight
- **Tendon rupture** — palpable gap in course of tendon, loss of function
- **Cartilage injury** (e.g. torn meniscus in knee) — catching, locking
- **Acute arthritis** (e.g. osteoarthritis, rheumatoid arthritis) — minimal trauma, signs of arthritis
- **Nerve injury** — loss of motor and/or sensory function
- **Osteomyelitis, bone tumour** — subacute onset, atypical presentation
- **Referred pain** from other structures supplied by the same nerve root
- **Tendinitis** — tendon swollen, tender, crepitus
- **Bleeding diathesis** — minimal trauma, large haemarthrosis

Complications and prognosis

Complications

- Prolonged symptoms
- Loss of range of movement in affected joint
- Delayed return to normal level of activity
- Reduced power in the surrounding muscles with consequent muscle wasting

[Schenck, 1999]

Prognosis

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There are few published data on the prognosis for sprains and strains in general.

Prognosis for a sprained ankle

- **The ultimate prognosis for a sprained ankle is good**, whatever the severity of the sprain. The time to full recovery, however, depends on the severity of the injury [[Dutch College of General Practitioners, 2000](#)].
 - o People with a mild sprain usually resume normal activities within 1–2 weeks
 - o Among people with a severe ankle sprain (grade 3) who have had early mobilization:
 - Over 50% return to work in less than 3 weeks, and 90% within 6 weeks.
 - From 60% to 90% return to sport at the same level as before the injury within 12 weeks.
 - From 20% to 40% have residual complaints such as pain, stiffness, swelling, and a feeling of instability, although these do not appreciably impair function.

Management issues

How do I manage an acute sprain or strain?

The evidence to support the following recommendations is summarized in [Supporting evidence](#).

Overview of management of acute sprains and strains

- Assess the cause, circumstances and extent of injury.
- Refer if necessary for emergency or specialized treatment.
- Initiate short-term treatment with RICE (Rest, Ice, Compression, Elevation).
- If pain needs additional measures, treat with analgesics.
- If rapid return to work or competitive sport is important, consider using an oral nonsteroidal anti-inflammatory drug (NSAID) for anti-inflammatory effect and analgesia.
- Advise early mobilization, typically starting after 2 days' rest.
- Advise on prognosis — recovery to usual function at work and sport depends on the site and severity of the injury, as well as on levels of activity. For example, with a severe sprained ankle it can take a few weeks to be able to return to work, but several months before fully active participation in sport is possible.
- Follow up people with a severe sprain or strain when the swelling has largely subsided (after about 7–10 days) to assess if referral for further treatment is indicated.

Who needs referral?

'Red flags' for major trauma or serious underlying condition

- People who have any of the 'red flags' in the following list need immediate referral [[NZGG, 2003](#)]:
 - o Unexplained deformity or swelling
 - o Appreciable weakness not due to pain
 - o Fever, chills, malaise
 - o Unexplained neurological deficit (sensory or motor)
 - o Pulmonary or vascular compromise
 - o Suspected malignancy or bleeding diathesis
- People subjected to domestic violence should be referred with an urgency appropriate to the situation.
 - o Markers for undisclosed domestic violence are detailed [below](#).

Criteria for referral of sprains and strains

Consider referring people as follows (according to local service provision):

- **Physiotherapy**
 - o Severe injuries requiring intensive/prolonged rehabilitation
 - o Major soft-tissue swelling
 - o Functional deficit
 - o Where GP feels specific expertise will accelerate recovery
- **Orthopaedic specialist**
 - o Joint laxity (i.e. sprain with complete rupture of joint capsule)
 - o Severe strain with complete rupture of muscle
 - o Fracture (definite or suspected)
 - o Swelling of a joint persisting more than 10 days — may have intra-articular pathology
 - o A sprain or strain that seriously impedes ability to function at work or competitive sport
 - o Recurrent sprains or strains

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- **Sports medicine specialist**
 - For people involved in professional or competitive sport
 - If diagnosis in doubt
 - Slow progress of recovery or rehabilitation
 - Deteriorating symptoms
 - To discuss appropriate imaging

How do I initiate treatment for an acute sprain or strain?

- **RICE: Rest, Ice, Compression, and Elevation** should be started as soon as possible
 - **Rest** *avoids pain* from movement.
 - Stabilize, protect, and rest the affected part (e.g. with an *elasticated bandage*) for up to 48 hours after injury, depending on pain. Complete immobilization (e.g. by a cast) is not indicated for sprains and strains treated in primary care.
 - **Ice (i.e. cryotherapy)** *reduces pain*.
 - Immerse the affected part in ice water for up to 10 minutes, or apply a malleable ice-pack (e.g. bag of frozen peas) for 10–30 minutes. Take care to avoid cold injury, and allow the affected part to warm up before repeating the procedure. Repeat as frequently as desired for 48 hours, e.g. every 2 hours while awake.
 - **Compression** *provides comfort* by limiting movement, and may restrict development of swelling.
 - Apply compression (e.g. with an *elasticated bandage*), taking care not to constrict blood flow — if tissues distal to the compression become blue or painful, the compression should be loosened and reapplied with less tension.
 - Compression must be used with caution if peripheral arterial disease is present or suspected (e.g. in elderly persons or people with diabetes).
 - **Elevation helps to control swelling**.
 - Elevate the injured part above the level of the heart, if practical.
- **Analgesia** should be prescribed if pain control is needed — see next section for details.

Which analgesic should I prescribe?

- **Paracetamol** taken regularly is effective for pain relief and is the *first choice* in minor injuries.
- **NSAIDs also provide effective pain relief**, but the risk of adverse effects is greater than with paracetamol.
 - NSAIDs may reduce the time sprains and strains take to heal.
 - Consider prescribing an NSAID for people who need to return as soon as possible to full function at work or competitive sport.
 - Ibuprofen is recommended as the first choice for an NSAID, as it has the lowest risk of adverse effects [CSM, 1994; Henry et al, 1996; CSM, 2002].
 - Consider giving gastroprotection (a proton pump inhibitor or misoprostol) to people at high risk of NSAID gastrointestinal adverse effects.
 - A *topical NSAID* is seldom indicated.
 - A systematic review identified only three small RCTs comparing topical with oral NSAIDs and found topical NSAIDs to be no more effective than oral NSAIDs [Mason et al, 2004b].
 - Topical NSAIDs have a better gastrointestinal adverse effect profile compared with oral NSAIDs. However, local adverse effects, such as rash have been reported [Mason et al, 2004b].
- **Paracetamol combined with codeine phosphate** should be considered if paracetamol alone provides *insufficient analgesia*.
 - Paracetamol and codeine should be prescribed as two separate medicines and the doses of each drug individually titrated to the person's needs.
- **Paracetamol may also be combined with an NSAID** if either drug alone does not provide adequate pain relief.
- **Combining an NSAID with codeine phosphate** may be a further option worth considering. However, the greatest body of evidence is for codeine combined with paracetamol.

What subsequent treatment is advised?

- **Early mobilization.** The most important component of rehabilitation is early mobilization. Movement should be within the constraints imposed by pain. Advise the person to exercise into the range of discomfort, and to aim to improve the range of movement a little every day.

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- **Stop compression.** There is little benefit after 48 hours from the use of crepe or support bandages.
- **Ultrasound, short-wave diathermy, infrared lamps, and manipulation:** these and other physical treatments are used by physiotherapists for treating sprains and strains. Referral to a chartered physiotherapist may therefore be indicated.

Is there evidence to support the use of rubefacients, ultrasound, homeopathic arnica, and oral hydrolytic enzymes?

There is no good evidence to support the use of *rubefacients*, *ultrasound*, *homeopathic arnica*, or *oral hydrolytic enzymes* in treating acute soft-tissue injuries.

What advice can I give about preventing sprains and strains?

Strategies to prevent sprains and strains are mostly based on expert opinion, as there is *little good evidence* from randomized controlled trials.

- **Stretching** may be beneficial. There is *insufficient evidence* either to endorse or to discontinue the commonly recommended practice of stretching before and/or after exercise.
- **Warm-up** may be beneficial. There is insufficient evidence either to endorse or to discontinue the commonly recommended practice of warming up before and/or after exercise.
- **Pre-season strength and endurance training** may be beneficial.
- **External ankle supports** can reduce the risk of *recurrent ankle sprains*.
- **Various bracing systems, boot cleat designs, and ski-boot binding systems** have been proposed for preventing **knee injuries**. However, there is *no good evidence* to support any of these technologies.

Medicines management

Paracetamol and codeine

- **Paracetamol** is the preferred analgesic. It is most effective if used regularly rather than 'as required'. It is safe and effective for the treatment of mild to moderate pain when used correctly, and is well tolerated at the recommended daily dose.
- **Codeine** (in combination with regular paracetamol) can be helpful when paracetamol alone is insufficient [*de Craen et al, 1996*].
 - o Paracetamol and codeine should be prescribed separately so they can be individually titrated; combination products such as co-codamol are not recommended.
 - o Codeine may cause nausea, vomiting, and drowsiness. Constipation is also another common adverse effect, although, with short-term use, there may not be a need for additional laxative use.

Nonsteroidal anti-inflammatory drugs

A full discussion on the contraindications, adverse effects, monitoring issues, and interactions of NSAIDs is beyond the scope of this guidance. For further information, see the CKS topic on *Nonsteroidal anti-inflammatory drugs (NSAIDs)*.

- Consider patient comorbidity when prescribing nonsteroidal anti-inflammatory drugs (NSAIDs).
- NSAIDs commonly cause gastrointestinal adverse effects, and can worsen asthma, hypertension, renal impairment, and heart failure.
- For people at high risk of gastrointestinal adverse events, we recommend the following options:
 - o Use paracetamol (with or without codeine) instead of a NSAID if possible.
 - o Or, use a gastroprotective agent with a standard NSAID [*NICE, 2001*].
 - o Or, consider using a *topical NSAID*.
- For advice on the management of dyspepsia due to NSAIDs, see the CKS topics on *Dyspepsia — symptoms (uninvestigated by endoscopy)* and *Dyspepsia — proven DU, GU, or NSAID-associated ulcer*.

Compression bandages

- Crepe, cotton crepe and cotton, polyamide, and elastane bandaging all provide support without exerting undue pressure.
- Elasticated tubular bandaging may be more convenient for people to use. This can be prescribed for NHS patients and also may be purchased over the counter.
- A range of other products are marketed as providing additional comfort, support, and compression. These are not available on an F10 prescription, but can be bought over the counter, and are often recommended by sports medicine specialists.

Supporting evidence

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What is the evidence to support diagnostic strategies?

Evidence for the Ottawa ankle rules

The set of Ottawa ankle rules is a decision-aid to help avoid unnecessary X-rays by assessing the likelihood of a fracture of the ankle or mid-foot on the basis of clinical evidence.

- A systematic review summarized the evidence to support the accuracy of the Ottawa ankle rules and conducted a meta-analysis on 27 studies involving 15,581 people [[Bachmann et al, 2003](#)].
 - The review concluded that evidence supports the Ottawa ankle rules as an accurate instrument for excluding fractures of the ankle and mid-foot. The instrument has a sensitivity of almost 100% and a modest specificity, and its use should reduce the number of unnecessary radiographs by 30–40%.

Evidence for the Ottawa knee rules

The set of Ottawa knee rules is a decision-aid to help avoid unnecessary X-rays by assessing the likelihood of a knee fracture on the basis of clinical evidence.

- A systematic review assessed the evidence to support the use of decision rules for deciding when to use plain X-rays of the knee [[Jackson et al, 2003](#)].
 - The review found five decision rules and recommended that the Ottawa knee rules be used to decide when to obtain plain films for suspected knee fracture.
 - The review also concluded that a careful physical examination should be sufficient to decide whether to refer people with potential meniscal and ligament injuries.
- Another systematic review summarized the evidence to support the accuracy of the Ottawa knee rules and conducted a meta-analysis on 6 studies involving 4249 adults [[Bachmann et al, 2004](#)].
 - In the pooled analysis the sensitivity was 98.5% (CI 93.2% to 100%).
 - The review concluded that a negative result on an Ottawa knee rule test accurately excluded knee fractures after acute knee injury.

What evidence supports treatments of sprains and strains?

Abbreviations

Table 2. The abbreviations listed below are used in the following sections on supporting evidence:

CI	95% confidence interval
OR	Odds ratio
RCT	Randomized controlled trial
RR	Relative risk
WMD	Weighted mean difference

Introduction

Evidence to support treatments of sprains and strains comes from relatively few randomized controlled trials (RCTs), most of which are for treatments of ankle sprains in adults. However, this evidence can often be applied to the management of other sprains and strains.

Evidence for RICE (Rest, Ice, Compression, Elevation)

RICE (Rest, Ice, Compression, Elevation) is standard first-aid treatment for sprains and strains. Not many would doubt the common sense on which RICE is based, or the comfort that it provides. However, few high-quality RCTs have studied the various ways in which RICE is implemented, or its efficacy in terms of return to full function at work and sport.

Evidence for rest, immobilization, functional treatment, and surgery

- A systematic review assessed the evidence from RCTs published between 1966 and 2002 of treating acute limb injuries with rest or mobilization [[Nash et al, 2004](#)].
 - The authors concluded that there is no benefit for immobilization after acute upper or lower limb injuries in adults.
- **One Cochrane systematic review assessed methods of immobilization** for the acute sprained ankle, and compared immobilization with functional treatment methods. Functional treatments involve early mobilisation and the use of an external support (e.g. tape and/or elastic bandage or orthotic support), combined with co-ordination training [[Kerkhoffs et al, 2002a](#)].
 - Twenty-one trials involving 2184 participants were included in the analyses
 - The review concluded that: 'functional treatment appears to be the favourable strategy for treating acute ankle sprains when compared with immobilization. However, these

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results should be interpreted with caution, as most of the differences are not statistically significant after exclusion of the low-quality trials. Many trials were poorly reported and there was variety amongst the functional treatments evaluated.'

- **A Cochrane systematic review compared different functional treatments for ankle sprains** [[Kerkhoffs et al, 2002b](#)].
 - o Nine trials involving 892 participants were included in the analysis.
 - o The review concluded that:
 - **Lace-up ankle support** seems to be effective in reducing swelling in the short term, compared with semi-rigid ankle support, elastic bandage, and tape.
 - **The use of an elastic bandage has fewer complications than taping**, but seems to be associated with a slower return to work and sport, and more reported instability than with a semi-rigid ankle support.
 - Definitive conclusions are hampered by the variety of treatments used, and the inconsistency of reported follow-up times.
- **A Cochrane systematic review compared surgical and conservative treatments for acute ankle sprains** [[Kerkhoffs et al, 2002c](#)].
 - o The review found 17 RCTs with a total of 1950 subjects, and concluded that there is insufficient evidence to determine the relative efficacies of surgical and conservative treatments of acute ankle sprains.

Evidence for ice, cryotherapy

- One systematic review found 22 RCTs of cryotherapy for treating soft-tissue injuries due to trauma or surgery [[Bleakley et al, 2004](#); [Hubbard and Denegar, 2004](#)].
- The authors concluded that:
 - o Cryotherapy seems to be effective in reducing pain.
 - o There is limited evidence that cryotherapy has only minimal benefit in terms of reducing swelling and restoring function.

Evidence for compression

- We found no systematic review of trials of compression used to treat soft-tissue injuries. We therefore conducted a rapid review: Medline was searched (1966 to October 2004) for RCTs in which compression was used to treat acute soft tissue injuries.
 - o **Immediate external compression.** One study investigated immediate external compression in the management of an acute muscle injury. The authors concluded that the application of a maximum compression bandage within 5 minutes of a traumatic muscle injury did not significantly reduce the size of the haematoma nor significantly shorten the time to complete subjective recovery, compared with no immediate treatment [[Thorsson et al, 1997](#)].
 - o **Elasticated tubular bandage.** One randomized controlled trial investigated the effectiveness of double Tubigrip in grade 2 and 3 ankle sprains [[Lewis and Atkinson, 2002](#)]. Subjects were all given analgesia and rehabilitation advice; half were randomly chosen to be given a double Tubigrip bandage in addition. The study found no statistically significant difference between the two groups in the time to recovery.
 - o **Quality of compression bandage.** One study compared the effectiveness of two different qualities of compression bandage and found no significant effect on pain, swelling, or tenderness [[Andersson et al, 1983](#)].
 - o **Layer bandage compared with elastic adhesive tape bandage.** One study compared different methods of compression for acute ankle sprains. No statistically significant difference was observed between the differently bandaged groups with regard to clinical findings and foot volume. However, elastic adhesive tape bandage caused significantly more complications, mainly excessive compression, irritation of the skin, or rash [[Viljakka and Rokkanen, 1983](#)].

Evidence for elevation

- We found no systematic review of trials of elevation used to treat soft-tissue injuries. We therefore conducted a rapid review. Medline was searched (1966 to October 2004) for RCTs in which elevation was used to treat acute soft-tissue injuries. No trial was found.

Evidence for NSAIDs used to treat acute sprains and strains

It is common practice to use NSAIDs as adjunctive treatment to RICE in the acute management of sprains and strains [[Weiler, 1992](#); [Schenck, 1999](#)]. The efficacy of NSAIDs used as analgesics is well-known from studies in other conditions, and the evidence is not reviewed here. However, we sought practical answers in the literature for two clinical questions related to the management of sprains and strains:

- Does the use of NSAIDs speed recovery from sprains and strains?
- Is there a role for topical NSAIDs in treating pain due to acute sprains and strains?

These two questions are addressed in the following sections.

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Does the use of NSAIDs speed recovery from sprains and strains?

- It has been suggested that the anti-inflammatory properties of NSAIDs improve healing of soft tissues and thus hasten return to full function at work and sport. The rationale is that inflammation after an acute injury is harmful and that its control will speed healing [Weiler, 1992; Schenck, 1999].
- However, other plausible hypotheses are that:
 - Inflammation due to trauma aids healing, and that interfering with this process is harmful.
 - NSAIDs do not effectively control inflammation due to trauma.
 - Inflammation due to trauma resolves in a few days, so anti-inflammatory treatment could have only a marginal effect.
- We found a comprehensive review (but no systematic review) of evidence on the use of NSAIDs in soft-tissue injuries [Weiler, 1992].
- The review summarised the results of 11 double blind, placebo controlled RCTs. All studies looked at short-term (7–14 days) outcomes. The review concluded that:
 - **There is no evidence that NSAIDs delay the healing process when given soon after an injury.**
 - **Modest benefits were seen in 7 of 11 studies.**
- On searching Medline, 1996 through to October 2004 we found a further 12 RCTs of NSAIDs in which at least one outcome reflected a possible anti-inflammatory affect. The conclusions from this rapid review are that:
 - There is limited evidence of effectiveness in terms of return to functionality when NSAIDs are used to treat sprains and strains — the quality of reporting and methodology is variable and the results are not entirely consistent.
 - The size of any anti-inflammatory effect is likely to be moderate (i.e. a difference of about 1–3 days in returning to usual activities).

Is there a role for topical NSAIDs in treating pain due to acute sprains and strains?

To address the question, we searched for evidence that topical NSAIDs, when used for in soft-tissue injuries, have (i) an anti-inflammatory effect, (ii) a clinically useful analgesic effect, and (iii) an analgesic effect at least equivalent to that of oral NSAIDs.

- **What is the evidence for anti-inflammatory benefit from topical NSAIDs used to treat soft-tissue injuries?**
 - We found no review or clinical trial of topical NSAIDs used in soft-tissue injuries for anti-inflammatory benefit.
- **What is the evidence for analgesic benefit from topical NSAIDs?**
 - A systematic review found 26 RCTs of topical NSAIDs and concluded that they provide effective, safe analgesia in acute pain due to strains, sprains, and sports injuries [Mason et al, 2004b].
- **What is the evidence for topical NSAIDs providing analgesia comparable to that from oral NSAIDs?**
 - A systematic review compared the efficacy of topical and oral NSAIDs for acute pain due to soft-tissue injuries [Mason et al, 2004b].
 - The review found three trials comparing a topical NSAID with an oral NSAID, but only two trials directly compared the same topical and oral NSAID.
 - Overall rates of treatment success were similar for topical (57%) and oral (62%) NSAIDs with no statistically significant benefit (relative benefit 0.9; CI 0.8 to 1.1).

Evidence for rubefacients used to treat acute sprains and strains

- We found no systematic reviews or controlled trials of rubefacients used to treat acute sprains and strains.
- We found one systematic review (search date March 2003) of evidence for efficacy of topical rubefacients containing salicylates for the treatment of acute and chronic pain [Mason et al, 2004a].
 - The review concluded that treatments with salicylate rubefacients were significantly better than placebo in controlling pain.
 - Adverse events were rare, with no significant difference between treatment and control groups.

Evidence for ultrasound used to treat acute sprains and strains

Ultrasound is used in the treatment of a wide variety of musculoskeletal disorders.

- A Cochrane systematic review evaluated the effects of ultrasound therapy in the treatment of acute ankle sprains [van der Windt et al, 2002]. The review found 5 trials involving 572 patients suitable for analysis:
- The review concluded that:

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- o The results do not support the use of ultrasound in the treatment of ankle sprains
- o The magnitude of most reported treatment effects seemed to be small, and may be of limited clinical importance

Evidence for homeopathic arnica used to treat acute sprains and strains

Arnica is used in two kinds of preparation to treat soft-tissue injuries: homeopathic and herbal. We found no clinical trial of herbal arnica (arnica oil). However, trials of homeopathic arnica have been published.

- A review of trials of homeopathic arnica used to treat acute soft-tissue injuries found that most trials were methodologically weak, and concluded that there is no good evidence of benefit [Ernst and Pittler, 1998].

Evidence for oral hydrolytic enzymes used to treat acute sprains and strains

- An RCT with 8 treatment arms compared the effectiveness and safety of treating acute ankle sprains with the enzymes rutoside, bromelain, and trypsin in all possible combinations, and placebo [Kerkhoffs et al, 2004]. The authors concluded that:
 - o The triple combination was not found superior to the three two-drug combinations, the three single substances, or placebo for treatment of people with acute unilateral sprain of the lateral ankle joint.
 - o However, subgroup analysis (of questionable validity) found that people treated without the support of a brace showed evidence of superiority of the triple enzyme combination over placebo.

What evidence supports strategies to prevent sprains and strains?

Evidence for risk factors for injury during sport and recreation

- A systematic review examined the published evidence from 117 articles on the effectiveness of current injury prevention strategies in sport and recreational activities, and assessed the applicability of the evidence to children and youth [MacKay et al, 2004].
 - o The review found that 'surprisingly few' well-designed and controlled studies investigated strategies to prevent injuries, and that an even smaller number evaluated strategies to reduce injury in children and youth.
 - o Most of the reviewed studies were of engineering-based interventions involving modification of the environment or protective equipment. However, this class of intervention often does not ensure injury reduction unless it is combined with educational/promotional activities and/or policy/legislation requiring use.
 - o The review did not discuss specific interventions, as its main purpose was to highlight the paucity of evidence.
- A systematic review found 45 studies that identified risk factors and potential prevention strategies which could be used to modify risk factors for injury in children and adolescents while participating in sport [Emery, 2003].
 - o There were problems with study design, internal validity, and generalizability.
 - o However, the review concluded that there is some evidence that potentially modifiable risk factors, including poor endurance, lack of preseason training, and some psychosocial factors, are important risk factors for injury in sport for children and adolescents.

Evidence for prevention of injury in football

- A systematic review sought evidence on the effectiveness of current injury-prevention strategies in football [Olsen et al, 2004].
 - o The review found one study of a complex set of interventions to prevent dehydration, and three studies of strategies to prevent injury.
 - One strategy was strength-training out of season. The other two were complex strategies that included specific education and supervised training.
 - o The review concluded that some of the strategies look promising, but that they lack adequate evaluation and require further research, particularly in younger players.

Evidence for stretching to prevent injury in sport

- We found one systematic review of stretching (before or after exercise) to prevent injuries in competitive or recreational athletes [Thacker et al, 2004]. The review found 6 controlled studies and could pool the results from 5 studies for a meta-analysis. The review concluded that:
 - o Stretching was not significantly associated with a reduction in total injuries
 - o There is insufficient evidence either to endorse or to discontinue the practice of stretching

Evidence for prevention of ankle injuries in sport

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Clinical Knowledge Summaries: Previous version – Sprains and strains

- A Cochrane systematic review assessed the effects of interventions used to prevent ankle sprains in physically active individuals from adolescence to middle age [Handoll et al, 2001].
- The review found 14 randomized trials with 8279 participants:
 - Twelve trials involved active, predominantly young, adults participating in organised, generally high-risk, activities
 - Two trials involved injured patients who had been active in sports before their injury
- Prophylactic interventions included:
 - External ankle support in the form of a semi-rigid orthosis
 - Air-cast brace
 - High top shoes
 - Ankle disk training
 - Taping
 - Muscle stretching
 - Boot inserts
 - Health education programmes
 - Controlled rehabilitation
- **Results and conclusions:**
 - **External ankle support**
 - The number of ankle sprains was significantly lower.
 - This reduction in number of ankle sprains was greater for those with a previous history of ankle sprain.
 - The severity of ankle sprains was not changed.
 - The incidence of other leg injuries was not altered.
 - **Ankle disk training exercises:** there was limited evidence for reduction in ankle sprain for those with previous ankle sprains.
 - **'High-top' shoes:** a protective effect remains to be established.
 - **Other interventions:** problems with data-reporting limited interpretation.

Evidence for prevention of knee injuries in sport

- A systematic review of the evidence for effectiveness of prevention strategies found 13 reports that compared alternative methods to prevent knee injury [Thacker et al, 2003].
 - **Bracing.** Five studies addressed the effectiveness of bracing in football players; these studies showed no consistent evidence of benefit.
 - **Cleat design.** Two studies comparing alternative cleat designs were difficult to interpret because of inadequate reporting of methodology.
 - **Ski-boot/binding system.** A controlled study testing the effects of adjustments in the ski-boot/binding system was difficult to interpret because of inadequate reporting of methodology.
 - **Conditioning and training.** Six studies addressed the impact of conditioning and training. There were serious flaws in study design, control of bias, and statistical methods; the median quality scores ranged from 11 to 56 (out of 100). Nevertheless, the authors concluded that there is encouraging evidence for the prevention of knee injuries from structured training programmes that emphasize neuromuscular and proprioceptive training.

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NHS staff in England can link, free of charge, from references to the full text journal articles by clicking on [NHS Athens Full-text]. You will need an NHS Athens password to access these resources. Click here for Athens registration.

All references with links to [Free Full-text] are freely available online to users in England and Wales. This includes the full text of Department of Health papers and Cochrane Library reviews.

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