Prelude: This review is by Peter Larmer DHSc, and was part of his Doctoral degree at AUT University.

Review of treatment for ankle sprains

Although the overall aim of this study is not to investigate the effectiveness of interventions, it is important to provide a background and an understanding of how physiotherapists treat ankle sprains. An appreciation of the effectiveness of interventions was considered useful as it provides an understanding of what may influence a physiotherapist to decide when a patient is ready for discharge. A preliminary search of the literature was undertaken to investigate the effectiveness of physiotherapy treatment programs for sprained ankles. This preliminary search identified a number of systematic reviews in this area. Thus a search focused upon systematic reviews of the effectiveness of physiotherapy interventions for sprained ankles was undertaken.

Methodology

The following databases were initially searched: Medline (1966-current), EBSCO Health, (included Biomedical Reference Collection, Clinical Reference Collection, Health Source Consumer/Nursing/Academic Edition, Psychological and Behavioral Sciences Collection and SPORTDiscus), Ovid (included Full text journals, EBM Reviews, AMED, CINAHL, ERIC, Health and Psychosocial Instruments, Ovid MEDLINE, PsycINFO,), CINAHL Current contents; Psyclit; Science Citation Index; sportdiscus, Cochrane controlled trials register, Cochrane Database of Systematic Reviews, Cochrane Complementary Medicine Fields Trial Register, PEDro. The search used the following initial keyword terms: ‘ankle$ and injur$ or sprain$ or strain$ and physiotherapy or treatment, and systematic review’.
To be eligible for inclusion in this review, studies had to be systematic reviews, have been published in English, and participants had to have suffered an ankle sprain. The studies also needed to have investigated interventions that could be delivered by a physiotherapist. It should be noted the following is primarily a narrative critical review. It is limited in the following respect; only published reviews have been obtained. A comprehensive search for unpublished reviews, conference proceedings and reports was not undertaken. A further limitation of the current review is that reviews have been analysed and described by a single author, thus there is an acknowledged bias in the conclusions that have been reached. As a result thirty three systematic reviews were identified. The abstracts where possible were obtained and appraised for each of these reviews. Twenty reviews were excluded for the following reasons; not a systematic review, surgery versus immobilisation, prevalence studies, reviewing only one modality (ice, or ultrasound), previous published systematic reviews that have been updated and journal comments related to a published review. Reference lists of the reviews were checked to identify further reviews. One review found on the Accident Compensation Corporation website was also included (Broad et al., 2001).

A critical appraisal and grading of each systematic review was undertaken involving a modified version of the Effective Practice and Organisation of Care (EPOC) group scoring system (Moe et al., 2007) (Appendix A). The EPOC scoring system comprises nine separate questions graded between 0 and 2 covering aspects of study design. A final overall score (quality rating), out of a possible 18, was awarded to each systematic review (see Table 3). A study was considered of low quality if it scored less than 50% (9/18), moderate quality if it scored greater than or
equal to 50% but less than 75% (14/18) and high quality if it scored greater than or equal to 75%.

For clarification in the following section when the term ‘review’ is used this refers to the systematic reviews that were obtained. When the term ‘studies’ is used this refers to the individual studies within each of the systematic reviews.

**Results**

As a result of the search a total of 13 reviews were obtained for full appraisal (See Table 2). The purpose of each review varied considerably and is summarised in Table 2. Ten reviews, (Bleakley, McDonough, & MacAuley, 2008; Broad et al., 2001; de Vries et al., 2006; M. H. Jones & Amendola, 2007b; Kerkhoffs et al., 2001; Kerkhoffs, Struijs et al., 2002; Loudon, Santos, Franks, & Liu, 2008; Pijnenburg et al., 2000; van der Wees et al., 2006; van Os et al., 2005) looked at the most effective intervention. Two reviews that examined surgery were not excluded as they included studies investigating conservative versus immobilisation management (de Vries et al., 2006; Pijnenburg et al., 2000). Three reviews, (Bleakley et al., 2008; Handoll et al., 2001; van der Wees et al., 2006) investigated the prevention of ankle sprains. One review, (de Noronha, Refshauge, Herbert, & Kilbreath, 2006) that met the inclusion criteria investigated predicting the likelihood of suffering an ankle sprain. This review did not look at interventions, but considered risk factors associated with ankle sprains. Finally, a recent review (van Rijn et al., 2008) considered the clinical course of a conventionally treated ankle sprain.

There were a total of two hundred and fifty studies included across the 13 reviews. However, a number of the individual studies were included in more than one review. Further examination revealed that there were one hundred and fifty seven individual studies. With respect to intention to treat, ten reviews, (Bleakley et
al., 2008; Broad et al., 2001; de Noronha et al., 2006; de Vries et al., 2006; Handoll et al., 2001; Kerkhoffs, Struijs et al., 2002; Loudon et al., 2008; van der Wees et al., 2006; van Os et al., 2005; van Rijn et al., 2008) indicated the number of studies that utilised an intention to treat approach (Table 2). Three reviews, (M. H. Jones & Amendola, 2007b; Kerkhoffs et al., 2001; Pijnenburg et al., 2000) failed to mention if the included studies undertook an intention to treat analysis. With respect to time since injury, six reviews, (Bleakley et al., 2008; Kerkhoffs et al., 2001; Kerkhoffs, Struijs et al., 2002; Pijnenburg et al., 2003; van Os et al., 2005; van Rijn et al., 2008) included acute ankle studies. One review, (Broad et al., 2001) included acute and sub acute studies. One review, (van der Wees et al., 2006) included both acute and chronic studies and two reviews, (de Vries et al., 2006; Loudon et al., 2008) included chronic studies only. Three reviews, (de Noronha et al., 2006; Handoll et al., 2001; M. H. Jones & Amendola, 2007b) did not state the time from injury. The reviews included studies that had a follow up period of up to 11 years (Table 2). Seventy two studies had follow up periods of less than or equal to three months. A further 38 studies did not have follow up periods stated.

The most common intervention identified across the reviews was immobilisation (67). Taping and bandaging (59) were the most common comparative interventions, followed by: bracing (35) physiotherapy (23), rest, ice, compression and elevation (RICE) (23), functional exercises (36), electrotherapy (16), manual therapy (16), medication (8), rehabilitation (6), and other (8). No reviews looked at physiotherapy interventions exclusively. A number of reviews used the generalised term of physiotherapy as the intervention, although many did not provide a detailed description of what this involved.
With respect to outcome measures, performance tests were used in two hundred and sixteen studies (Table 2). Performance tests included postural balance and specific activity tests. Impairment measures were used in one hundred and fifty four studies. Impairment measures included range of movement, strength and swelling. Pain was measured on one hundred and thirteen occasions. A number of variations of pain scales were used; however, the ‘visual analogue scale’ (VAS) was most commonly indicated. Seven reviews (Bleakley et al., 2008; Broad et al., 2001; de Vries et al., 2006; Handoll et al., 2001; M. H. Jones & Amendola, 2007a; Loudon et al., 2008; van der Wees et al., 2006) specifically mentioned that self-report questionnaires were used on twenty occasions. The remaining six reviews did not indicate if questionnaires were used as an outcome measure. There were sixty two non specific outcome measures used including recurrence rates, incidence and service utilisation. Three reviews, (Kerkhoffs, Struijs et al., 2002; Loudon et al., 2008; Pijnenburg et al., 2000) used a ‘level of evidence’ approach throughout the review. Six reviews, (de Vries et al., 2006; Handoll et al., 2001; M. H. Jones & Amendola, 2007b; Kerkhoffs et al., 2001; van der Wees et al., 2006; van Rijn et al., 2008) used a partial ‘levels of evidence’ approach whereby only selected studies were combined for analysis. The remaining four reviews, (Bleakley et al., 2008; Broad et al., 2001; de Noronha et al., 2006; van Os et al., 2005) did not use a ‘level of evidence’ approach. With respect to the quality scores of the reviews, these ranged from 3 to 17/18 (Table 3). Eight reviews, (de Noronha et al., 2006; de Vries et al., 2006; Handoll et al., 2001; Kerkhoffs et al., 2001; Kerkhoffs, Struijs et al., 2002; Loudon et al., 2008; van der Wees et al., 2006; van Os et al., 2005) attained a high quality score (greater than 75%). Four reviews, (Bleakley et al., 2008; Broad et al., 2001; Pijnenburg et al., 2000; van Rijn et al., 2008) attained a medium quality score
(between 60% and 75%). Only one review (M. H. Jones & Amendola, 2007b) attained a poor quality score (20%).

The findings of the reviews varied considerably. Four reviews (Broad et al., 2001; M. H. Jones & Amendola, 2007b; Kerkhoffs et al., 2001; Pijnenburg et al., 2000) concluded that early mobilisation resulted in better outcomes than immobilisation. With respect to exercise rehabilitation, one review (van der Wees et al., 2006) concluded that a wobble board exercise is useful for prevention of recurrent ankle sprains and one review (van Os et al., 2005) concluded that there was limited evidence that the addition of a supervised exercise programme resulted in greater reduction of swelling and earlier return to work. One review (Loudon et al., 2008) concluded that conservative treatment interventions including balance, proprioceptive and muscle strengthening exercises were effective for patients with functional ankle instability. One review examining factors that might predict recurrence (de Noronha et al., 2006) concluded that decreased ankle dorsiflexion may increase the risk of ankle sprains. With respect to manual therapy, one review (Bleakley et al., 2008) concluded manual therapy can improve short term symptoms after an ankle sprain, while a further review (van der Wees et al., 2006) concluded manual mobilisation has an initial effect on dorsiflexion range of movement. With respect to taping or bracing one review (Kerkhoffs, Struijs et al., 2002) concluded that no definite conclusions could be drawn as to whether taping, elastic bandage or semi-rigid bracing provided the optimal functional treatment, while a further review (Handoll et al., 2001) concluded that there was good evidence for external supports to prevent ligamentous injuries. One review (van Rijn et al., 2008) concluded that while there is a rapid decrease in pain for the 2 weeks following an acute ankle sprain, after 1 year a high percentage of patients still experienced pain and subjective
instability. Finally one review (de Vries et al., 2006) found insufficient evidence to support any specific surgical or conservative intervention.

Discussion

With regard to the overall findings, there were a number of issues that were central to this thesis. These included the difficulty of evaluating the effectiveness of interventions across a number of systematic reviews. This has been highlighted by authors who have identified that care needs to be taken in handling the vast quantity of health information (Clarke, 2007; Hatala, Keitz, Wyer, & Guyatt, 2005; Oxman et al., 1991). While the primary aim of the current review was to investigate the effectiveness of physiotherapy interventions for sprained ankles not all systematic reviews specifically addressed this question. Additionally a number of limitations were identified. Missing data from the individual studies was identified as a common fault by the authors in many of the reviews. The time since injury varied considerably across the studies with some reviews including acute and chronic studies. It is worth noting that authors of the reviews generally commented that the follow up periods within the studies were often too short to measure effectiveness of interventions. This review classified the studies according to acute, subacute and chronic duration as described by previous authors (Pengel et al., 2007). The acute phase is considered up to six weeks, the subacute phase between six weeks and three months and the chronic stage longer than three months. Further relevance of these timeframes are provided by Hubbard and Hicks-Little (2008) in a recent systematic review where they identified that it took between six weeks and three months for ligament healing to occur following an ankle sprain.

A large number of interventions were applied across the studies. With respect to physiotherapy interventions, while twenty three studies specifically mentioned
physiotherapy all the other interventions identified, apart from medication, clearly fell within the general category of modalities that a physiotherapist would be likely to use. The variation in the number and type of interventions and the number of outcome measures made comparisons across individual studies difficult. Authors of the included reviews have identified this as a common weakness in the studies. To be able to identify the most effective intervention a consistency of outcome measures is needed (Bialocerkowski, Grimmer, Milanese, & Kumar, 2004). Outcome measurement using self-report questionnaires has been recommended as an important method of evaluating effectiveness of treatment interventions as well as differentiating severity of injury and patient perception (Mann, Nyska, Hetsroni, & Karlsson, 2006; Ross, Guskiewicz, Gross, & Yu, 2008; Saltzman, 2001; Swiontkowski, Buckwalter, Keller, & Haralson, 1999; Valderas et al., 2008; Vallance-Owen & Cubbin, 2002). The findings from the current review show that twenty questionnaires were identified across the studies indicating that this method of outcome measurement is perhaps under-utilised. Apart from one review (Loudon et al., 2008) that specifically identified four outcome questionnaires it was not possible to identify what specific functional outcome questionnaires had been used on the other sixteen occasions. Of interest, Loudon and co-reviewers (2008) specifically evaluated if the reliability or validity of outcome measures used in studies had been reported. They found of the sixteen reviewed studies only five reported on reliability measures and no studies reported on validity of outcome measures. No other reviews evaluated this aspect.

The overall poor quality of the individual studies makes any attempt to pool the data from the reviews questionable. While some authors of reviews identified that they excluded some studies from analysis in the pooling of data it was not always
possible to ascertain how this had been undertaken. Previous authors (Hatala et al., 2005) have suggested that when there is significant variation in subjects, interventions, outcome measurements and study methods then pooling of data should not be undertaken. Additionally it has been identified that inadequate intention to treat data along with variable follow up periods make pooling of data likely to result in false estimates of effect (D'Amico, Deeks, & Altman, 1998, 1999; Smeeth, Haines, & Ebrahim, 1999). While the scoring system has been previously validated (Oxman & Guyatt, 1991) and utilised for reviews of systematic reviews, (Jamtvedt et al., 2008; Moe et al., 2007), there are limitations with any scoring method. As there is no ‘gold standard’ to benchmark critical appraisal tools against and there is no one generic tool that can be used across all studies then there will always be limitations to their validity (Katrak, Bialocerkowski, Massy-Westropp, Kumar, & Grimmer, 2004).

Despite the identified limitations, this current critical review could make some generalised conclusions based upon a majority consensus appearing across the reviews rather than a strict ‘level of evidence’ approach. This summary of the reviews lends further support for early mobilisation in the management of ankle sprains. There was a consistent recommendation from two high quality, one medium quality and one poor quality review, that immobilisation should be avoided and early mobilisation was the most effective strategy in ankle sprain recovery. Early mobilisation is in keeping with contemporary treatment management. With regard to active interventions, all listed interventions apart from medication, are incorporated into general physiotherapy treatment. This lends support to the fact that physiotherapists are appropriate health practitioners to be involved in the treatment and management of ankle sprains. However, there is still a lack of evidence as to the most appropriate and effective physiotherapy intervention. The large number and
variety of outcome measurements across the studies is cause for concern. While aspects of functional activities were assessed across the studies, in keeping with WHO recommendations (World Health Organization, 2001), the use of any functional outcome questionnaires has not been widely reported. Outcome questionnaires have been highly recommended as assisting in evaluating and improving the effectiveness of interventions (Guyatt, Feeny, & Patrick, 1993). The current review identified that while seven reviews reported the use of self-report questionnaires, these were only used on twenty occasions across all the studies.

The variability in results of both interventions and outcomes across the research, makes it difficult for clinicians to confidently assess when a patient is recovered and ready for discharge based on evidence from research. Clinicians as a result have difficulty determining appropriate long term rehabilitation plans. This is supported from findings that after one year a high percentage of patients still experienced pain and subjective instability with their ankles (van Rijn et al., 2008), and that patient satisfaction has been demonstrated to be poor at discharge (M. H. Jones & Amendola, 2007a). It has been suggested that these factors may be attributable to the high rate of recurrence of this injury (Refshauge, 2008). Additionally it has been identified that clinicians need to know if their observations reflect the perceived disability of patients (Dowrick, Gabbe, Williamson, Wolfe, & Cameron, 2006). These findings have important clinical implications and are particularly relevant to the current study.

It is acknowledged that there is difficulty when investigating effectiveness of treatment. While it is difficult to control for variation in both treatment interventions and therapist interaction with the patient, it is possible to standardise outcome measurements. This review has highlighted the lack of consistency in outcome
measurement. An appreciation of the complex nature of outcome measurements is needed before this issue can be resolved. The following section reviews this aspect.
Table 1: Summary of systematic reviews of sprained ankle interventions

<table>
<thead>
<tr>
<th>Author</th>
<th>Review questions</th>
<th>No of studies</th>
<th>Types of interventions (Number of studies)</th>
<th>Outcome measures (Number of studies)</th>
<th>Physiotherapy related results as reported by authors</th>
<th>Levels of evidence approach (Yes/No/Partial)</th>
<th>Quality score (/18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loudon et al. 2008</td>
<td>To examine the changes induced by exercise treatments to the various potential functional ankle instability factors.</td>
<td>16 RCTs and controlled trials</td>
<td>Strengthening (5), Balance (3), Exercises (3), Disc training (2), Bi-directional bicycle pedal (1), Joint position sense (1), Coordination (1)</td>
<td>Pain (1)</td>
<td>Conservative treatment interventions including balance, proprioceptive and muscle strengthening exercises are effective for patients with functional ankle instability.</td>
<td>Yes</td>
<td>15</td>
</tr>
<tr>
<td>van Rijn et al. 2008</td>
<td>What is the clinical course of conventionally treated acute lateral ankle sprains in adults and its prognostic factors?</td>
<td>31 observational and controlled trials</td>
<td>Bandage (12), Bracing (10), RICE (7), Mobilisation (6), Taping (5), Physiotherapy (2), Medication (1)</td>
<td>Pain (19)</td>
<td>During the first 2 weeks after an acute sprain, there is a rapid decrease in pain; however, after 1 year follow up a high percentage of patients still experienced pain and subjective instability.</td>
<td>Partial</td>
<td>13</td>
</tr>
<tr>
<td>Study</td>
<td>Question</td>
<td>Findings</td>
<td></td>
<td></td>
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<td>-------------------------------</td>
<td>-------------------------------------------------------------------------</td>
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</tr>
</tbody>
</table>
| Bleakley et al. 2008          | • Which intervention(s) best augment early mobilisation and external support after an acute ankle sprain?  
• What is the most appropriate method of preventing re-injury? | • 23 RCTs  
• 14 studies  
• Acute  
• < 3 months (17)  
≤1 year (4)  
Not stated (2)  
• Electrophysical agents (9), Drugs (7), Manual therapy/rehab (4), Other (3)  
• Pain (19)  
• Impairment measures (15)  
• Performance tests (16)  
• Self-report questionnaires (7)  
• Others (15)  
| Manual therapy can improve short term symptoms after ankle sprain and neuromuscular training may prevent re-injury.  
• No  
• 12 |
| Jones and Amendola 2007       | • Does a difference exist between time to return to preinjury level of activity with early functional treatment compared with immobilisation?  
• Is there a difference between the two groups for patient satisfaction, subjective instability and rate of injury? | • 9 RCTs  
• Not stated  
• Not stated  
• < 3 months (2), Not stated (7)  
• Immobilisation (9), Tape (4), Brace (4), Early motion (1)  
• Pain (0)  
• Impairment measures (0)  
• Performance tests (20)  
• Self-report questionnaires (2)  
• Others (0)  
| Level 2 evidence trend favouring early mobilisation for ankle sprains.  
• Partial  
• 3 |
| Van der Wees et al. 2006      | • To collect evidence to Update Clinical Practice Guideline Ankle Injury of the Royal Dutch Society for Physical Therapy. | • 17 RCTs  
• 2 studies  
• Acute and chronic  
• ≤ 3 months (10), < 1 year (4), ≥ 1 year (3)  
• Balance (8), Physiotherapy (7), Proprioception (5), Manual Therapy (4), RICE (3), Tubigrip (3), Plaster (1), Orthosis (1), Directional pedal exercises (1)  
• Pain (6)  
• Impairment measures (5)  
• Performance tests (21)  
• Self-report questionnaires (2)  
• Others (0)  
| Level 2 evidence that exercise therapy including a Wobble Board exercise is effective in the prevention of recurrent ankle sprains for patients with functional instability. Level 2 evidence manual mobilisation has an initial effect on dorsiflexion ROM.  
• Partial  
• 15-16 |
| Study                                      | Measures of voluntary strength, proprioception, range of motion, or postural sway can predict lateral ankle sprain. | Quantify the risk of lateral ankle sprain. | 3 RCTs, 18 Prospective cohorts | No interventions – predictive study | Pain (0) | Impairment measures (27) | Performance tests (7) | Self-report questionnaires (0) | Others (17) | Reduced ankle dorsiflexion range may lead to an increased risk of ankle sprain. | |---------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------|-----------------------------------|----------------|----------------------------|------------------------|--------------------------------|----------------|----------------------------------------------------------------| |---------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------|-----------------------------------|----------------|----------------------------|------------------------|--------------------------------|----------------|----------------------------------------------------------------|
| de Noronha et al. 2006                | Measures of voluntary strength, proprioception, range of motion, or postural sway can predict lateral ankle sprain. | Quantify the risk of lateral ankle sprain. | 3 RCTs, 18 Prospective cohorts | No interventions – predictive study | Pain (0) | Impairment measures (27) | Performance tests (7) | Self-report questionnaires (0) | Others (17) | Reduced ankle dorsiflexion range may lead to an increased risk of ankle sprain. | |---------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------|-----------------------------------|----------------|----------------------------|------------------------|--------------------------------|----------------|----------------------------------------------------------------|
| de Vries et al. 2006                  | To compare different treatments, both conservative and surgical, for chronic lateral ankle instability.          |                                                                                                         | 7 RCTs, 6 surgery, 1 conservative treatment | Exercises (1), Bi- directional bicycle pedal (1) | Pain (1) | Impairment measures (1) | Performance tests (2) | Self-report questionnaires (3) | Others (0) | Insufficient evidence to support any specific surgical or conservative intervention for chronic ankle instability. | |---------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------|-----------------------------------|----------------|----------------------------|------------------------|--------------------------------|----------------|----------------------------------------------------------------|
| van Os et al. 2005                    | To compare the effectiveness of conventional treatment with supervised exercises versus conventional treatment alone. |                                                                                                         | 7 RCTs, 6 surgery, 1 conservative treatment | Exercises (1), Bi- directional bicycle pedal (1) | Pain (1) | Impairment measures (1) | Performance tests (2) | Self-report questionnaires (3) | Others (0) | Insufficient evidence to support any specific surgical or conservative intervention for chronic ankle instability. | |---------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------|-----------------------------------|----------------|----------------------------|------------------------|--------------------------------|----------------|----------------------------------------------------------------|
| Kerkhoffs et al. 2002                 | To compare different types and durations of functional treatment for the management or acute lateral ankle injuries. |                                                                                                         | 9 RCTs, 1 study Acute                      | Elastic bandage (9), Semi-rigid ankle supports (4), Immobilisation (1), Exercises (1) | Pain (5) | Impairment measures (7) | Performance tests (11) | Self-report questionnaires (0) | Others (5) | Elastic bandage seems preferable to tape and semi-rigid ankle support seems preferable to elastic bandage. However, no definite conclusions can be drawn as to which is the optimal functional treatment. | |---------------------------------|---------------------------------------------------------------------------------------------------------------|------------------------------------------|-----------------------------------|-----------------------------------|----------------|----------------------------|------------------------|--------------------------------|----------------|----------------------------------------------------------------|
Kerkhoffs et al. 2001  
- To assess the effectiveness of the various methods of immobilisation for acute ankle sprain compared with alternative conservative treatments.  
- 22 RCTs  
- Not stated  
- Acute  
- < 3 months (5), < 1 year (8), > 1 years (9)  
- Immobilisation with or without plaster cast (20), Brace (8), Strapping (6), Physiotherapy (2), Wrap (2)  
- Pain (11)  
- Impairment measures (10)  
- Performance tests (19)  
- Self-report questionnaires (0)  
- Others (9)  
- Immobilisation for uncomplicated ankle injury should be abandoned. If necessary immobilisation should only be for short periods. Functional treatment should be encouraged.  
- Partial  
- 17  

Broad et al. 2001  
- To investigate the evidence for physiotherapy, chiropractic, osteopathy and acupuncture in the management of soft tissue injuries to the ankle joint.  
- 1 systematic review, 43 RCTs  
- 19 studies, 24 Not stated  
- Acute or sub acute  
- < 3 months (23), ≤ 1 year (12), > 1 years (4), Not stated (5)  
- Immobilisation (16), Therapeutic Heat and Cold, Compression and Elevation (7), Functional treatment (7), Electrotherapy (7), Rehabilitation (3), Manual therapy (2), Acupuncture (1)  
- Pain (25)  
- Impairment measures (42)  
- Performance tests (48)  
- Self-report questionnaires (1)  
- Others (7)  
- There is some support for use of elevation. No evidence to support the use of immobilisation. No evidence that any type of taping or brace is more effective than any other. Laser therapy should be discontinued as it has been shown to delay recovery and is cost inefficient. The use of electrotherapy is of doubtful value. The use of manual therapy may improve ROM. Rehabilitation programmes with proprioceptive training (balance and coordination) should be recommended.  
- No  
- 11
<table>
<thead>
<tr>
<th>Study</th>
<th>Objective</th>
<th>Number of Studies</th>
<th>Chronicity</th>
<th>Treatments</th>
<th>Measures</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handoll et al. 2001</td>
<td>To compare the types of intervention for the prevention of ankle ligament injuries in individuals from adolescence to middle age. Those with no prior ankle ligament injury were analysed separately from those with previous ankle ligament injury. Those undergoing rehabilitation for ankle sprain were analysed separately.</td>
<td>14 RCTs</td>
<td>Not stated</td>
<td>Exercises (7), Bracing (6), Taping (2), Information (2), Physiotherapy (1)</td>
<td>Pain (0), Impairment measures (5), Performance tests (5), Self-report questionnaires (1), Others (17)</td>
<td>Good evidence for the use of external ankle support devices, in the form of a formal semi-rigid ankle orthosis or Aircast brace, to prevent ligamentous injuries, principally of the lateral ligament complex, during high risk sporting activities. Participants with a previous ankle sprain should be advised that future sprains can be reduced with the use of these types of external supports when engaging in high risk activities. There is insufficient evidence from studies of other preventive interventions to provide firm conclusions. Partial 16-17</td>
</tr>
<tr>
<td>Pijnenburg et al. 2000</td>
<td>To perform a meta-analysis of the effectiveness of existing treatment strategies for acute ruptures of the lateral ankle ligaments.</td>
<td>27 studies</td>
<td>Acute ≤ 1 year (14)</td>
<td>Operation (18), Immobilisation with or without plaster cast (18), Strapping (8), Physiotherapy (5), Wrap (4), Brace (2)</td>
<td>Pain (25), Impairment measures (0), Performance tests (25), Self-report questionnaires (0), Others (0)</td>
<td>Functional treatment significantly better result with less pain, earlier return to work and less giving way than cast immobilisation. Yes 12-13</td>
</tr>
</tbody>
</table>

RCT = Randomised Control Trial, NS= Not Stated, ROM = Range of Motion, RTW = Return to Work, RICE = Rest, Ice, Compression and Elevation.

**Table 2: Grading scores for systematic reviews of sprained ankle interventions**
<table>
<thead>
<tr>
<th>Author</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>Totals /18</th>
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<tbody>
<tr>
<td>Loudon et al. 2008</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>van Rijn et al. 2008</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>13</td>
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<tr>
<td>Bleakley et al. 2008</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Jones and Amendola 2007</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
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<tr>
<td>Van der Wees et al. 2006</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
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<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>15-16</td>
</tr>
<tr>
<td>de Noronha et al. 2006</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<td>2</td>
<td>1</td>
<td>2</td>
<td>14</td>
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<td>de Vries et al. 2006</td>
<td>2</td>
<td>2</td>
<td>2</td>
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