


Management and treatment of ankle sprain according to clinical practice guidelines

A PRISMA systematic review

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Abstract

Background: The lateral sprain of the ankle is a very frequent injury in the population in general, appearing in the emergency services frequently. The general objective was to review the current clinical practice guidelines (CPGs) on management and treatment of ankle sprains, assess their quality, analyze the levels of evidence and summarize the grades of recommendation.

Methods: A systematic search of the literature in relevant databases with the search terms “ankle,” “sprain,” “practice guideline,” and “guideline” was carried out. There were included those guidelines that had the system of grades of recommendation and level of evidence concerning to management and treatment of ankle sprain. The quality of the guides was assessed using the Appraisal of Guidelines for Research and Evaluation II (AGREE II) tool.

Results: Seven clinical practice guides were included in this review. The AGREE II scores ranged from 42% to 100%, with only six CPGs explicitly declaring the use of a systematic methodology. Seventeen recommendations were extracted and summarized.

Discussion: Six of the recommendations analyzed present enough evidence to be applied in clinical practice and are highly recommended for ankle sprain management: Ottawa rules, manual therapy, cryotherapy, functional supports, early ambulation, short term NSAIDs and rehabilitation.

Abbreviations: AGREE II = Appraisal of Guidelines for Research and Evaluation II, CPGs = clinical practice guidelines, NSAIDs = non-steroidal anti-inflammatory drugs.

Keywords: ankle, guideline, practice guideline, review, sprain

1. Introduction

An ankle sprain is the most frequent musculoskeletal injury in athletes and very common in the general population with secondary conditions that require considerable medical attention.^[1] Ankle sprains cause pain and restricted range of motion; it can lead to functional deficits or disability, post-traumatic osteoarthritis, and chronic ankle instability.^[2–4] These signs can appear in 44% of patients with a sprain one year after the injury.^[5] It is known that aspects such as foot type (supinated, neutral, or pronated), general joint laxity, or gender are not risk factors.^[6]

Reportedly ankle sprains account for 12% of all injuries seen in emergency departments and up to 30% of all sports injuries.^[7,8] In the Netherlands, an estimated 110,000 ankle sprains require treatment, causing an economic cost of €84,240,000.^[9]

This causes a high economic impact, with thousands spent annually in the initial treatment and its follow-up.^[11] The costs of treating ankle sprains are combined with managing the loss of physical and occupational activity and caring for post-traumatic ankle osteoarthritis.^[10]

Ankle injuries are known to account for 45% of injuries that occur during basketball and 31% during soccer.^[11] Likewise, 29% of all injuries to the lower extremities in soccer affect this joint, 75% of them to the lateral ligaments.^[12]

Clinical practice guidelines (CPGs) are recommendation guidelines based on the evidence of primary or secondary studies for the evaluation, treatment, and follow-up of pathologies, conditions, or health problems that offer the most efficient health care.^[13]

To our knowledge, a systematic review of CPGs focused on ankle sprains, including levels of evidence and grades of

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recommendation, has not been published. The objective of this study was to review the current CPGs on the management and treatment of ankle sprains, assess their quality, analyze the levels of evidence and summarize the grades of recommendation.

2. Methods

A systematic review of the CPGs focused on the management and treatment of ankle sprains was carried out in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA).^[14]

2.1. Search strategy and selection of the studies

A search was carried out in the databases: PubMed, National Guideline Clearinghouse, AMed, SCOPUS, CINAHL, EMBASE, FSTA, Global Health, Health, and Medical collection, Nursing & Allied Health Database, PILOTS, SPORT Discus, Web of Science, Dialnet, Medes, LILACS, CUIDEN, ENFISPO, OTSeeker, RNAO, NICE, GIN, PEDro, Library Cochrane Plus, INDEXs CSIC, CUIDATGE, DynaMed, Medline Complete, Bookshelf - USA NLM - Evidence-based Medicine, ClinicalTrials.gov, Epistemonikos, Guiasalud.es, HealthEvidence, TRIP database. The search terms used were “ankle,” “sprain,” “practice guideline,” and “guideline.”

Search strategy for Pubmed database was: ((ankle) OR (sprain)) AND ((practice guideline) OR (guideline))

The included studies were CPGs published from 1st January 2010 up to 30th December 2021 in English, Portuguese and Spanish. Searches were screened based on title, abstract, and reading of the full article. To avoid the risk of bias, two independent reviewers reviewed the manuscripts. A third blinded reviewer, belonging to the research group, determined any differences in the search and selection of the documents.

2.2. Eligibility criteria

All CPGs which mentioned grades of recommendation and level of evidence regarding management and treatment of ankle sprain were chosen.

The included studies were conducted in accordance with the following PICO statement (P = population; I = intervention; C = comparison; O = outcome):

- P = patients with ankle sprain diagnosis.
- I = management and treatment of ankle sprain.
- C = CPGs with high internal validity.
- O = level of evidence and grade of recommendation.

There were no restrictions on type of population, grade of severity, with/without fracture or other conditions.

2.3. Quality assessment

Two blinded researchers assessed the evidence, methodology and quality of the CPGs included through the Appraisal of Guidelines for Research and Evaluation II (AGREE II). This instrument consists of 6 domains (scope and objective, participation of those involved, rigor in preparation, clarity of presentation, applicability, and editorial independence) and a global assessment, furthermore an indication of whether a systematic methodology was used. Each of the 6 domains items and the items of the global assessment is graded using a 7 point scale (from 1 “strongly disagree” to 7 “strongly agree”). For each of the 6 domains a quality score is calculated independently by summing up all the scores of the items included in each domain and by representing the total as a percentage of the maximum score for that domain. “Quality CPGs” were those that achieved an overall score larger than 4.^[15]

2.4. Summary of the results

Two blinded researchers extracted the treatment and management recommendations of the included guidelines. The criteria established by Harbor and colleagues were applied to unify the different levels of evidence which allowed comparing the results obtained from each of the guidelines.^[16]

2.5. Ethical review

In the present study, the use of ethical permissions was not necessary. No human or animal subjects were involved. The present study was carried out based on original documents previously published.

3. Results

3.1. Selection of the studies

Figure 1 shows the PRISMA flow diagram where the guidelines selected for this review are specified and the reasons for excluding all those that were not finally chosen. The initial search showed 18,240 studies, which after reading the title and abstract were reduced to 137 studies. After reading the full text and meeting the inclusion criteria, 7 studies were selected for qualitative analysis.

3.2. Quality assessment

The AGREE domains and the overall quality percentages and an indication of whether a systematic methodology was presented in Table 1. Five of the seven guides scored above 90% in scope and objective. The average percentage for stakeholder participation was 79%. Mastery percentages for developmental rigor averaged 84%. In the domain of presentation, the clarity presents an average of 98.61%. The applicability domain obtained the lowest score with an average of 68%. The mean editorial independence of the included guides was 78%.

3.3. Summary of the results

According to the literature reviewed, a standardization of the classification systems of the scientific evidence obtained was carried out to have an easy interpretation of the results. Through the consensus of two researchers, the recommendations included from the selected CPGs were 17. For each of them, the grade of recommendation and the level of evidence provided are detailed (Table 2). Table 2 shows the classification of the levels of evidence considering “A” as high/very high level and “D” as very low level. The classification of the grades of recommendation is divided into colors considering “green” as strongly recommended and “red” as not recommended.

Out of the seven guidelines included, four included existing risk factors, prevalence, exploration, and treatment in general.^[17-20]

The Ottawa Rules and intervention guidelines such as functional support, therapeutic exercise or manual therapy and cryotherapy, showed high levels of recommendation and scientific evidence. In contrast, for two of the seven guidelines, there was not a clear statement on the scientific evidence and degrees of recommendation for the use of ultrasound, diathermy, electrotherapy, and low-level laser. However, there is controversy in interventions such as immobilization and the use of non-steroidal anti-inflammatory drugs (NSAIDs).

In contrast, the other guidelines focused on the use of opiates, NSAIDs, and acupuncture; although they showed high scientific evidence, the degrees of recommendation were low.^[21-23]

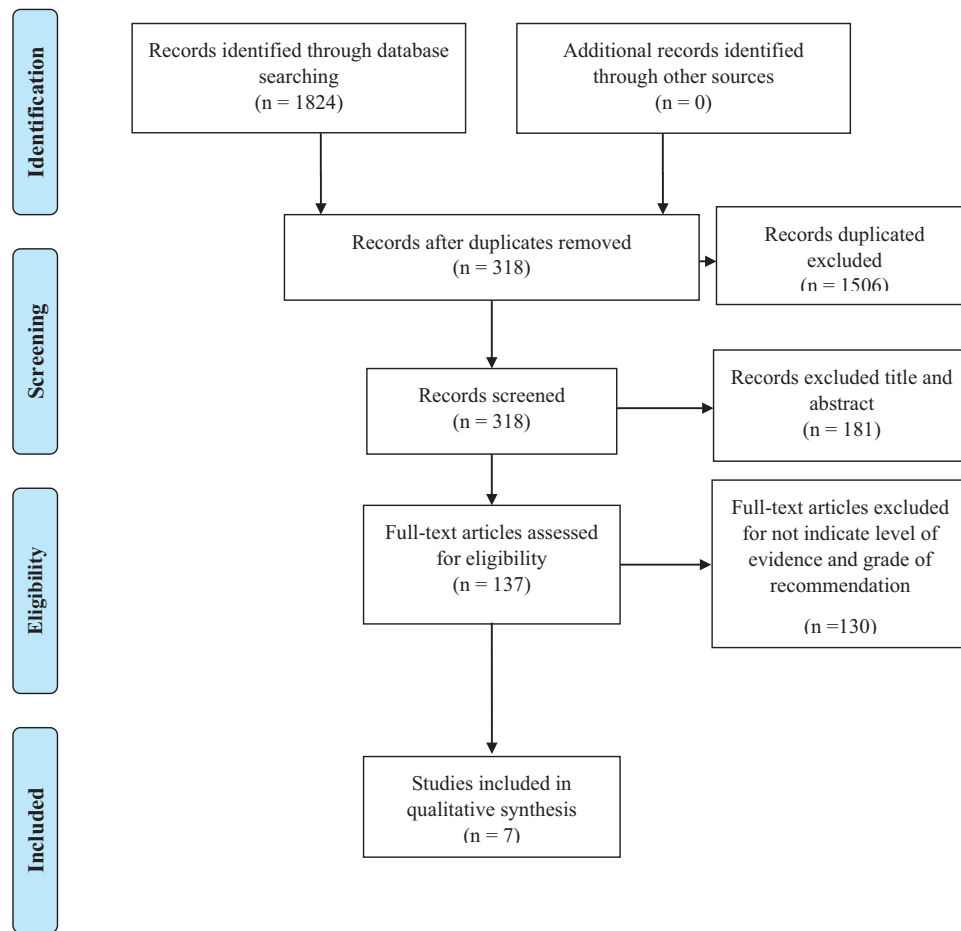


Figure 1. PRISMA flow diagram. PRISMA = Preferred Reporting Items for Systematic Reviews and Meta-analyses.

Table 1
AGREE II domain in percentages, quality global assessment and systematic methodology.

| Study | Country | Domain scores (%) | | | | | | Global assessment | Systematic methodology |
|------------------------|---------------|-------------------|----|----|-----|----|-----|-------------------|------------------------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | | |
| Martin et al, 2013 | United States | 94 | 72 | 81 | 100 | 67 | 75 | 6 | √ |
| State of Colorado 2006 | United States | 94 | 78 | 93 | 94 | 56 | 50 | 5 | √ |
| Hegmann et al, 2014 | United States | 61 | 56 | 60 | 100 | 42 | 67 | 4 | ? |
| Kerkhoffs et al, 2012 | Netherlands | 94 | 89 | 88 | 100 | 75 | 100 | 7 | √ |
| Vuurberg et al, 2018 | Netherlands | 94 | 89 | 88 | 100 | 75 | 100 | 7 | √ |
| Choi et al, 20017 | South Korea | 66 | 83 | 96 | 100 | 83 | 75 | 6 | √ |
| Kaminski et al, 2019 | United States | 94 | 83 | 83 | 94 | 75 | 80 | 7 | √ |

√ = defined systematic method, ? = systematic method not indicated, AGREE II = Appraisal of Guidelines for Research and Evaluation II.

4. Discussion

The objective of this study was to review the current CPGs on the management and treatment of ankle sprains, assess their quality, analyze the levels of evidence and summarize the grades of recommendation.

Seven CPGs were identified. The guidelines that presented the highest methodological quality according to the AGREE II score were those published by Kerkhoffs et al,^[18] Vuurberg et al,^[20] and Kaminski et al^[17]

The use of the Ottawa rules presented in 3 of the guides had a high degree of recommendation and allows the differential diagnosis of ankle sprain with respect to ankle fracture pathologies, which is highly recommended to avoid unnecessary irradiation

of patients. These guidelines also showed a high degree of methodological quality.^[17-19]

Regarding the use of external or functional supports, showed a level of evidence (B),^[18] but in its update was found a level of evidence (A) where the use of functional support for 4 to 6 weeks was preferable to the immobilization or elastic bandage.^[20] For example, the use of an ankle brace is always more recommendable compared to the kinesiotape as the latter did not provide sufficient mechanical support on unstable ankles. This suggests that there is no need for further research in this line of treatment.

The treatment with physical exercise had a lower grade of recommendation in the acute phase than in the recovery phase, as does walking.^[19] Along the same lines, Kerkhoffs and colleagues

Table 2
Grades of recommendation and level of evidence of the CPGs included.

| | Martin et al, 2013 | State of Colorado 2006 | Hegmann et al, 2014 | Kerkhoffs et al, 2012 | Vuurberg et al, 2018 | Choi et al, 20017 | Kaminski et al, 2019 | |
|------------------------------------|----------------------------------|----------------------------------|---------------------|-----------------------|----------------------------------|-------------------|----------------------|---------------|
| Ottawa Rules | A | | | A | | | A | |
| Immobilization | A | | | D | D | | B | |
| Functional support | | | | B | A | | | |
| Physical exercises/ manual therapy | B ₁ A ₁ | | | B | A | | A | |
| Ambulation | A | | | | | | | |
| Cryotherapy | A | | | B | A | | C | |
| Ultrasounds | D | | | | D | | | |
| Diathermy | C | | | D | D | | C | |
| Electrotherapy | Co | | | D | D | | C | |
| Low level laser | Co | | | D | D | | | |
| Acupuncture | | | | | D | B | | |
| Pharmacopuncture | | | | | | D | | |
| Electroacupuncture | | | | | | C | | |
| NSAIDs | | B ₂ D ₁ | A | | B ₂ D ₁ | | A | |
| Opiates | | | D | | | | | |
| Surgery | | | | D | A | | | |
| Rehabilitation | | | | B | | | B | |
| Grades of recommendations | | | | | Levels of evidence | | | |
| Strongly recommended | Fairly recommended | Little recommended | Nothing recommended | A | B | C | D | Co |
| | | | | Very high/high | Moderate/half | Low | Very low | Controversial |

A1 = in the recovery phase, B1 = in acute phase, B2 = short-term treatment, CPG = clinical practice guidelines, F1 = long-term treatment.

showed a high grade of recommendation (B) for therapeutic exercises^[18] and, these same exercises had a very high grade of recommendation (A) in other guides.^[17,20] Physical exercise reduces the risk of functional ankle instability and optimizes a better recovery of joint function of the ankle, although it is not clear whether the exercises should be supervised by a professional or not.^[20] Likewise, passive mobilizations should be used to increase ankle dorsiflexion and improve its function. Balance exercises should be performed throughout rehabilitation to reduce the rates of recurrent injuries.^[17]

In what refers to manual therapy, in three guidelines, with an AGREE II score higher than 8, its application was recommended with a high degree of scientific evidence both in the short and long term, improving recovery from the injury. A single session was associated with an improvement in edema and pain in individuals with acute ankle sprains.^[18–20] In the acute phase of the injury; walk or bear weight on the affected limb also had a high grade of recommendation.^[19]

Cryotherapy was included in four guidelines with high methodological quality.^[17–20] In three of them, cryotherapy was highly recommended (Table 2), showing that the application of ice in the acute phase of an ankle sprain considerably reduces pain compared to the use of analgesic drugs. However, the guidance published by Kaminski et al showed low effectiveness of cryotherapy in the recovery phase, indicating that it should be applied only to acute ankle sprains to reduce pain, minimize swelling and avoid secondary injuries.^[21]

Four of the guidelines^[17,20,22,23] (with an AGREE II score of 7) agreed that the use of NSAIDs in the acute phase of the injury is highly recommended, being considered a safe procedure; however, two of them specify that their long-term use is not recommended.^[20,23]

Although it only appears in two guidelines, rehabilitation presented a high degree of recommendation. Thanks to this intervention, patients have a greater recovery when returning to sports, with an improvement in proprioception, strength, coordination, and functionality of the lower limb.^[17,18]

On the one hand, the evidence on acupuncture was not conclusive on the therapeutic effect due to the great heterogeneity

between the studies included in the guidelines analyzed.^[20] On the other hand, with an AGREE II score of 8, acupuncture treatment presented a high grade of recommendation (B). Still, it was not possible to determine the effectiveness of this treatment with respect to conventional non-surgical treatment.^[21] Despite the controversy regarding the efficacy of its use, due to its low cost and risk, experts consider it to be a treatment option. However, electroacupuncture showed a low grade of recommendation due to the lack of clinical research, although it was observed that its efficacy was slightly higher than physical exercises to improve proprioceptive capacity. Pharmacopuncture with bee venom had a low recommendation grade, although it has anti-inflammatory and analgesic effects. The evidence for these effects in an acute ankle sprain is still low and is associated with discomfort during the treatment and allergic reactions that can occur after the treatment.^[21]

Not exceeding ten days before a grade III ankle sprain, Immobilization had a high degree of evidence.^[17,19] Subsequent guide updates had shown that its use for more than four weeks is not recommended in the event of an acute ankle sprain. Therefore, the use of a cast to treat pain or edema in a grade III ankle sprain should be applied for a maximum of 10 days, then removing it and starting with the functional treatment.^[18,20]

Surgery showed a very low grade of recommendation because in the studies carried out, the recovery time is superior to other interventions, and there were also side effects such as altered mobility and joint stiffness.^[18] However, surgery was strongly recommended after chronic injuries or ligament rupture. For example, in professional athletes, surgical treatment is preferred to ensure a quicker return to sport.^[20]

Conservative treatment was considered the reference for ankle sprain; this also helped to avoid unnecessary exposure to invasive treatment and unnecessary risk of complications.^[18]

Other therapies such as ultrasound, diathermy, electrotherapy, or laser had low degrees of recommendation since there was no solid evidence on the effectiveness of these modalities; therefore, they are not recommended to treat an ankle sprain.

Ultrasound had not shown any effect on pain, edema, function, and return to sports practice (level of evidence D).^[19,20] Likewise, diathermy presented a low recommendation because neither the range of motion nor the strength improved. Still it did reduce the edema and gait deviations caused by the sprain.^[17-20]

Regarding the recommendations for the use of opiates, their grade of recommendation was low, requiring new research with clinical evidence for their uses.^[22]

From this systematic review, it can be concluded that the Vuurberg et al guide^[20] is the reference document for the management and treatment of ankle sprain. It presents a high level of evidence and grade of recommendation based on a score of 9 on the AGREE scale and is the one that includes the highest number of recommendations. It is suggested to complete this document with the rehabilitation guidelines and the Ottawa rules included in the guide published by Kaminski et al^[17]

It is known usefulness to review and summarize the knowledge published in the CPGs; in the same line as this work, other studies have shown the latest updates on other pathologies such as depression,^[24] strokes,^[25] breast cancer,^[26] or diabetes.^[27]

4.1. Limitations

An extensive search was attempted to include three languages (English, Spanish, and Portuguese) and more than 30 databases; it could have been possible to have missed other guides published.

4.2. Future research

A highlight of this systematic review is that essential basic data about the management of ankle sprain are now available to healthcare professionals, and thus, this step will improve outcomes in this pathology. Researches of treatments such as laser, electrotherapy, and diathermy, as well as their cost-effectiveness and their applicability, are justified.

5. Conclusion

After reviewing the current CPGs of ankle sprain management, 17 recommendations were identified. Then evaluating their quality, analyzing the levels of evidence and the degrees of recommendation, 6 of the recommendations analyzed present enough evidence to be applied in clinical practice and are highly recommended for ankle sprain management: Ottawa rules, manual therapy, cryotherapy, functional supports, early ambulation, short term NSAIDs and rehabilitation.

Areas such as acupuncture, electroacupuncture, and pharmacopuncture have fewer but high scientific evidence, so future research is needed. There are deficient areas that present poor clinical evidence such as the use of diathermy, laser, electrotherapy and ultrasound.

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Writing – original draft: Francisco J. Ruiz-Sánchez, Jaime Martin-Martin, Maria Ruiz-Muñoz.

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