



Current nursing interventions for adults with repetitive ankle sprains

Literature review

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Abstract

Ankle sprain is a common ankle soft tissue injury, and repeated ankle sprains can cause chronic pain and become a CAI patient, and even potential complications such as traumatic osteoarthritis may occur, which affects the quality of life of the patient and aggravates the follow-up care of the patient cost. After conservative treatment fails, surgical treatment is needed. Improving current nursing interventions for patients with recurrent ankle sprains can help prevent patients from getting worse. Therefore, the main research goal of this study is to find current effective nursing interventions for adults with repeated ankle sprains. Literature are searched based on different keywords from the literature library ScienceDirect, Janet, CINAHL (Ebsco), PubMed through the method of literature review, and then the literature is screened by criteria such as repetition rate and relevance. A total of 125 documents were identified, and 42 of them were selected as the result analysis based on the year limit and the degree of relevance. After preliminary analysis and sorting, it can be found that the nursing intervention measures for repeated ankle sprains can be divided into prevention, conservative intervention, surgical nursing intervention and pain management. According to the detailed analysis of different steps, the conclusions can be gained: 1), Due to the repeated ankle sprains can lead to traumatic osteoarthritis, balance training and additional support as well protection during exercise can effectively prevent sprains again. 2), conservative intervention to apply ice on the ankle for 20 minutes is proved to be the best time. 3), If conservative treatment fails for 3 to 6 months, surgical treatment is required. And surgical intervention should pay attention to the potential complications of the ankle joint. 4) Nurses need to use related analgesics to provide patients with good pain management. 5), Nurses need to follow up the basic condition of the patient in follow-up care, and understand the health education of the patient and his family.

Keywords/tags (subjects)

Repetitive ankle sprain ,CAI, nursing intervention

Miscellaneous (Confidential information)

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1 Introduction

The history of ankle sprains is common among the general public, but the recurrence rate of ankle sprains is as high as 70%. Repeated ankle sprains can easily cause chronic ankle sprain (CAI), or cause potential complications such as post-traumatic osteoarthritis (Herzog et al. 2019; Mai et al. 2009, 34–39). These complications reduce people's level of physical activity and at the same time reduce the quality of life. This indicates that post-traumatic ankle osteoarthritis is a degenerative health problem, not unique to the middle-aged and elderly population (Gribble et al. 2016).

According to a survey on the cost of an ankle sprain in the Netherlands, the average medical cost per patient with an ankle sprain is 823 euros (De Boer et al. 2014). Although the cost of simply treating an ankle sprain is not high, the cost of follow-up care and rehabilitation is high. Due to the high proportion of the population suffering from such injuries, the burden of social medical resources has increased (Katherine 2019; Gribble et al. 2016). Although ankle sprains are common and seem not to affect people's return to normal life on the surface, repeated sprains caused by people's neglect can cause complications that can seriously affect patients' subsequent lives (Gribble et al. 2016; Herzog et al. 2019).

Currently, there are only some nursing interventions for ankle sprains, especially for the acute phase of ankle sprains. There is no nursing intervention for patients with repeated ankle sprains or CAI. This study intends to summarize the current nursing interventions for recurrent ankle sprains through a systematic review. Searching for articles are related to repeated ankle sprains through conservative treatment and non-conservative treatment. During the search process, a large number of nursing intervention literatures can be found in conservative treatment, surgical treatment, and pain management. Through gaining summary and analysis of these literatures can promote the progress of nursing intervention methods for repeated ankle sprains.

2 Background

2.1 Prevalence of repetitive ankle sprains

The ankle sprains are the most common crural injury in daily life which happens in the different ages. In the adult, student of university or those people of engaged in sports, dancing and other industries are higher rate to happen ankle sprains. Generally, the ankle sprains have high probability to happen again which result to high risk of chronic ankle instability (CAI) and posttraumatic osteoarthritis causing people activities of daily life limitation. Residual physical trauma which can involve long-term ankle dysfunction, may occur in up to 70% of persons who experience an acute ankle sprain. (Mackenzie et al. 2019). The second leading cause of ankle posttraumatic osteoarthritis is chronic ankle injuries, accounting for 13% to 16% of all cases, although this number has been reported to be as high as 78% (Thomas et al. 2016).

At the same time, the people with a history of sprained ankles are 3.5 times more likely to be sprained than those without history of ankle sprains. According to the statistical report of the emergency department in the United States, a half of the sprains of patients with ankle sprains do not occur during exercise period. In the general population, the probability of ankle sprain in Danish emergency department from 2000 to 2010 was 19 to 26.6 per thousand people, while in the United States emergency department in 2010, 3.29 per thousand people had ankle sprain. (Waterman et al. 2010; Herzog et al. 2019.)

From the statistics in professional athletes of ankle sprains situation research, the areas like Football, basketball, and volleyball are the most easily to happen ankle sprains. The probability of a sprained ankle in basketball player is 3.5/1000, while that of professional volleyball players is as high as 19.8%. Among football players, high/sydesmotic sprain accounts for 40% of ankle sprains. Football players are most prone to this type of ankle sprain in all population groups. (Al Bimani et al. 2018.)

According to U.S. emergency statistics the women are more likely to have sprains at home, while men are more likely to have ankle sprains in entertainment or sports venues. At the same time,

the data also show that men under 40 and women over 25 have a higher incidence of ankle sprains than their peers. (Waterman et al. 2010.)

In the data of repetitive ankle sprains, the incidence of recurrent ankle sprains caused by volleyball is 46%, American football is 43%, basketball is 28%, football is 19%, and in other cases 12% to 47%(Attenborough et al. 2014). Therefore, all over the world many people have ankle sprain which is common injury of ankle, but ankle sprain have high potential become repetitive ankle sprain and occur repeatedly sprain will have rate cause development of CAI.

2.2 Common forms and causes of ankle sprains and repetitive ankle sprains

Ankle sprain is one of the common causes of ankle injury in daily life. Firstly, one of factors caused by participation physical activities and particularly in sports such as basketball, baseball, football, soccer and trail running that involve jumping, cutting movement, or rolling or twisting of the foot (Al Bimani et al. 2018).

Secondly, if the floor or ground surfaces are always uneven, the person will easily have experience of damage to the ankle. The risk of an ankle sprain might be raised by walking or running on uneven surfaces or bad field conditions. The people are more likely to sprain it again after who have sprained their ankle or have had some form of ankle injury(Mayo clinic 2020).

Thirdly, If the physical condition is not good or the shoes are not suitable, the low strength or stability of the ankle joint when people participate in sports will increase the risk of sprain. Because the shoes are not fit or suitable for sports, the ankle is more likely to be injured. Generally speaking, high-heeled shoes are more likely to be sprained (ibid., 2020).

Finally, a variation of inversion and foot adduction in plantar flexion is the most common ankle sprain injury mechanism (supination). Ankle sprain of 80% are inversion injuries (Pommering et al. 2005). This injury mechanism can cause damage to the ligament of the lateral ankle. Anterior talo-fibular ligament damage with intact medial ligaments is consistent with anterolateral rotational instability. A tilting of the talus is added by further transection of the calcaneofibular ligament (Petersen et al. 2013).

Moreover, the cause of recurrent ankle sprains is not completely clear. According to the latest literature research, patients with recurrent ankle sprains have greater internal rotation in talocrural during the stance phase. This significantly different internal rotation is a movement characteristic of patients with recurrent ankle sprains. Other review studies believe that the high recurrence rate of ankle sprains is probably due to the premature exercise and intense activity of the patient under the protection of Non-steroidal anti-inflammatory drugs and ankle braces after the initial ankle sprain. As a result, the soft tissues that have not healed completely are injured again (Miklovic et al. 2018).

2.3 Degree of ankle sprain

Different degrees of ankle sprains require different rehabilitation time, and the patient's activity limitation and the degree of pain in the ankle area are also different, which is also the standard for judging the degree of ankle sprain. Generally, ankle sprains are divided into three grades. The grade 1 is a slight ankle sprain causes slight swelling in the appearance of the ankle and slight pain in the lateral ankle, and during this period, the patient can still walk. The grade 2 is a moderate ankle sprain causes moderate pain and external swelling, and a partial tear of the anterior fibula may cause mild or moderate looseness. The grade 3 is severe ankle sprains are accompanied by severe pain and swelling. During this period, the ligament may be completely ruptured, and the joint instability may exceed 4mm, which may be accompanied by fractures and surgery should be required (Slade 2012; Tricia et al. 2008).

If a patient with a sprained ankle does not follow the nurse's guidance on daily activities during the rehabilitation period, it may cause chronic instability of the ankle joint or limitation of moving and pain after prolonged activities which result to patients with ankle sprains are more risk of repetitive ankle sprain than those without ankle sprains (Doherty et al. 2016; Mai et al.2009).

In fact, most of people wouldn't go to hospital emergency department when they are ankle sprains. Therefore, when nurses are in primary health care institutions, it is very important to understand how to care for sprained ankles in order to guide patients in the follow-up(Kelly 2009; Herzog et al. 2019).At the same time, the Ottawa ankle rules (OAR), led by emergency triage nurses has improved patients' satisfaction with emergency services, shows that nurses play an important role in patients with ankle sprains (Fatema et al. 2020).

2.4 Surgical treatment and nursing intervention for repetitive ankle sprains

Generally, ankle sprain patients without obvious functional instability of the ankle are more suitable for non-surgical measures. Conservative treatment is usually given priority to patients with repeated ankle sprains. When conservative treatment failed for a period of time, surgical treatment was considered to improve the patient's long-term ankle instability and functions recovery. General surgical procedures are divided into Anatomic ligament repair, Nonanatomic reconstruction and Anatomic Graft Reconstruction. For different types of surgery, there will be some same and different methods of postoperative care(McCriskin et al.2015; Camacho et al.2019).

Firstly, for patients with chronic ankle instability, Anatomic ligament repair is generally the preferred method. Because this surgical method can preserve the patient's ankle joint and subtalar functional movement, and at the same time can effectively recover the patient's original ankle joint anatomy, stability and joint kinematics. If the patient does not improve after the operation repair, the operation can be performed again on the basis of the first operation. The Brostrom procedure and its modified procedures are the most common surgical methods, and they are also the standard surgical procedures for the modern treatment of chronic ankle instability(Camacho et al.2019). Although this type of operation is technically simpler than non-anatomical reconstructive surgery, its success depends on the condition of the injured tissue. The Brostrom operation has a good effect in restoring the stability of the ankle joint. The probability of needing another operation is relatively low, and the patient's postoperative quality of life is good. This improved method of Gould Modification has been proven to increase repair strength by 50%. Compared with the Brostrom operation, the Karlsson procedure has the advantage that it is ligament-to-bone healing, rather than the ligament-to-ligament healing of the Brostrom operation(McCriskin et al.2015). According to a 3-year follow-up study of patients undergoing Karlsson surgery, 88% of patients' functional outcomes, including stable ankle function, pain, activity level, and swelling, were all recovered well to excellent(Camacho et al.2019).

Once the patient is determined to require ankle surgery, the nurse needs to evaluate the patient's preoperative care. For example, the patient's understanding of surgical procedures, willingness to operate, postoperative rehabilitation training plan, and assessment of the patient's current health status. The health assessment includes smoking, obesity, asthma, diabetes, etc. (Peters et al. 1989; Brazytis et al. 1992).

During surgery, perioperative nurses need to ensure the patient's position, while paying attention to the occurrence of intraoperative complications and the integrity of surgical instruments (Peters et al. 1989). After the operation, the patient was sent to the postoperative observation room. The nurse observes the patient's vital signs, pain, wound bleeding, etc. Due to the small opening of ankle arthroscopy, patients can be discharged on the same day without adverse conditions (Brazytis et al. 1992).

2.5 Pain management of repetitive ankle sprain

Patients with repeated ankle sprains will easily experience chronic ankle pain, and chronic ankle pain is defined as recurrent or prolonged pain that lasts at least 3 months. During this time, the patient will find it difficult to walk on uneven ground, to walk in high heels, or to participate in sports. If the patient is active for a long time, it can cause instability, swelling and stiffness (Lau et al. 2018).

After an ankle sprain, the main complaint of the patient to the emergency department is pain and loss of function. Analgesia can improve the patient's comfort and reduce their anxiety. Therefore, nurses must consider continuous pain assessment and prompt pain management during the patient's hospitalization or emergency room to discharge (Fatema et al. 2020). Being a nurse can improve care by prescribing treatment immediately, not only helping to reduce waiting time, but also by educating and comforting patients how to cope with their injuries (Kennet 1996).

Most people in the United States receive one or more painkillers in the emergency department after an ankle sprain. In terms of analgesic use, the frequency of opioid use reached 44%, followed by non-steroidal anti-inflammatory drugs with 40%, and 20% of patients used repeated analgesics (Kosik et al.2021).

In pain management, the methods used for non-pain management are roughly divided into five categories: physical methods, cognitive methods, behavioral methods, invasive methods, and non-invasive methods. According to the research data, the most frequently used non-drug pain relief methods used by nurses are cold and hot compresses 53.3%, rest 55.5%, posture adjustment

68.8% and exercise 50.8%. The above four methods have the highest application rate and have the advantages of easy application, no side effects such as analgesics, and no economic burden (Gumus et al. 2020).

3 Aim, purpose & research question

The aim of this study is to provide information on nursing interventions for adults with repetitive ankle sprains. Purpose from a nursing perspective is to reduce the development of chronic ankle instability and traumatic osteoarthritis in patients with repetitive ankle sprains, and to provide theoretical support for nursing interventions of clinical repetitive ankle sprain.

The research question is: What are the current nursing intervention for adults with repetitive ankle sprains?

4 Methodology

4.1 Literature review

Literature review is a systematic method of collecting, critically evaluating, and of professional knowledge in the medical field, literature reviews play an important role in the field of health care. It is applicable to a wide range of research fields such as: accessibility, protection, qua presenting multiple research results after data integration. The literature review provides an evaluation of a question or topic of interest, the level of quality and scale of existing evidence methods. With the continuous increase of care, cost, professional or patient experience, etc. (Pati et al. 2018).

Planning sources and searching helps to meet the requirements of the literature review and answer research questions. When formulating a search strategy, the scope of the search, the level of thoroughness, and the time available for the search all need to be considered. Its purpose is to ensure that the review of the system is comprehensive, thorough and objective (Smith et al. 2011; Pati et al. 2018). In terms of review quality evaluation, it is necessary to provide information about the search scope from a clear article in order to conduct a comprehensive evaluation of the review scope. As a whole, it is necessary to evaluate the selection and inclusion criteria, the evaluation

bias of publication, the evaluation of heterogeneity, and the comparability of inclusion of the thesis (Smith et al. 2011).

In theory, a systematic analysis should be extended to any research topic (Delgado-Rodríguez et al. 2017.)

4.2 Literature search methods

The research method used in this article is structured literature review, which effectively screens out the existing comprehensive nursing articles about repeated ankle sprains and chronic ankle sprains (Smith et al. 2011; Pati et al. 2018). The screening strategy of the literature was selected based on the repetitive /recurrence ankle sprain and the CAI relevance in the literature. Then the thesis considered whether it meets nursing intervention, nursing care and other aspects (Smith et al. 2011;Delgado et al. 2017). Screening literature selection viewed the relevance to the research question from the abstract, and at the same time found suitable articles for screening in the reference list of the searched literature. Finally, it was checked whether the specific details of the article met the needs of the research question, and some titles that match but the content may does not match were excluded.

The articles are from ScienceDirect, Janet, BMJ (British Medical Journal), CINAHL (Ebsco), PubMed.

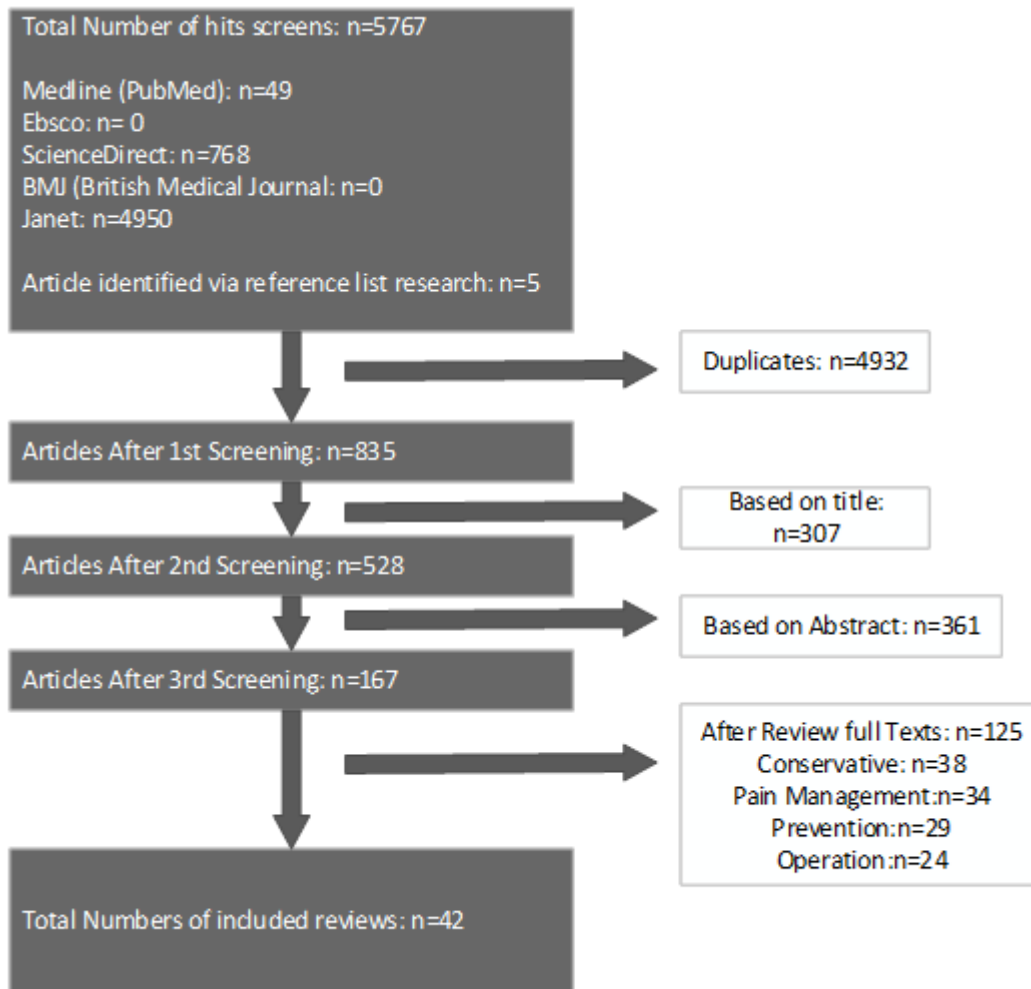


Figure 1. The applied structured literature review methodology.

The structured literature review is mainly divided into the above five steps (shown in Figure 2) (Smith et al. 2011; Delgado-Rodríguez et al. 2017; Pati et al. 2018). Keyword searches were carried out in five interdisciplinary and complementary databases finally: Medline, Ebsco, ScienceDirect, BMJ (British Medical Journal) and Janet. The main deleted keywords from "Primary step" to "the articles after 1st screening" are 'ankle sprain', 'Nursing care'. A total of 5767 papers were retrieved. From 'after first screening' to 'after second screening', the main retrieved keywords are related to the topic, so the deleted keywords are 'current nursing methods', 'repetitive ankle sprain' and 'adults'. After deletion, a total of 835 papers meet the standard. The main deletion keywords from 'after second screening step' to 'after third screening step' are based on abstract and the background part of the article.

The following inclusion criteria was followed: 1, the article must focus on the studying 'repetitive ankle sprain', 'chronic ankle sprain'. 2, the article must involve the contents about nursing care or therapy methods. The full text should be available online for JAMK students and peer-reviewed. It is formulated and needs to be based on the theme of Figure 1 to correspond to related articles.

There were many articles with repeated views in this process. When evaluating and analyzing each article, Table 2 records in detail the main points of some major articles and summarizes them in the final citable literature. Finally, 42 articles are included for the analysis. The rest of the articles were excluded because they did not meet the criteria for screening such as articles unrelated to research questions, research uncondacted with adults, articles not published between 2009-2021, articles published not in English, peer reviewed, research uncondacted nursing interventions, which are shown in Table1.

Table 1. Exclusion criteria

Exclusion criteria
* Articles unrelated to research questions
* Research uncondacted adults
* Articles not published between 2009-2021
* Articles published not in English
* Peer reviewed
* Research uncondacted Nursing interventions

4.3 Literature Data Analysis

According to the above criteria, the data was obtained. The specific information on the data are in the appendix 1. Using a summary table or figure helps to present the results of the literature review. Presenting in a clear structure helps readers to evaluate the article (Smith et al. 2011). The analysis method of this study is mainly based on the heterogeneity mentioned by Delgado et al. (2017). Through the above method, the results of 42 articles were classified, and finally the key points of the results were presented in Table 2 for easy understanding.

Table 2. Literature data analysis.

<p>PRICE measure</p> <p>Conservation interventions in nursing</p>	Cryotherapy	<ol style="list-style-type: none"> 1.20 mins Cryotherapy is best effectiveness 2.Effectively relieve pain 3.No evidence show cryotherapy improve soft tissue injuries
	External Support	<ol style="list-style-type: none"> 1.Ankle braces and ankle tape 2.Effectively prevent ankle sprains 3.Protection in the acute phase 4.Promote patients to return to normal functional levels
	Patientn Education	<ol style="list-style-type: none"> 1.follow up(Internet or telephone) 2.Self-management after discharge 3.Rehabilitation exercise (balance training)
	Pain Management	<ol style="list-style-type: none"> 1.Oral NSAID (COX2 affects ligament healing),and common side effects of NSAID drugs 2.Local NSAID (side effects: skin irritation) 3.Hyaluronic acid injection (Expensive,not popular)
<p>Surgical Nursing Care</p>	Pre-operative Care	<ol style="list-style-type: none"> 1.Assess the patient's condition (health history, family history, allergy history) 2.Alleviate patients' worries 3.Give patients preoperative guidelines in advance
	Intra-operative Care	<ol style="list-style-type: none"> 1.Confirm the operation information 2.Check the patient's condition 3.Pay attention to intraoperative complications 4.Time out
	Post-operative Care	<ol style="list-style-type: none"> 1.Safe transfer of patients 2.Postoperative risk intervention (nausea, vomiting, wound conditions, vital signs) 3.Instruct patients and family members to self-care after discharge 4.Provide contact information (for guidance to avoid serious complications)
	Post-operative Pain Management	<ol style="list-style-type: none"> 1.Over 24 hours analgesia 2.Opioid or NSAID 3.Non-drug analgesia (music, body position, postoperative ice)

5 Results

5.1 Conservation interventions in nursing

Price measure

For most grade I, II, and III ankle sprains, non-surgical intervention is effective. The most basic conservative intervention is PRICE, which is also the most commonly used measure to deal with ankle sprains. 'P' stands for protection, 'R' stands for rest, 'I' stands for Ice, 'C' stands for compression,

and finally 'E' stands for Elevation. In the face of sprains that have already occurred, PRICE measures can alleviate the patient's acute pain (Myrick 2014; Katherine 2019).

The first point is that the purpose of protection and rest is to reduce pain, reduce soft tissue swelling in the ankle area and prevent the injured area from further deterioration. Because continuing to move the affected limb after a sprain, it will aggravate the continuous bleeding in the injured area, leading to further aggravation of soft tissue swelling (Mai et al. 2009).

Secondly, ice packs have been proven to help relieve pain after sprains. Current recommendations indicate that ice should be used intermittently for 20 minutes during the first week after a sprain to reduce pain (Mutlu et al. 2020). Some patients may have misconceptions about ice compress. Some people think that the ice pack directly touches the skin and makes the whole ankle feel numb, which will make the ice compress more effective. But in fact, direct contact with the skin may also cause frostbite to the local tissues. Wrap the ice pack with thin clothes or towels, which will make the ice pack more effective ((Mai et al. 2009). A study by Mutlu et al. indicated that 20 minutes of ice is the best soft tissue ice time. It is essential to explain to the patient the ice application as a nurse. Hot compresses are generally not applicable within 36 to 48 hours after the injury, as it will increase tissue edema. (Mutlu et al. 2020; Kosik et al. 2021; Mai et al. 2009;).

Thirdly, compression can increase tissue pressure, reduce the occurrence of edema, thereby reducing pain and increasing ROM (range of movement). In the acute phase of the ankle joint, compression can promote venous blood circulation and support the damaged calf-muscle pump, so Compression can bring good recovery to the ankle joint (Hansrani et al. 2015). According to relevant literature, Air-Stirrup brace is the best choice currently economical and practical. (Beynnon et al. 2006; Slade 2012; Fatoye et al. 2016). The method of use is simple and the study by Beynnon et al. uses both Air-Stirrup brace and elastic wrap to have a good effect on patients with grade I and II sprains. And it can help patients recover to their pre-injury state as soon as possible. Compared with patients using Air-Stirrup brace or elastic wrap alone, the effect of using the two methods together can make patients recover 10 days earlier (Beynnon et al. 2006). The Powell 2019 study showed that 67% of patients with AirLoc stents were able to return to work, while 46% of patients with plaster (Plaster of Paris) were able to return to work. The AirLoc stent can provide better external support for patients with grade III ankle sprains, and support patients to return to normal

life more smoothly. From a nursing point of view, with holistic care as the center, it improves patient satisfaction from all aspects and reduces the inconvenience caused by ankle sprains. A more convenient and economical device can improve patient compliance, thereby providing convenience for subsequent rehabilitation phase treatment (Powell 2019).

Fourthly, Elevation's purpose is to reduce the pressure of the injured ankle joint blood vessels, so as to reduce soft tissue bleeding. At the same time, the drainage of inflammatory exudate through the lymphatic vessels is increased, which limits soft tissue edema (Mai et al. 2009).

In the rehabilitation phase, patients can be provided with a supervised or unsupervised exercise therapy program, which lasts at least one and a half months to about 2 months. Every year, about 10% of sprained patients receive training programs in rehabilitation institutions, and more patients choose to perform rehabilitation training at home (Katherine 2019).

The primary conservative intervention method is simple and easy to operate, and has a good effect on I, II ankle sprains and most grade III sprains (Powell 2019). As a nurse, it is essential to provide post-sprain health education to patients and their family members, and to inform patients the benefits of rehabilitation training. Let patients choose how to conduct rehabilitation at home under supervision or unsupervised. Informing patients and their family members to reduce unnecessary weight in the initial stage, this can avoid re-injury to the unhealed ligament, and the harm and risk of sprain again. At the same time, the patient's nervousness or worries about temporarily restricting activities should be soothed (Kosik et al. 2021). Because nervous emotions sometimes not only increase the psychological burden, but also cause endocrine disorders, and in severe cases, it can lead to long-term depression, which is not conducive to injury recovery.

Patient education

Preventive measures can reduce the incidence of repeated ankle sprains, and good prevention can prevent patients from interfering with the impairment of ankle joint function caused by long-term ankle instability. From the perspective of long-term benefits, the necessity of preventive measures can bring huge benefits to patients' quality of life in the future and reduce the economic burden of

social medical care (Janssen et al. 2014). Preventive measures are divided into three aspects: the application of preventive braces, rehabilitation exercise training, and follow-up visiting.

The first is the application of ankle tape and ankle braces. According to related studies, non-rigid ankle braces and preventive ankle straps are also effective ways to avoid first sprains and repeated sprains. The brace and tape are to limit the ankle's mobility and prevent excessive internal rotation of the ankle. After an ankle sprain, an ankle brace or bandage can be used for one year to avoid recurrence. (Vuurberg et al. 2018; chen et al. 2019;). For people with a history of ankle sprains, these two preventive measures have been shown to reduce the risk of ankle sprains by 50% to 70% (McKeon et al. 2008). Although the use of ankle braces can reduce the incidence of recurring ankle sprains, it does not reduce the severity of ankle sprains (McGuine et al. 2011). Tape has a smaller volume than a branch and can adapt to different anatomical conditions. Tapes are usually divided into Elastic tape and non-elastic tape. However, the brace has the advantages of being reusable and easy to adjust, and the brace will be more economical than tape. Advice can be given to patients according to their specific conditions and needs, such as patients' economic conditions, professional needs, and so on. Although the brace is the most economical and effective measure for preventive intervention, it does not mean that the brace has become the best measure for the treatment and follow-up of ankle sprains (Camacho et al. 2019; Janssen et al. 2014).

The second aspect is rehabilitation exercise training, which is to prevent repeated ankle sprains and the remarkable effectiveness has been proven. If exercise therapy has been given a high dose (more than 900 minutes of exercise therapy training), this training effect will be improved. Common sense of balance trainings are these two kinds: wobble- or balance-board training (Rivera et al. 2017; Vuurberg et al. 2018). These rehabilitation programs can help improve patients' ankle joint position sense, muscle reaction time, and functional outcome scores. These rehabilitation training can reduce recurrent ankle sprains and improve patients' proprioception. When conducting health education for patients, it is necessary to inform them of the benefits of these rehabilitation training. At the same time, provide patients with the contact information of the rehabilitation institution, or form a complete referral procedure with the rehabilitation institution. From the perspective of nursing, we should also consider the psychology of patients, who may be anxious and disturbed about the disease. Or patients will resist sports training which may result in many

factors such as lack of professional guidance, time-consuming, or inconvenience, pain and other factors. Relieving the patient's psychological burden can enable the patient to actively participate in sports training to prevent repetitive ankle sprains (Katherine 2019; Saed et al. 2018; Kennet 1996.).

The third aspect is telephone or online follow-up. Follow-up after the initial sprain can help nurses understand the patient's ankle recovery at home. According to relevant British emergency studies, nurses will provide a written instruction sheet for self-management of ankle sprained patients after they leave the hospital. However, the guidance sheet lacks specific criteria for determining the ankle recovery threshold and clear standards for returning to work or sports activities, ultimately leaving patients vulnerable to repeated ankle sprains and long-term residual symptoms after sprains. Therefore, telephone follow-up or online follow-up can understand whether the patient has potential complications, and ask the patient's proprioception and the patient's degree of recovery. It can provide data for nurses to understand the quality of life of patients during the rehabilitation period, thereby promoting nurses' ankle health education and providing a consultation channel for discharged patients. At the same time, these follow-ups can provide relevant data support for studying the association between repeated ankle sprains and CAI as well osteoarthritis (Katherine, 2019; Saed et al. 2018).

In summary, ankle sprains is a very common disease in primary care institutions, and it is a very important step for nurses to assessment patients with ankle sprain. And the mechanical weakness, chronic swelling, stiffness, and long-term degenerative changes may all result from an ankle injury. The sprained limbs with a history of sprains are twice as much as those without a history of sprains, and the chance of recurrence of ankle sprains are extremely high. Mismanagement of sprains can result in chronic complications that can last for up to two years following the original injury which management are very important for the patients (Myrick 2014;Mai et al.2009; Saed et al. 2018).

The ankle sprain has no wound, through early treatment interventions and simple nursing process can speed up the patient's return to normal activities which results into easily ignored. In fact, many patients with ankle sprains do not receive professional care management and supervision in the follow-up, which increases the probability of patients with sprains again (Gribble et al.2016).

Subsequent the characteristics of patients with repetitive sprains, ankle giving way or spontaneous reports of ankle dysfunction that lasted more than one year after the original sprain and so on, and ultimately the patient was defined as CAI (Tyler et al.2018).

Research by Pourkazemi et al. showed that the risk factors for repetitive ankle sprains include higher height and weight, increased number of steps when one leg is balanced, increased ligament laxity, and proprioception unstable. In the young age population and experience of ankle sprain, these two reasons are independent risk factors. The two independent risk factors have a much higher probability of recurring ankle sprains than the other eight factors. The above risk factors can predict 90% of patients with ankle sprains recurrence (Pourkazemi et al.2018).

Therefore, it is important as a nurse to identify risk of factors and implementation prevention measures for repetitive ankle sprains, because a better understanding of these risk factors can emphasize the importance of preventing repetitive ankle sprains. The importance of optimal methods and preventive projects in adults to reduce the burden from repetitive ankle sprains which prevent patients suffering from complications of ankle sprains. (Kemler et al.2015) .

Pain management

Pain is the main complaint of patients with repeated ankle sprains, and pain management has always been a challenge in clinical practice. Pain is subjective, and each patient's cultural background and personal experience will make patients respond differently to pain. Effective pain management is not only a simple pain score number, but also considers the patient's pain needs from multiple aspects. Providing better pain management measures for clinical nursing practice, thereby improving patient satisfaction with care is one of main purposes in pain management (Rosa 2018; Sherwood et al. 2017). The pain management of patients with repetitive ankle sprains is divided into non-surgical pain management and postoperative pain management. For non-surgical patients, the pain caused by repeated ankle sprains is chronic and lasts long. After the acute phase of the sprain, pain remains for a long time. In the acute phase of non-surgical treatment, PRICE measures combined with NSAID drugs can generally achieve good results. Nearly 60% of patients treated in primary health care will receive medications for pain relief in the emergency department or clinic of the hospital (McKeon et al. 2019; Kosik et al. 2021).

A study by Kosik et al., 2021 showed that nearly 30% of patients will receive a prescription for painkillers when they are discharged from the hospital, and 55% of patients will receive an over-the-counter painkiller nonprescription when they are discharged from the hospital (Kosik et al. 2021). At the same time, for patients with chronic long-term ankle pain, in addition to discussing pain management with the patient themselves, it is also necessary to discuss with the patient's family, so that the patient can get support and help from family members at home (McKeon et al. 2019; Kosik et al. 2021; Sherwood et al. 2017).

According to the literature of Carter et al., analgesic drugs for ankle sprains are generally divided into oral NSAIDs and Topical NSAIDs, Hyaluronic acid injection. A common side effect of oral NSAIDs is gastrointestinal reactions, and it is not suitable for patients with asthma and pregnant women. Because it may induce asthma attacks in asthma patients and affect fetal development for pregnant. Topical NSAIDs are usually well tolerated and do not cause gastrointestinal side effects like oral NSAIDs. There is only one adverse effect, skin irritation. Hyaluronic acid injection is not suitable for all patients with ankle sprains, because the price is far more expensive than traditional analgesics. Nowadays, Hyaluronic acid injection is only suitable for patients who urgently need to return to a normal functional state, such as athletes, soldiers, etc (Carter et al. 2015).

Based on animal experiments in most literatures, COX2 inhibitor drugs in NSAIDs can affect early ligament healing. Selective COX-2 inhibitors can cause damage to tendon-to-bone healing, weaken mechanical stability, and reduce the content of PGE2 in synovial fluid. However, non-selective COX inhibitors have no negative effects on the healing of soft tissues such as labrum, tendons and ligaments. Nowadays, there is a lack of relevant data from human experiments, so the use of NSAID drugs for pain relief is not recommended in the relevant guidelines for the treatment of ankle sprains. Whether to use COX2 inhibitors in the acute phase of ankle sprain is still controversial (Elder et al.2001; Sauerschnig et al. 2018; Ghosh et al.2019).

5.2 Surgical nursing care of repetitive ankle sprain

Preoperative care

First of all, before ankle surgery, nurses provide them with good preoperative guidance for different independent individuals. Nurses will evaluate and record the basic information of the patient,

then confirm that the patient is accompanied by family or friends on the day of the operation. (Arakelian et al. 2017; Crystal et al, 2011). Patients with repeated ankle sprains will have chronic pain. The patient should be reminded to communicate with the doctor about the medication history before surgery to avoid dependence on analgesics or related complications after surgery (Zacharia et al.2011; Bohl et al.2020).

Johnson showed in a 2011 study, during the preoperative evaluation of ankle surgery and during the perioperative period, nurses can use RCRI risk stratification tools to evaluate the patient's cardiovascular status. At the same time, the nurse can also evaluate the mentality, nutrition and daily life ability of the client. A good assessment can reduce perioperative risks and thus ensure patient safety (Johnson 2011). The study by Arakelian et al. stated that patients need to be able to talk to perioperative nurses about the surgical process and the way they want to receive care, and at the same time give the patient the individual respect they deserve, or discuss and formulate postoperative rehabilitation training with the patient. On the other hand, if the patient is familiar with the perioperative nurse throughout the entire perioperative period, it can bring the patient a safe and relaxed atmosphere, thereby reducing the patient's anxiety and bringing better perioperative care to the patient experience (Arakelian et al. 2017). Good preoperative assessment and communication between nurses and patients can not only provide patients with perioperative safety from the perspective of professional knowledge, but also provide patients with psychological support from the overall patient-centered care and spiritual level.

Intraoperative care

Secondly, in ankle surgery, the instruments needed during the operation should be prepared via nurses according to the surgical method selected by the doctor before the operation. Under normal circumstances, patients undergoing ankle joint repair surgery are placed in a supine position, and general anesthesia is used as an anesthesia method. The nurse needs to cooperate with the anesthesiologist to perform anesthesia and pay attention to whether the patient has any adverse reactions to the anesthesia. (Crystal et al, 2011; Porter et al. 2019).

In the study of Crystal et al., nurses need to provide proper and safe fixation of the patient's position, and avoid too many people entering and exiting the operating room during the operation, so

as to reduce the pollution to the sterile environment of the operation. The circulating nurse needs to confirm the name of the surgical patient, the specific surgical limb, the name of the operation, etc., and confirm with the entire surgical team to prevent incorrect information from causing major accidents during the operation of the patient (Crystal et al, 2011). Surgical nurses should pay attention to the potential complications of ankle joint repair surgery. The most common ankle arthroscopic surgery complication is Superficial peroneal nerve injury, which accounts for about 4%. Usually due to the injury of the peroneal nerve caused by the intraoperative operation, the patient should be informed of the potential risks before the operation (Guelf et al. 2016; Zekry et al. 2018). The other side stated in the 2021 study by Camila et al. that hypothermia is the most common perioperative complication, which not only can happen to elderly patients, there are other reasons, such as: due to anesthetics, administration of cold intravenous fluids, underweight, long operation time, type of operation, etc., the patient's hypothermia can all lead to hypothermia. Therefore, as a nurse, nurse should pay attention to the possibility of hypothermia during the operation, so as to avoid the adverse consequences of hypothermia (Camila et al.2021).

Postoperative care

Finally, after ankle arthroscopy, the patient was safely transferred from the operating room to the post-anesthesia care unit (PACU) for postoperative observation. Postoperative nurses need to observe conditions such as nausea and vomiting, bleeding from the wound, and clarity of consciousness. In 2019 study by Ramarapu et al., it was shown that the Rapid System Review Score (RSR) scale helps nurses evaluate the patient's condition after surgery, and the corresponding score corresponds to the number of interventions. RSR Score helps perioperative nurses to intervene in possible risks to ensure the safety of patients undergoing day surgery (Odom et al. 2017; Ramarapu et al. 2019). Meanwhile, deep vein thrombosis (DVT) is also one of the possible complications after ankle arthroscopy (Guelf et al. 2016; zekry et al. 2018).

If there are no special circumstances, patients undergoing ambulatory surgery will be discharged on the same day of surgery. A study by Odom et al. in 2017 showed that it is extremely important for nurses to give proper discharge instructions after orthopedic day surgery. The guidance content includes providing relevant self-care information for patients and their families such as wound care, pain management, abnormal situation handling, external support and other related

knowledges. Meanwhile, it is necessary to give the patient guidance on daily life, such as how to use crutches correctly. The patient may need help from family members while taking a bath to avoid slipping and other problems. Due to inconvenience in life and movement within a short period of time, the patient may have psychological problems. At the same time, family members may face difficulties in the care process or life pressure, and lack of relevant nursing knowledge. (Odom et al, 2017). The nurse should give the patient the contact information of the hospital and the time for follow-up in the future, and inform the patient of the importance of rehabilitation training, and urge the patient to gradually carry out the corresponding rehabilitation exercise training. Because good rehabilitation training can make patients return to normal life activities as soon as possible (Zacharia et al. 2011).

In summary, from good preoperative preparation to intraoperative care and postoperative anesthesia care, each stage of the operation is related, and these relationships will affect the patient's postoperative recovery stage. Providing good perioperative care can alleviate the patient's psychological anxiety and physical discomfort for the operation, and can also reduce complications, thereby speeding up the patient's return to normal functional levels.

Postoperative pain management

Regarding postoperative pain management, when patients undergoing day surgery have no adverse postoperative complications within a few hours of postoperative observation, the patients need to be discharged home with family or friends on that day. Good postoperative pain management can reduce pain, reduce the adverse effects of pain, thereby improving the quality of life of the patient during the recovery period, and promoting the patient to return to a normal life state as soon as possible. However, if the pain caused by the ankle outpatient surgery does not receive good care methods to relieve the pain, then the pain after the operation will have a negative impact on the patient, such as causing damage to the peripheral and central nervous system, which may lead to the development of chronic pain (Zacharia et al. 2011; Sherwood et al. 2017). Effective and good postoperative pain management and improvement of postoperative results of patients cannot be separated from the cooperation of nursing, surgeons, and anesthesiologists (Sherwood et al. 2017). In the application of analgesics after ankle surgery, opioids are usually

used in clinical practice. With the widespread use of these addictive drugs in clinical practice, medical staffs are also afraid to promote patients' dependence on analgesics. At the same time, patients and their family members are not only concerned about drug addiction, but also about the strength and side effects of analgesics (Bohl et al. 2020; Sherwood et al. 2017; Zacharia et al. 2011). As nurses, they not only need to further learning and improving knowledge and attitudes towards pain management, but also to understand the differences in patients' attitudes towards pain and individual differences, and then use the knowledge learned to relieve patients and family members' concerns about pain (Maysoon et al. 2011).

After ankle surgery, more than 24 hours of continuous analgesia are generally required (Zacharia et al. 2011). The safe and comfortable pain relief program need to be provided to patients. From the perspective of care, in addition to giving analgesics as prescribed by the doctor, it is necessary to inform the patients and their families about the possible side effects of painkillers, how to use the drugs, and the dosage of the drugs when they are discharged from the hospital. Pharmacological drugs are used to treat pain at the physical (physiological and sensory) level, while non-pharmacological methods are used to treat emotional, neurological and spiritual pain. For analgesia methods, non-drug analgesia methods such as distraction, relaxation, hot and cold application, positioning, exercise, reflexology, aromatherapy, and music therapy can also be provided to patients (Gumus et al. 2019). Many literature studies have shown that these non-medicinal pain relief methods can reduce the pressure caused by surgery and increase the secretion of endogenous opioids in the brain, raising the threshold of pain for the patient, providing relaxation and improving the comfort of the patient. Therefore, these methods are effective in postoperative pain management. (Zacharia et al. 2011; Gumus et al. 2020; Poulsen et al. 2019).

According to the research data of Gumus et al. 2020, the non-drug treatment methods commonly used by nurses in post-operative care are cold and hot compress taking 53.3%, rest taking 55.5%, posture taking 68.8% and exercise taking 50.8%. These four methods have the highest application rate. The low use rate of other non-medicinal pain relief methods is due to the need for additional professional training, and some methods require interdisciplinary cooperation such as the cooperation of doctors, nurses, and physical therapists. The reasons that affect nurses to implement these non-medicinal analgesia methods are the high workload of nurses, eagerness for rapid pain

relief, lack of confidence in these methods by nurses and patients, lack of specific method information, and no relevant equipment available (Gumus et al. 2020).

In the research of Poulsen et al. 2019, music therapy as a postoperative pain management nursing intervention stated that music therapy is safe, cost-effective and can develop different personalized music for each patient. The greatest benefit was seen when patients were given lists of available music that included soothing, relaxing, and mainly instrumental selections. At the same time, for better synchronize with desired heart rates, therapeutic music should be of a soothing sort, with movements played at 60 to 80 beats per minute. And that no special music player is needed, which is convenient and simple. Music helps nurses and patients to establish a good nurse-patient relationship which increase trust of patients. (Poulsen et al. 2019).

Therefore, it is undeniable that both opioids and NSAID drugs can bring excellent effects for patients to relieve pain. As a nurse, you cannot ignore the fact that most non-pain-killing methods are effective in reducing pain. These methods create opportunities for nurses to influence and formulate policies to reduce the use of opioids (Poulsen et al. 2019; Gumus et al. 2020). Whether in conservative treatment or surgery, good pain management can alleviate patients' discomfort and improve patients' satisfaction with nursing care.

6 Discussion

6.1 Conclusions

In summary, the treatment of a single ankle sprain does not seem to be complicated, and the cost of a single treatment is low. However, according to the current relevant CAI research, the long-term consequences of repeated ankle sprains to patients cannot be underestimated. The repeated ankle sprains may lead to traumatic osteoarthritis, but the exact correlation factors have not yet been discovered. Due to neglected rehabilitation training and daily ankle protection, the recurrence rate of ankle sprains has been greatly increased.

First of all according to the results of this review, in the prevention of repeated ankle sprains, balance training and additional support and protection during exercise can effectively prevent another sprain. Nurses should improve patient compliance and allow patients to perform exercise rehabilitation regardless of whether they choose to have professional guidance or not. Patients need to complete rehabilitation training on time to prevent soft tissue damage caused by sprains again. After the patient is sprained for the first time, the nurse can follow up on the phone or online, or through interdisciplinary cooperation, let the patient learn how to recover on the relevant rehabilitation mobile phone application. Meanwhile, nurses can provide relevant nursing guidance on the mobile phone application of such rehabilitation training. For some patients who may be unfamiliar with mobile phone applications, nurses can provide relevant brochures for the patients to go home for self-management.

The second point according to the results is that in the conservative treatment stage of recurrent ankle sprains, PRICE measures can effectively alleviate the pain of patients after repeated ankle sprains occur. Applying ice to the ankle for 20 minutes has proven to be the best time. It will not cause uncomfortable symptoms such as redness, swelling, and numbness of the soft tissues because of the long ice application time. Nurses need to cooperate with relevant local analgesics or oral analgesics to provide patients with good pain management. In addition to the acute treatment, long-term daily life guidance and pain management guidance cannot be ignored. For example, women should try to avoid high heels and bring trekking poles on uneven roads. For patients who like to exercise for a long time, they can wear elastic bandages or braces for ankle joint protection during exercise.

The third point found in the analysis is that for patients with repeated ankle sprains who need surgery, if conservative treatment fails for 3 to 6 months, the patient needs surgical intervention. In addition to understanding the basic condition of the patient before the operation, it is also necessary to consider the patient's psychological problems such as preoperative anxiety. Consistent nursing throughout the perioperative period can establish a good nurse-patient relationship. Nurses need to inform patients in advance how to use crutches after surgery, and participate in nursing with their family members. Intraoperative nurses should pay attention to peroneal nerve damage, hypothermia and other common complications during ankle surgery. Postoperative

nurses need to safely transfer and handover patients, and the application of postoperative assessment scale RSR can estimate the corresponding risks and intervene, thereby improving patient safety and reducing the hospitalization time of patients undergoing ankle surgery during daytime surgery.

Self-management after discharge from the hospital is particularly important. The degree of understanding of the patient and his family about the care after discharge is related to the patient's recovery. Let patients and their caregivers understand the use of painkillers and their side effects, and inform them of non-analgesic methods in detail, so that patients can have more analgesic measures instead of relying on painkillers alone. Nurses need to follow up in follow-up care to understand the health education status of patients and their families. In future research, self-care guidance on the Internet can be launched, so that they can easily get remote care technical support at any time.

6.2 Ethical considerations, reliability and limitations

Understanding the principles of research ethics is the foundation of good research practice. Meanwhile, researchers have the responsibility to prove that they have taken corresponding measures to ensure the protection of their subjects, encrypt and protect the corresponding data, and treat each subject fairly and impartially as well present the research results truthfully, clearly and logically (Doody et al. 2016). None of the articles reviewed in this research violated ethical principles, and the data used was approved by the corresponding organization. The data was kept confidential to ensure the authenticity and validity of the data.

In terms of validity and reliability, whether the analysis is quantitative or qualitative research, or the unique method of each methodology, the use of verification techniques requires the originality, sensitivity, versatility, and expertise of researchers, which determine the reliability and validity of the research (Cypress 2017). The research results of this study answer the questions raised in purpose. In the final research results, the required nursing interventions at each different stage correspond to the corresponding intervention measures. Meanwhile, the articles selected in this study are strictly selected according to the above methodology. The methodology framework is supported by a large amount of literature data, and the source of the interpretation framework conforms to the selected criteria for logic and clarity. This study conducts real data analysis and

summary based on the existing data and discusses the results. Finally, the reliability and validity of the results presented in this study are supported by a large amount of literature.

The limitation of this study is that due to the current daytime orthopedic surgery in China has not yet been fully implemented, the intervention of day surgery on the ankle joint is temporarily not applicable to China (CASA 2019), but it can provide future theoretical support for orthopedic day surgery in China. So far, the part of ankle joint day surgery is only applicable to countries that have perfected orthopedic day surgery techniques. In addition, some of the nursing methods in the article still lack more comprehensive scientific basis and experimental data. For example, the principle of ice compress has yet to be verified, and ice compress can only have corresponding effects for analgesia, and other effects have not been obtained and confirmed. This research has not conducted block surveys for unused scenarios and regions, so I hope that future research can be carried out on this basis, and clinical data can be used to verify the effectiveness and rationality of various nursing methods to make the article more completed.

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Zekry, M., Shahban, S. A., El Gamal, T., & Platt, S. (2019). A literature review of the complications following anterior and posterior ankle arthroscopy. *Foot and ankle surgery : official journal of the European Society of Foot and Ankle Surgeons*, 25(5), 553–558.

Guelfi, M., Zamperetti, M., Pantalone, A., Usuelli, F. G., Salini, V., & Oliva, X. M. (2018). Open and arthroscopic lateral ligament repair for treatment of chronic ankle instability: A systematic review. *Foot and ankle surgery : official journal of the European Society of Foot and Ankle Surgeons*, 24(1), 11–18.

Appendices

Appendix 1. Reviewed data

Number	Reference	Main Idea	Research Methods	Repetitive/Chronic Ankle Sprain	Nursing Intervention
1	Carter D, Amblum-Almer J. Analgesia for people with acute ankle sprain. <i>Emerg Nurse</i> . 2015 Apr;23(1):24-31.	Analysis of NSAIDs effect for Ankle sprain recovery and cost control and side-effect	Literature Review Integrated	x	Ice, Analgesia, Compression, elevation, rest
2	Powell S (2019) A comparison of two interventions in the treatment of severe ankle sprains and lateral malleolar avulsion fractures. <i>Emergency Nurse</i> .	1, The patients using AirLoc is more satisfact than using plaster cast. 2, The Airloc's recovery effect is better.	Questionnaire	x	AirLoc, plaster cast
3	Al Bimani SA, Gates LS, Warner M, Ewings S, Crouch R, Bowen C. Characteristics of patients with ankle sprain presenting to an emergency department in the south of England (UK): A seven-month review. <i>Int Emerg Nurs</i> . 2018 Nov;41:38-44.	1, Taking prevention strategies. 2, Taking appropriate assessment tools and good rehabilitation programs for patients.	Retrospective review of records, Literature Review	x	Prevention methods, OAR assesment tools should be taken in future
4	Gumus K, Musuroglu S, Karaman Ozlu Z, Tasci O. Determining the Use of Nonpharmacologic Methods by Surgical Nurses for Postoperative Pain Management and the Influencing Professional Factors: A Multicenter Study. <i>J Perianesth Nurs</i> . 2020 Feb;35(1):75-79.	Gender, geographic region of work, choosing the profession willingly, and receiving training on pain management affected the nurses' rate of using nonpharmacologic methods.	personal information form and questionnaire	x	Pain management
5	Fatema Hamed Al Abri, Joshua Kanaabi Muliira, Huda Al Awaisi, Effect of triage nurse-led application of the ottawa ankle rules on pain and patient satisfaction with emergency department care, <i>Clinical Epidemiology and Global Health</i> , Volume 8, Issue 4, 2020, Pages 1402-1407, ISSN 2213-3984.	Triage nurse application of the OAR improved patient satisfaction with ED care, but did not lead to a significant reduction in acute ankle injury related pain.	Quasi-experimental design	x	OAR assessment tools application, Pain management
6	Kemler E, Badenbroek IF, Port IGL van de, Hoes AW and Beckx FJC. Incidence and Determinants of Recurrent Lateral Ankle Ligamentous Sprain. <i>Phys Med Rehabil Int</i> . 2015; 2(8): 1064.	1, analysis of ALALS' age distribution— young adults are highest rate. 2, Prevention of risk factors from recurrent ankle ALALS	Prospective cohort study, Univariable and multivariable Cox regression analysis	x	Prevention: Tape and Braces, training and balance programs.
7	Poulsen, M. J., Coto, J., & Cooney, M. F. (2019). Music as a Postoperative Pain Management Intervention. <i>Journal of perianesthesia nursing</i> : official journal of the American Society of PeriAnesthesia Nurses, 34(3), 662-666.	Offering music throughout the perioperative experience continues to yield positive results for reducing pain and opioid use for postoperative patients.	Literature Review Integrated	x	Pain management, Music Therapy and Opioid offering.
8	Camacho LD, Roward ZT, Deng V, Latt LD. Surgical Management of Lateral Ankle Instability in Athletes. <i>J Athl Train</i> . 2019 Jun;54(6):639-649.	1, Suitable time using surgery to recover ankle function. 2, Using a modified Brostrom technique as the primary operative treatment. 3, Deliberating the athlete returning playing time.	Thematic literature Review, Literature Review Integrated	x	Postoperative Management, Recovery Time Assessment
9	Chen ET, Borg-Stein J, McInnis KC. Ankle Sprains: Evaluation, Rehabilitation, and Prevention. <i>Curr Sports Med Rep</i> . 2019 Jun;18(6):217-223.	Clinical evaluation is necessary to ensure an accurate diagnosis and appropriate treatment prescription.	Narrative Review	x	Prevention interventions, Clinical eveluation, Physical examination, NSAIDs, Bracing, Manual Therapy, Neuromuscular Training
10	Janssen KW, Hendriks MR, van Mechelen W, Verhagen E. The Cost-Effectiveness of Measures to Prevent Recurrent Ankle Sprains: Results of a 3-Arm Randomized Controlled Trial. <i>Am J Sports Med</i> . 2014 Jul;42(7):1534-41.	Bracing was found to be the dominant secondary preventive intervention over both MT and the combination of both measures	Economic and decision analysis, Self-reporting of outcomes	x	bracing and neuromuscular training for the prevention
11	Katherine Newsham, The Ubiquitous Lateral Ankle Sprain: Time to Reconsider Our Management?, <i>The Journal for Nurse Practitioners</i> , Volume 15, Issue 5, 2019, Pages 343-346. e3, ISSN 1555-4155,	1, Good LAS and CAI examinations and management interventions can reduce the cost. 2, unsupervised programs provide similar long-term benefits as supervised. 3, exercise therapy should be continued for at least 6 to 8 weeks.	Literature Review Integrated	x	Prevention of recurrent LAS, exercise therapy, Radiographs and OAR, Protection without immobilization

12	Kennet J. Tubigrip, ibuprofen and home? The nurse's role in the care of patients with ankle sprains in the accident & emergency department. <i>Accid Emerg Nurs.</i> 1996 Jul;4(3):121-4.	1,Nurses should help the patients on time. 2,Nurses should teach patients how to cope the injuries. 3,Nurses can save costs for patients.	Thematic Literature Review	x	Emergency Assessment,X-Ray Suggestion,Compression Bandages, Anagesia
13	Gribble PA, Bleakley CM, Caulfield EM, et al 2016 consensus statement of the International Ankle Consortium: prevalence, impact and long-term consequences of lateral ankle sprains <i>British Journal of Sports Medicine</i> 2016;50:1493-1495.	1,LAS and CAI will result heavy financial burden for patient. 2,LAS subsequent high rate of CAI, which increased the number of disability.	Thematic Literature Review	x	-
14	Mai, N., & Cooper, L. (2009). Assessment of Ankle Injuries. <i>The Journal of School Nursing</i> , 25(1), 34 - 39.	This article has outlined specific guidelines for history taking, physical assessment, and treatment options and included decision-making tools such as the OAR. These guidelines combined with knowledge of ankle anatomy will allow the school nurse to provide the best care possible	Feature article,Literature Review	x	Prevention Interventions,Indications for X-Ray,Physical Examination
15	McQuine TA, Brooks A, Hetzel S. The effect of lace-up ankle braces on injury rates in high school basketball players. <i>Am J Sports Med.</i> 2011 Sep;39(9):1840-8.	Use of lace-up ankle braces reduced the incidence but not the severity of acute ankle injuries	Randomized controlled trial: Level of evidence, 1	x	Lace-up ankle braces
16	McKeon PO, Mattacola CG. Interventions for the prevention of first time and recurrent ankle sprains. <i>Clin Sports Med.</i> 2008 Jul;27(3):371-82, viii.	1,The use of external support and balance training individually reduces the risk of reinjury in those who have a history of ankle instability.2,The application of external support and balance training are effective in assisting patients in returning to function.	Feature article,Literature Review	x	Prevention,External support,Balance/coordination training
17	Pourkazemi F, Hiller CE, Raymond J, Black D, Nightingale EJ, Refshauge KM. Predictors of recurrent sprains after an index lateral ankle sprain: a longitudinal study. <i>Physiotherapy.</i> 2018 Dec;104(4):430-437.	1,Ankle sprain and younger age were the only independent predictors of ankle sprain. 2,The combination of greater height or weight, feeling of instability, peak power and impaired balance predicted the occurrence of ankle sprain in almost 90% of participants.	Prospective cohort study, Level of evidence II	x	Risk analysis and factors to make prevention.
18	Rivera MJ, Winkelmann ZK, Powden CJ, Games KE. Proprioceptive Training for the Prevention of Ankle Sprains: An Evidence-Based Review. <i>J Athl Train.</i> 2017 Nov;52(11):1065-1067.	Proprioceptive training programs were effective in reducing the incidence rates of ankle sprains in the athletic population, including those with and those without a history of ankle sprains.	An Evidence-Based Review	x	Proprioceptive training programs
19	Tyler M. Miklovic, Luke Donovan, Omar A. Protzok, Matthew S. Kang & Mark A. Feger (2018) Acute lateral ankle sprain to chronic ankle instability: a pathway of dysfunction, <i>The Physician and Sportsmedicine</i> , 46:1, 116-122.	The use of an impairment-based model may be advantageous when treating patients with an acute LAS.	CLINICAL FEATURE REVIEW	x	Functional tasks,
20	Vuurberg G, Hoortje A, Wink LM, van der Doelen EFW, van den Bekerom MP, Dekker R, van Dijk CN, Krips R, Loogman MCM, Ridderikhof ML, Smithuis FF, Stufkens SAS, Verhagen EALM, de Bie RA, Kerkhoffs GMMJ. Diagnosis, treatment and prevention of ankle sprains: update of an evidence-based clinical guideline. <i>Br J Sports Med.</i> 2018 Aug;52(15):956.	1, the severity of ligament damage can be assessed most reliably by delayed physical examination (4-5 days post trauma). 2, the patient with an acute lateral ankle ligament rupture benefits most from use of tape or a brace in combination with an exercise programme. 3,For the prevention of recurrent lateral ankle sprains, ankle braces should be considered as an efficacious	Literature Review Integrated	x	Functional treatment,Prevention:Functional Support,Exercise Therapy, Footwear. Sport resumption
21	Myrick KM. Clinical assessment and management of ankle sprains. <i>Orthop Nurs.</i> 2014 Sep-Oct;33(5):244-8; quiz 249-50.	The guidance nurse for clinical assessment and management of ankle sprains	Literature Review	X	History and Physical Examination, RICE

22	Mutlu S, Yilmaz E. The Effect of Soft Tissue Injury Cold Application Duration on Symptoms, Edema, Joint Mobility, and Patient Satisfaction: A Randomized Controlled Trial. <i>J Emerg Nurs</i> . 2020 Jul;46(4):449-459.	The findings suggest that a duration of 20 minutes for cold application for an ankle injury is recommended.	A Randomized Controlled Trial	x	Cold therapy
23	Kosik KB, Bowers LC, Hoch MC, Humphries RL, Thurza MP, Bain KA, Slone S, Gribble PA. Pain Medication Administered and Prescribed to Patients With an Ankle Sprain Treated in an Emergency Department: A Record-Based Cohort Study. <i>J Emergency Nurse</i> . 2021 Feb 19;50(99-1767(20):30437-2.	Opioids accounted for most of the medications administered in the emergency department. Opioids were followed by NSAIDs. 15% of the patients received an opioid prescription at the time of discharge. More patients aged >15 years were given opioids than adolescents and children.	A record-Based Cohort Study	x	Pain management, Intervention recommendations
24	Hansrani V, Khanbhai M, Bhandari S, Pillai A, McCollum CN. The role of compression in the management of soft tissue ankle injuries: a systematic review <i>Eur J Orthop Surg Traumatol</i> . 2015 Aug;25(6):987-95.	The best way to treat ankle sprains is still unknown, with over 75 percent of hospitals using tubular compression bandaging, which has been found to be ineffective at improving regeneration and can intensify the need for analgesia. To accurately evaluate the efficacy of compression and how best to deliver it, well-designed multicenter RCTs are needed.	systematic review	x	External support
25	Beynon BD, Renström PA, Haugh L, Uh BS, Barker H. A prospective, randomized clinical investigation of the treatment of first-time ankle sprains. <i>Am J Sports Med</i> . 2006 Sep;34(9):1401-12.	Treatment of first-time grade I and II sprains with the Air-Stirrup brace provided earlier return to preinjury function. Treatment with a walking cast for 10 days followed by the use of an elastic wrap was more effective.	Randomized Clinical Investigation	X	External support
26	Slade, H. (2012). Treatment options for ankle ligament sprain. <i>Emergency nurse</i> , 19(9), pp. 19-22.	Air-stirrup braces can be used to manage moderate and severe ankle sprains. It is as effective as below-knee casts that are worn for ten days.	Literature Review	x	External support
27	Fatoye F, Haigh C. The cost-effectiveness of semi-rigid ankle brace to facilitate return to work following first-time acute ankle sprains. <i>J Clin Nurse</i> . 2016 May;25(9-10):1435-43	The results of this economic assessment provide evidence for nurses to use a semi-rigid ankle brace to enable return to work in persons with first-time ankle sprains.	model analysis	x	External support
28	Rosa WE. Transcultural Pain Management: Theory, Practice, and Nurse-Client Partnerships. <i>Pain Manga Nurse</i> . 2018 Feb;19(1):23-33.	Nursing transcultural pain relief is both an art and a technology in and of itself. Understanding the complexities of pain is critical for successfully relieving symptoms and improving quality of life.	Literature review		Pain management
29	Sherwood G, McNeill J. Reflective practice: providing safe quality patient-centered pain management. <i>Pain Manga</i> . 2017 May;7(3):197-205.	Reflective practice encourages nurses to think of potential treatments for people who are in distress. Care professionals can understand more about the patient by asking questions about both the patient and themselves.	reflective practice		Pain management
30	McKeon, P. O., & Donovan, L. (2019). A Perceptual Framework for Conservative Treatment and Rehabilitation of Ankle Sprains: An Evidence-Based Paradigm Shift. <i>Journal of athletic training</i> , 54(6), 628-638.	The researchers believe that rehabilitation procedures for ankle sprains must improve. CAI disability	systematic review	x	Pain management and rehabilitation
31	Bohl, D. D., Hejna, E., Mehraban, N., Lin, J. L., Holmes, G. B., Lee, S., & Hamid, K. S. (2020). Postoperative Opioid Dependence following Orthopaedic Foot and Ankle Surgery: A Cohort Study of 448 Patients. <i>Foot & Ankle Orthopaedics</i>	The research discovered that preoperative opioid usage was the single most powerful predictor of postoperative opioid dependency. The presence of a chronic foot or ankle injury did not predict postoperative opioid dependency.	A Cohort Study	x	Pain management

32	Zacharia Facaros, Steven P. Kissel, Michael G. Palladino, Thomas Zgonis, Postoperative Complications in Foot and Ankle Reconstruction, Perioperative Nursing Clinics, Volume 6, Issue 1, 2011, Pages 75-88, ISSN 1556-7931,	To avoid such complications, meticulous postoperative monitoring is needed and should be prioritized by the whole medical team and related practitioners.	Literature review	x	Postoperative intervention
33	Abdalahim, M. S., Majali, S. A., Stomberg, M. W., & Bergbom, I. (2011). The effect of postoperative pain management program on improving nurses' knowledge and attitudes toward pain. Nurse education in practice, 11(4), 250 - 255.	This research has consequences for nursing education in nursing schools as well as health care institution in-service education. Postoperative pain awareness must be incorporated into educational curricula.	Literature review		postoperative pain management
34	Arakelian, E., Swenne, C. L., Lindberg, S., Rudolfsson, G., & von Vogelsang, A. C. (2017). The meaning of person-centred care in the perioperative nursing context from the patient's perspective - an integrative review. Journal of clinical nursing, 26(17-18), 2527 -2544.	FOC entails treating each patient as a person. It also means having access to one's own nurse who is physically and emotionally available during the perioperative period.	Integrative review		Perioperative intervention
35	Johnson J. P. (2011). Preoperative assessment of high-risk orthopedic surgery patients. The Nurse practitioner, 36(7), 40 -47.	The nurse will use the RCRI risk stratification tools to assess the severity of diseases and the patient's health status. The nurse will then decide whether the patient is in good enough health to undergo elective orthopedic surgery.	Literature review	x	Preoperative intervention
36	Porter, M., Shadbolt, B., Ye, X., & Stuart, R. (2019). Ankle Lateral Ligament Augmentation Versus the Modified Broström-Gould Procedure: A 5-Year Randomized Controlled Trial. The American journal of sports medicine, 47(3), 659 -666.	When compared to the MBG treatment, primary repair combined with LARS results in improved overall FAOS and higher Tegner activity scores in physically active patients with chronic lateral ligament dysfunction at 5-year follow-up.	Randomized Controlled Trial	x	intraoperative
37	Guerrini, M., Zamperetti, M., Panzone, M., Usuali, F. G., Salini, V., & Oliva, X. M. (2018). Open and arthroscopic lateral ligament repair for treatment of chronic ankle instability: A systematic review. Foot and ankle surgery : official journal of the European Society of Foot and Ankle Surgeons, 24(1), 11 - 15.	The findings of this study indicate that open and arthroscopic surgical operations have superior effectiveness in the treatment of chronic ankle dysfunction	systematic review	x	Surgery complications
38	Zekry, M., Shahban, S. A., El Gamal, T., & Platt, S. (2019). A literature review of the complications following anterior and posterior ankle arthroscopy. Foot and ankle surgery : official journal of the European Society of Foot and Ankle Surgeons, 25(5), 553 -558.	Both anterior and posterior ankle arthroscopy did not result in any life-threatening complications, according to the literature. The most frequent complications after anterior and posterior ankle arthroscopy are superficial peroneal nerve damage and transient Achilles tendon tightness.	literature review	x	Surgical nursing intervention
39	Odom-Forren, J., Reed, D. B., & Rush, C. (2017). Postoperative Distress of Orthopedic Ambulatory Surgery Patients. AORN Journal, 105(5), 464 -477.	This research contributes to the body of information regarding postoperative pain in patients and caregivers after orthopedic ambulatory surgery and how they treat symptoms, which is a novel emphasis. Nurses and other health care providers should not measure home readiness fully.	Literature review	x	Surgical nursing intervention
40	Ramarapu, S., & Cook, R. (2019). Rapid System Review Score-A Tool to Measure Predictive Interventions in Patients Admitted to the Postanesthesia Care Unit. Journal of perianesthesia nursing : official journal of the American Society of PeriAnesthesia Nurses, 34(6), 1257 -1264.	These findings imply that if the RSR score changes, so will the number of treatments.	Observational clinical study	x	Surgical nursing intervention
41	Camila de Assunção Peixoto, Maria Beatriz Guimarães Ferreira, Múrcia Marques dos Santos Felix, Caroline Bueno de Moraes Pereira, João Vitor Cândido, Vinicius Ferreira Resende Rocha, Lúcia Aparecida Ferreira, Maria Helena Barbosa, Factors contributing to intraoperative hypothermia in patients undergoing elective surgery, Perioperative Care and Operating Room Management, Volume 22, 2021, 100130, ISSN 2405-6030,	Hypothermia is a common multifactorial event, during the operative.	Observational, prospective and quantitative study		Intraoperative intervention
42	Crystal L. Ramanujam, Justin Wade, Michael Palladino, Elective Foot and Ankle Surgery, Perioperative Nursing Clinics, Volume 6, Issue 1, 2011, Pages 1-7, ISSN 1556-7931,	1.A multidisciplinary team approach yields the best results for surgical correction of symptomatic foot and ankle conditions. 2.Perioperative treatment for patients performing elective foot and ankle surgery should be personalized to the operation, the patient's medical status, and the patient's level of progression in the healing process.	literature review	x	Surgical nursing intervention