Technoleg Iechyd Cymru
Health Technology Wales

Appraisal Summary

Extracorporeal shockwave therapy for the treatment of musculoskeletal conditions

Why did HTW appraise this topic?

There are many different types of musculoskeletal conditions that can cause pain (often persistent), affect mental wellbeing, and lead to limitations in mobility, dexterity and functional ability. These conditions include tendinopathies, plantar fasciitis, greater trochanteric pain syndrome, osteoarthritis, myofascial pain syndrome, carpal tunnel syndrome and Morton's neuroma.

ESWT is a non-invasive treatment, given as a single session or a series of sessions, whereby focused or radial acoustic shockwaves pass through the skin to the affected area. The mechanism by which this therapy might have an effect is unknown, but speculated mechanisms include actual destruction of nerve endings, increased blood flow to the area, and damage to the area that triggers neovascularisation.

Some, but not all, local health boards in Wales offer ESWT as a treatment option for certain musculoskeletal conditions.

HTW undertook an evidence review to address the following question: is extracorporeal shockwave therapy (ESWT) clinically and cost effective in comparison to other interventions, no treatment or placebo for the treatment of musculoskeletal conditions?

What evidence did HTW find?

HTW identified a large body of evidence on the effectiveness of ESWT, the majority of which was for the treatment of tendinopathies and plantar fasciitis. Most of the evidence reported by HTW is from systematic reviews of randomised controlled trials. However, these reviews were limited by reliance on a small number of trials for each indicated condition and trials with small sample sizes. Overall, the evidence identified by HTW suggests that ESWT is a safe treatment option. However, its effectiveness varied according to the specific condition treated and what outcomes were measured (these included pain relief, functional outcomes, quality of life improvement, and patient satisfaction). For most outcomes and conditions, the available evidence suggests that there is no statistically significant difference between ESWT and no treatment/placebo/sham treatment. Three network meta-analyses (NMA) were identified investigating ESWT in patellar tendinopathy, plantar fasciitis and mid-portion Achilles tendinopathy. The NMAs generally suggest that ESWT is not superior to other interventions available. The outcomes where ESWT was ranked highest were medium-term pain relief and medium- and long-term function outcomes in patellar fasciitis.

Estimated costs of using ESWT were included in this report, but no relevant health economic studies were found. It is therefore difficult to fully assess the health economic implications of using ESWT because of a lack of evidence on outcomes relevant to health economic analysis. In particular, there is a lack of evidence available that would allow for quality-adjusted life-years to be estimated.

What was the outcome of HTW's Appraisal?

Health Technology Wales is a national body working to improve quality of care in Wales. We collaborate with partners across health, social care, and industry to issue independent Guidance that informs commissioning within NHS Wales. We are supported by an Assessment Group, who ensure our work adheres to high standards of methodological and scientific rigour, and an Appraisal Panel, who consider evidence within the Welsh context and produce HTW Guidance. More details on our appraisal process, the assessment group, and the appraisal panel can be found on the HTW website.

The HTW Assessment Group concluded that the evidence for ESWT for the treatment of musculoskeletal conditions is currently too heterogeneous to inform the production of Guidance at this time.

Evidence Appraisal Report 022 follows below and provides full details for this topic.

Technoleg Iechyd Cymru
Health Technology Wales

Evidence Appraisal Report

Extracorporeal shockwave therapy for the treatment of musculoskeletal conditions

1. Purpose of the evidence appraisal report

This report aims to identify and summarise evidence that addresses the following question: what is the clinical and cost effectiveness of extracorporeal shockwave therapy (ESWT) for the treatment of musculoskeletal conditions compared to other interventions, no treatment or placebo?

Evidence Appraisal Reports are based on rapid systematic literature searches, with the aim of identifying clinical and economic evidence on health technologies. Researchers critically evaluate this evidence. The Evidence Appraisal Report is reviewed by experts and by Health Technology Wales (HTW) multidisciplinary advisory groups before publication.

2. Health problem

Musculoskeletal conditions affect the muscle or bone. They are typically characterised by pain (often persistent) and limitations in mobility, dexterity and functional ability. This can reduce people's ability to work and participate in social roles, with associated impacts on mental wellbeing. There are many different types of musculoskeletal conditions (WHO 2019).

Tendinopathy (also called tendinosis) describes a range of conditions that affect tendons, the bands of fibrous connective tissue that connect muscle to bone. The condition is often, but incorrectly, referred to as "tendinitis," which suggests it is an inflammatory condition, but markers of inflammation are rarely present in tendinopathy. Tendinopathy is usually thought be caused by chronic repetitive overload stresses. The most commonly reported tendinopathies are Achilles tendinopathies, lateral epicondylitis (tennis elbow), and rotator cuff (tendons of the shoulder) pathology (ECRI 2013).

Plantar fasciitis occurs when the ligament at the bottom of the foot, between the heel and the toes, deteriorates and causes foot pain (NICE 2009a).

Greater trochanteric pain syndrome is a disorder that affects the side of the hip. Greater trochanteric pain may be associated with inflammation of the trochanteric bursa (also known as trochanteric bursitis). The trochanteric bursa is a small fluid-filled sac that separates the greater trochanter of the femur and the overlying fascia lata to allow smooth movement. Greater trochanteric pain may also be associated with direct injury, tendon damage, infection, differences in leg length or hip-replacement surgery.

Osteoarthritis refers to a clinical syndrome of joint pain accompanied by varying degrees of functional limitation. Osteoarthritis is characterised pathologically by localised loss of cartilage,

remodelling of adjacent bone and associated inflammation. It is the most common form of arthritis, and one of the leading causes of pain and disability worldwide. The most commonly affected peripheral joints are the knees, hips and small hand joints (NICE 2014).

Myofascial pain syndrome is a chronic condition that causes pain in the musculoskeletal system. The pain is confined to a particular area and typically associated with trigger points in muscles. These trigger points radiate to the affected area when pressure is applied to them, and sometimes spontaneously with no pressure (American Society of Anesthesiologists 2021).

Carpal tunnel syndrome occurs when there is pressure of a nerve on the wrist, causing tingling, numbness and pain in the hand and fingers. Carpal tunnel syndrome sometimes clears up by itself in a few months (NHS 2018a).

Morton's neuroma occurs when a nerve in the foot is irritated or damaged. It usually causes pain between the third and fourth toes. The symptoms may be worse when weight-bearing, and it often gets worse over time (NHS 2018b).

The pain associated with musculoskeletal conditions includes treatment with ice and rest, nonsteroidal anti-inflammatory drugs (NSAIDs), physical therapy, corticosteroid injections, or, in more severe cases, surgery. Other non-drug treatment options include ESWT, laser therapy, radiation therapy, and transcutaneous electric nerve stimulation (TENS) (CADTH 2016).

3. Health technology

ESWT is a non-invasive treatment in which a device is used to pass acoustic shockwaves through the skin to the affected area. Ultrasound guidance may be, but is not always, used to assist with positioning of the device. The shockwaves can be either focused (fESWT) or unfocused (often referred to as radial shockwave therapy (rESWT). The focused shockwaves are generated using electrohydraulic, electromagnetic or piezoelectric energy. The unfocused shockwaves are generated pneumatically. ESWT may be applied in a series of treatments or a single session. Local anaesthesia may be administered before treatment because high-energy ESWT can be painful, although there is evidence that local anaesthesia may influence the outcome of ESWT (NICE 2016).

The mechanism by which ESWT might have an effect on tendinopathy is unknown (NICE 2016). Speculated mechanisms include actual destruction of nerve endings, induction of anaesthesia by altering neuronal membranes, increased blood flow to the area; and damage to the area that triggers neovascularisation, and the release of growth factors. ESWT may also destroy calcifications in tendons, similar to the way shockwaves break up kidney stones (ECRI 2013).

4. Evidence search methods

HTW searched for evidence comparing the clinical and cost effectiveness of ESWT for the treatment of musculoskeletal conditions compared to other interventions, no treatment or placebo. The criteria used to select evidence for the appraisal are outlined in Appendix 1. These were developed following input from the HTW Assessment Group and UK experts.

A systematic literature search for evidence was undertaken and last updated on 19 October 2020. Databases searched included Medline, Embase, the Cochrane Library and the International Network of Agencies for Health Technology Assessment (INAHTA) Health Technology Assessment (HTA) database; as well as ongoing clinical trials databases and selected websites. A separate

search for patient issues was carried out 1 to 3 September 2020. This search included Medline, PsycINFO and a number of selected websites. The search strategies are available upon request.

Appendix 2 summarises the selection of articles for inclusion in the review.

Where relevant, we will include comparisons of different types of ESWT to each other as well as to standard care.

5. Guidance (UK and international)

5.1 UK Guidance

National Institute for Health and Care Excellence (NICE) Interventional Procedures Guidance (IPG), published between 2009 and 2016, considers ESWT to be safe but states that evidence on its efficacy for refractory tennis elbow (IPG313), refractory plantar fasciitis (IPG311), refractory greater trochanteric pain syndrome (IPG376) and Achilles tendinopathy (IPG571) is inconsistent and/or limited. NICE recommends that this procedure should only be used with special arrangements for clinical governance, consent and audit or research, and encourages further research into ESWT (NICE 2009a, NICE 2009b, NICE 2011, NICE 2016).

6. Clinical effectiveness

6.1 Secondary evidence

The following systematic reviews, published between 1999 and 2020, were identified that studied the clinical effectiveness of ESWT compared to other interventions:

- Ninety systematic reviews for the treatment of tendinopathies/tendinitis.
- Forty systematic reviews for the treatment of plantar fasciitis.
- Four systematic reviews for the treatment of greater trochanteric pain syndrome and carpal tunnel syndrome.
- Three systematic reviews for the treatment of osteoarthritis and myofascial pain syndrome.
- One systematic review for the treatment of Morton's neuroma.

Due to the number of studies of ESWT identified in the literature search, we asked the topic proposers which they believed to be most relevant for inclusion. For each included topic, where there were multiple systematic reviews that covered the same population, we selected the most recent reviews for inclusion based on their search dates, methodological quality (assessed using the AMSTAR-2 tool (Shea BJ et al. 2017)) and how closely they aligned with our inclusion criteria.

We included one systematic review which focused on rotator cuff disease with and without calcific deposits (Surace et al. 2020); one systematic review and meta-analysis (Mani-Babu et al. 2015) focused on Achilles tendinopathy, and one network meta-analysis (NMA) focused specifically on midportion Achilles tendinopathy (Rhim et al. 2020); one systematic review and NMA focused on patellar tendinopathy (Chen et al. 2019); one systematic review focused on proximal hamstring tendinopathy (Korakakis et al. 2018); two systematic reviews and meta-analyses (Buchbinder et al. 2005, Yao et al. 2020) focused on lateral epicondylitis; two systematic review and meta-analyses (David et al. 2017, Li et al. 2019) and one systematic review and NMA (Babatunde et al. 2019) focused on plantar fasciitis/plantar heel pain; one systematic review focused on greater trochanteric pain syndrome (Koulischer et al. 2017); one systematic review and meta-analysis focused on osteoarthritis (Chen et al. 2020); one systematic review and meta-

analysis focused on myofascial pain syndrome (Zhang Q et al. 2020); one systematic review and meta-analysis focused on carpal tunnel syndrome (Xie et al. 2020); and one systematic review focused on Morton's neuroma (Thomson et al. 2020).

The characteristics of the systematic reviews and the outcomes reported by each review are summarised in Appendix 4.

We searched for randomised controlled trials (RCTs) when we did not identify any systematic reviews for clinical outcomes. The outcomes where we used primary evidence only include patient satisfaction in patellar tendinopathy (Smith & Sellon 2014) and plantar fasciitis (Eslamian et al. 2016) (Rompe et al. 2010); and quality of life in lateral epicondylitis (Celik & Anaforoglu Kulunkoglu 2019, Aydin & Atic 2018) (Chung & Wiley 2004), plantar fasciitis (Ordahan et al. 2017), greater trochanteric pain syndrome (Ramon et al. 2020) and myofascial pain syndrome (Gezginaslan & Gumus Atalay 2020) (Gur et al. 2013).

6.2 Clinical effectiveness outcomes

The following section lists the evidence identified, comparing ESWT to other interventions, no treatment or placebo, for each relevant outcome:

- Table 1: rotator cuff disease (with and without calcific deposits)
- Table 2: Achilles tendinopathy
- Table 3: patellar tendinopathy
- Table 4: proximal hamstring tendinopathy
- Table 5: lateral epicondylitis
- Table 6: plantar fasciitis/plantar heel pain
- Table 7: greater trochanteric pain syndrome
- Table 8: osteoarthritis
- Table 9: myofascial pain syndrome
- Table 10: carpal tunnel syndrome
- Table 11: Morton's neuroma.

Due to the large number of comparators in the evidence, we specifically looked at incidences where ESWT was compared to no treatment/placebo/sham. Table 12 shows the number of outcomes across reviews which were significant versus non-significant.

6.3 Functional outcomes

6.3.1 Definitions of functional outcomes

Numerous measures were used to assess functional outcomes in the included studies. Figure 1 provides a list of the functional measures used and a brief description of each measure. Some of these measures assess pain as well as function.

Figure 1. Description of functional measures

- American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score (AOFAS): higher score means more favourable outcomes;
- Boston carpal tunnel questionnaire functional status score: higher score suggests more disability;
- Constant 0 to 100 scale: higher score means better function;
- Foot Function Index: 0 to 10 scale, with higher score meaning worse pain and function;
- Harris Hip Score – scores range from 0 to 100, with higher scores representing less dysfunction and better outcomes;

- Neck Disability Index – score out of 100, higher score means the greater a patient's perceived disability due to neck pain;
- Nirschl phase rating: Phase 0 to 7, with higher phase indicating worse pain and function;
- Shoulder pain and disability index (SPADI): 0 to 100 scale, higher score means worse function).
- Victorian Institute of Sports Assessment – Achilles questionnaire (VISA-A): higher score indicates more favourable outcomes.

6.3.2 Tendinopathies/tendinitis

Rotator cuff disease (Table 1)

Surace et al. (2020) included 14 RCTs and quasi-RCTs measuring the effect of ESWT on the ability to use the shoulder in rotator cuff disease, with or without calcification. Nine RCTs, with 608 participants, investigated ESWT versus placebo. It was reported that ESWT results in little or no clinically important improvement in function at three-month follow-up (standardised mean difference [SMD]: 0.62, 95% confidence interval [CI]: 0.13 to 1.11).

One study in the review assessed rESWT versus supervised exercises. There were no between-group differences in mean function (measured by SPADI) at any time point: six-week follow-up (mean difference [MD]: 7.70, 95% CI: −1.57 to 16.97; three-month follow-up MD: 9.10, 95% CI: −1.13 to 19.33; six-month follow-up MD: 4.70, 95% CI: −5.39 to 14.79; and 12-month follow-up MD: 3.90, 95% CI: −6.08 to 13.88).

The review also included one study (25 participants) assessing rESWT versus ultrasound-guided needling with glucocorticoids (measured using the Constant 0 to 100-point scale). At three-months, there was no statistically significant change in mean function (MD: −11.70, 95% CI: −24.79 to 1.39).

Another study using the Constant 0 to 100-point scale (40 participants) compared ESWT with no treatment and found that there was no between-group difference in function at three months (MD: 3.80, 95% CI −6.33 to 13.93).

ESWT versus TENS was compared in one RCT of 62 participants. At six-weeks follow-up (Constant 0-100 scale), the MD in function favoured ESWT compared to TENS (MD: 14.53, 95% CI: 8.70 to 20.36). At three months, improvement in function was greater with ESWT compared to TENS (MD: 16.45, 95% CI 9.86 to 23.04); the study authors judged the difference in function between each treatment to be clinically important.

There was evidence from one RCT (34 participants) comparing ESWT to ultrasound-guided hyaluronic acid injection. At three months follow-up, using the Constant 0 to 100-point scale, there was no significant difference in function between ESWT and ultrasound-guided hyaluronic acid injection (SMD: −0.26, 95% CI: −0.94 to 0.41).

Achilles tendinopathy (Table 2)

Mani-Babu et al. (2015) included five RCTs in their pooled analysis of functional outcomes. Functional measures included the Functional Index of Lower Limb Activity, AOFAS and VISA-A. Moderate-quality evidence in the review indicates that ESWT is more effective than eccentric loading for insertional Achilles tendinopathy and equal to eccentric loading for mid-portion Achilles tendinopathy in the short term. Additionally, there is moderate quality evidence that combining ESWT and eccentric loading in mid-portion Achilles tendinopathy may produce superior outcomes to eccentric loading alone, reporting a difference of 14 points in the VISA-A score.

Rhim et al. (2020) conducted an NMA of RCTs specifically looking at ESWT for mid-portion Achilles tendinopathy at between three- and 12-months follow up. They used the VISA-A scale to

measure both function and pain. NMA ranked ESWT plus eccentric exercise as having the highest efficacy ranking according to SUCRA (surface under cumulative ranking curve). ESWT alone was ranked seventh out of eight.

Patellar tendinopathy (Table 3)

An NMA by Chen et al. (2019) included 11 RCTs with 430 affected patellar tendons and examined nine types of non-surgical interventions, including both fESWT and rESWT. Using direct and indirect comparisons, the network meta-analysis reports that fESWT was significantly better than corticosteroid injections (CSI) in change in VISA score (weighted mean difference: 21.72, 95% CI: 7.12 to 36.32). fESWT was significantly worse in change in VISA score than LR-PRP (WMD: -14.50, 95% CI: -24.15 to -4.85) as was rESWT (WMD: -19.90, 95% CI: -35.75 to -4.05). Dry needling was also significantly better than rESWT (WMD: 24.20, 95% CI: 1.03 to 47.37). There were no other significant differences across group when fESWT and rESWT were compared to each other, to control arms, or interventions other than those outlined above. The study does not report full details on SUCRA or mean rank but reports that for function, dry needling was likely to be highest ranked (SUCRA = 90.5) and LR-PRP was likely to be second highest ranked (SUCRA = 87.5%). The ESWT ranking for function was not reported in this study, but HTW researchers inferred that fESWT was ranked 7/10 and rESWT was ranked 9/10. It is unclear which outcomes were used in the NMA when a study had multiple follow-ups within the specified time period.

Proximal hamstring tendinopathy (Table 4)

One RCT of 40 participants, comparing rESWT to traditional conservative treatment (consisting of rest, NSAIDs, physiotherapy and a 3-week exercise programme), was included in a systematic review by Korakakis et al. (2018). Pain and function outcomes were measured on the Nirschl phase rating scale. Function did not improve significantly in patients in the rESWT group after three months, six months and 12 months (MD: -4.40, 95% CI: -5.57 to 3.23) (Korakakis et al. 2018).

Lateral epicondylitis (Table 5)

Pooled analysis of eight RCTs (458 participants) by (Yao et al. 2020) found that grip strength improved significantly in people in the ESWT group compared to those in the wrist-extensor splint, placebo, laser therapy, autologous blood injection and corticosteroid injection groups (WMD: 3:36, 95% CI: 2:39 to 4:33, p < 0:00001).

6.3.3 Plantar fasciitis/plantar heel pain (Table 6)

Thirty-one RCTs involving 2,450 participants across 10 different combinations of interventions (ESWT, ESWT plus exercise, ESWT plus orthoses, exercise, NSAID injection plus exercise, oral NSAIDs, orthoses, corticosteroid injection, corticosteroid injection plus exercise and placebo/sham) provided sufficient data for inclusion in the NMA by Babatunde et al. (2019). Placebo/sham-ESWT comparisons were most common for short (n = 4 studies) and long term follow-up (n = 2 studies), while ESWT/corticosteroid injection and corticosteroid injection with exercise/exercise alone comparisons (n = 3 studies) were joint most common for medium term follow-up. The number of participants ranged from 20 (long-term follow-up for exercise) to 226 (short-term follow-up for ESWT). This NMA did not detect evidence of inconsistency between direct and indirect treatment comparisons in the networks, but sparse data led to wide credible intervals. Available evidence does not suggest that any of the commonly used treatments for the management of PHP are better than any other, although corticosteroid injections, alone or in combination with exercise, and ESWT were ranked most likely to be effective for the management of short-term, medium-term and long-term function. ESWT was ranked third out of six for short-term function, second out of six for medium-term function, and second out of five for long-term function.

Li et al. (2019) reported the American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score in a systematic review, containing 2 RCTs of 76 participants, comparing ESWT to ultrasound

therapy. They did not find a significant difference between groups (MD = 3.19, 95% CI: - 1.72 to 8.10, P = 0.20).

6.3.4 Greater trochanteric pain syndrome (Table 7)

Koulischer et al. (2017) performed a systematic review, including 1 case-control study of 66 participants, and analysed pain and functional outcomes using the Harris hip score at 12-months follow-up. ESWT had superior Harris hip score improvement compared to multimodal therapy (a combination of relative rest, anti-inflammatory medications, ice, gluteal and tensa fascia lata muscle stretching and strengthening, physiotherapy modalities, iontophoresis, a CSI injection, and a local anaesthetic injection): low-intensity ESWT showed a 30.3 mean increase in Harris hip score and allowed 64% of patients to return to normal physical activity.

6.3.5 Osteoarthritis (Table 8)

Chen et al. (2020) analysed outcomes in 32 RCTs comparing ESWT to other interventions in osteoarthritis. A pooled analysis of nine RCTs including 538 patients showed that ESWT had significant improvement in function compared with placebo (SMD: -1:84, 95% CI: -2.47 to -1.20, P < 0.00001). The meta-analysis also showed that ESWT resulted in significant improvement in function compared with hyaluronic acid intra-articular injection, CSI, medication, ultrasound, and kinesiotherapy. There was no significant difference between ESWT and acupotomy surgery (P = 0.24) or platelet-rich plasma (P = 0.89).

6.3.6 Myofascial pain syndrome (Table 9)

In a systematic review and meta-analysis, Zhang Q et al. (2020) included 5 RCTs (196 participants) in a sensitivity analysis and found that there was no significant effect in function on the neck disability index when ESWT was compared to conventional treatments (dry needling, trigger point injection, laser, therapy) (MD: -0.28, 95% CI:-1.01 to 0.44).

6.3.7 Carpal tunnel syndrome (Table 10)

Xie et al. (2020) performed a meta-analysis using RCTs to evaluate whether ESWT, compared to interventions such as CSI, supplements, ultrasound and supportive wrist splints, could improve functional outcomes on the Boston carpal tunnel questionnaire functional status score. They found that functional outcomes were significantly improved in patients treated with ESWT who were followed up between three- and 12 months (mean difference: -1.25 [95% CI: -2.08 to -0.43]). There was no significant difference between groups in patients followed up at a time point of less than three months.

6.3.8 Morton's neuroma (Table 11)

Thomson et al. (2020) conducted a systematic review which included an RCT of 14 participants. There was an increase in American Orthopaedic Foot and Ankle Society Ankle-Hindfoot score at four weeks with ESWT compared to sham, but after four weeks the result was not statistically significant.

6.4 Pain outcomes

6.4.1 Definitions of pain outcomes

Numerous different measures were used to assess pain outcomes in the included studies. Figure 2 provides a list of the measures of pain used and a brief description of each measure.

Figure 2. Description of measures of pain

- Likert: 0 to 9 scale, with 9 indicating severe pain;
- Numerical Rating Scale (NRS): 0 to 10 scale (higher score indicating worse pain);

- Visual Analog Scale (VAS): 0 to 10 scale, with 10 indicating worst pain.

6.4.2 Tendinopathies/tendinitis

Rotator cuff disease (Table 1)

Surace et al. (2020) included 13 RCTs and quasi-RCTs measuring the effect of ESWT on pain in rotator cuff disease, with or without calcification. Nine RCTs (608 participants) investigated ESWT versus placebo on two scales: a VAS score. It was reported that ESWT results in a statistically significant improvement in pain at three-months follow-up (SMD: -0.49, 95% CI: -0.88 to -0.11).

One study in the review investigated rESWT compared to supervised exercises. There were no between-group differences in mean pain at any time point: six weeks MD: 0.30, 95% CI −0.53 to 1.13; three months MD: 0.40, 95% CI: -0.36 to 1.16; six months MD: 0.20, 95% CI: −0.56 to 0.96; one year MD: 0.50, 95% CI −0.20 to 1.2.

At six-weeks follow-up, the MD in pain in one study in the review (62 participants) favoured ESWT compared to TENs (MD: −1.90, 95% CI −2.98 to −0.82). The study authors judged the difference in pain between ESWT and TENs at three-months to be clinically important (MD: −2.34, 95% CI: −3.53 to −1.15).

One study in the review assessed rESWT versus ultrasound-guided needling with glucocorticoids (25 participants). At three-months follow-up, there was a statistically significant and clinically important increase in mean pain in participants who received rESWT (MD: 1.60, 95% CI: 0.13 to 3.07). At 12 months and greater, there was no statistically significant or clinically important change in mean pain between the groups (MD: 0.20, 95% CI: −2.05 to 2.45).

One study in the review (n = 201) found no evidence of a difference in mean pain when comparing ESWT to ultrasound-guided percutaneous lavage at six-weeks follow-up (MD: – 0.10, 95% CI −0.26 to 0.06). There was a statistically and clinically significant increase in mean pain when comparing ESWT to ultrasound-guided percutaneous lavage at three months (MD: 1.90, 95% CI: 1.54 to 2.26). There was also a statistically significant increase in mean pain, favouring ultrasound-guided percutaneous lavage, at six months (MD: 1.80, 95% CI: 1.36 to 2.24) and 12 months (MD: 1.90, 95% CI: 1.34 to 2.46).

No trial in the review measured participant-reported pain-relief of 30% or greater. However, one study (74 participants) reported participant-reported pain relief of 50% or greater at three-months follow-up. It was found that 4% more had pain relief with ESWT compared to placebo, but this difference was not statistically significant (RR: 1.10, 95% CI: 0.62 to 1.94).

Achilles tendinopathy (Table 2)

Mani-Babu et al. (2015) used the VAS to measure pain in a pooled analysis of four RCTs and two case control studies. ESWT was found to reduce pain, in mid-portion tendinopathy and insertional tendinopathy, significantly more than conservative therapy at more than 12 months (MSD: -3.42, 95% CI: -4.18 to -2.66; SMD: -2.39, 95% CI: -3.02 to -1.76, respectively). Moderate quality evidence in the review indicates that ESWT is more effective than eccentric loading for insertional Achilles tendinopathy and equal to eccentric loading for mid-portion Achilles tendinopathy in the short term. Additionally, there is moderate-quality evidence that combining ESWT and eccentric loading in mid-portion Achilles tendinopathy may produce superior outcomes to eccentric loading alone, reporting a difference of 1.5 centimetres in the VAS score.

Rhim et al. (2020) conducted an NMA of RCTs specifically looking at ESWT for midportion Achilles tendinopathy at between three- and 12-months follow up. They used the VISA-A scale to measure both function and pain. NMA ranked ESWT + eccentric loading as having the highest efficacy ranking according to SUCRA. ESWT alone was ranked seventh out of eight.

Patellar tendinopathy (Table 3)

An NMA by Chen et al. (2019) included 11 RCTs with 430 affected patellar tendons and examined nine types of non-surgical intervention including both fESWT and rESWT. Using direct and indirect comparisons, the NMA reports that participants treated with LR-PRP showed significantly better improvements in pain compared to fESWT (weighted mean difference: 2.00, 95% CI: 0.84 to 3.16). There were no other significant differences across groups when fESWT and rESWT were compared to each other, to control arms, or other interventions. The study does not report full details on SUCRA or mean rank but reports that LR-PRP was most likely to be ranked best in change in pain score (SUCRA = 94.9%). It is unclear where ESWT ranked for pain.

Proximal hamstring tendinopathy (Table 4)

One RCT of 40 participants, comparing rESWT to traditional conservative treatment (consisting of rest, NSAIDs, physiotherapy and exercise programme for last three weeks), was included in a systematic review by Korakakis et al. (2018). Pain was measured at three-, six- and 12-months follow-up using the NRS measure and patient-rated pain reduction measure. Radial ESWT resulted in a significant reduction in pain at each of these time-points compared to traditional conservative treatment (MD: -5.40, 95% CI: -6.47 to -4.33).

Lateral epicondylitis (Table 5)

Pooled analysis of 14 RCTs (950 participants) by Yao et al. (2020) found that change in pain score using VAS improved significantly in people in the ESWT group compared to those in the wrist-extensor splint, placebo, laser therapy, autologous blood injection, CSI, physiotherapy and kinesiology tape (WMD: -0.68, 95% CI: -1.06 to – 0.30, p = 0.0004).

6.4.3 Plantar fasciitis/plantar heel pain (Table 6)

Thirty-one RCTs involving 2,450 participants across 10 different combinations of interventions (ESWT, ESWT+exercise, ESWT+orthoses, exercise, NSAID injection+exercise, oral NSAIDs, orthoses, corticosteroid injection, corticosteroid injection+exercise and placebo/sham) provided sufficient data for inclusion in the NMA by Babatunde et al. (2019). Placebo/sham-ESWT comparisons were most prevalent across all pain outcome networks (n = 6 studies with short or medium term follow-up, n = 4 with long term follow-up), while the number of participants ranged from 31 (NSAID injection + exercise with long term follow-up) to 574 (ESWT with medium term follow-up). This NMA did not detect evidence of inconsistency between direct and indirect treatment comparisons in the networks, but sparse data led to frequently wide credible intervals. Available evidence does not suggest that any of the commonly used treatments for the management of PHP are better than any other, although corticosteroid injections, alone or in combination with exercise, and ESWT were ranked most likely to be effective for the management of short-term, medium-term and long-term pain management. ESWT was the treatment with the fourth highest ranking out of eight for short-term pain, second highest ranking out of nine for medium-term pain, sixth highest ranking out of eight for long-term pain

In a pooled analysis of four RCTs (144 participants), Li et al. (2019) used the VAS measure at two- , three-, four- and 24-weeks follow-up to compare ESWT to ultrasound therapy. The results favoured ESWT (MD: -13.41, 95% CI: -14.07 to -12.75, p < 0.00001).

6.4.4 Greater trochanteric pain syndrome (Table 7)

Koulischer et al. (2017) performed a systematic review analysing pain using the VAS measure and the Likert scale at three-, four-, 12- and 15-month follow-ups. The review included one case-control study of 66 participants comparing ESWT to multimodal therapy (a combination of relative rest, anti-inflammatory medications, ice, gluteal and tensa fascia lata muscle stretching and strengthening, physiotherapy modalities, iontophoresis, a CSI injection, and a local anaesthetic injection). The review also included a quasi-RCT of 229 participants, comparing rESWT to CSI or

home training. Radial ESWT significantly reduced pain compared to multimodal therapy at all time-points (at 12 months, the VAS recuced from 3.7 to 2.7 in the ESWT group, and from 7 to 6.3 in the multimodal therapy group). At 15-months follow-up, rESWT or home training produced better results than CSI.

6.4.5 Osteoarthritis (Table 8)

Chen et al. (2020) analysed outcomes in 32 RCTs comparing ESWT to other interventions in osteoarthritis. A pooled analysis of 11 RCTs including 666 patients showed that ESWT had significant improvement in pain reduction compared with placebo (SMD: -1:44, 95% CI: -1.77 to -1.10, P < 0.00001). The meta-analysis also showed that ESWT resulted in significant improvement in pain reduction compared with CSI, hyaluronic acid, medication, platelet-rich plasma and ultrasound (P < 0:05).

6.4.6 Myofascial pain syndrome (Table 9)

Pooled analysis of 10 RCTs by Zhang Q et al. (2020) found that, compared with sham ESWT (MD: -2.02; 95% CI: -2.86 to -1.17, P<.00001) and ultrasound (SMD: -1.20, 95% CI: -1.74 to -0.66), ESWT exhibited significant differences in pain reduction. There was no significant effect when compared with conventional treatments (dry needling, trigger point injection, laser therapy).

6.4.7 Carpal tunnel syndrome (Table 10)

Xie et al. (2020) performed a meta-analysis using RCTs to evaluate whether ESWT, compared to interventions such as CSI, supplements, ultrasound and supportive wrist splints, could improve pain outcomes on the VAS. They found that pain outcomes were significantly improved in patients treated with ESWT who were followed up between three- and 12 months (mean difference: -0.60, 95% CI: -1.16 to -0.05). There was no significant difference between groups in patients followed up at a time point of less than three months.

6.4.8 Morton's neuroma (Table 11)

Thomson et al. (2020) conducted a systematic review, which included 27 participants in 2 RCTs investigating ESWT, and found that ESWT showed significant improvements to VAS scores compared to sham at a mean follow-up of two months (p < 0.001).

6.5 Recovery or changes in symptoms

6.5.1 Carpal tunnel syndrome

Xie et al. (2020) performed a meta-analysis using RCTs to evaluate whether ESWT could improve symptom severity using the Boston carpal tunnel questionnaire severity score; compared to interventions such as CSI, supplements, ultrasound and supportive wrist splints. They found that symptom severity significantly reduced, compared to other interventions, in patients treated with ESWT who were followed up both at time points less than three-months (mean difference: -2.44, 95% CI: -4.19 to -0.70) and between three- and 12 months (mean difference: -2.26, 95% CI: -3.24 to -1.27).

6.6 Adverse events or complications

6.6.1 Tendinopathies/tendinitis

Rotator cuff disease (Table 1)

Surace et al. (2020) investigated the number of withdrawals and adverse events in patients treated with ESWT compared to placebo. There were 290/581 withdrawals in the ESWT group

compared with 291/581 withdrawals in the placebo group (RR: 0.75, 95% CI: 0.43 to 1.31; 7 trials, 581 participants). There were 41/156 adverse events with ESWT compared with 10/139 adverse events in the placebo group (RR: 3.61, 95% CI: 2.00 to 6.52; 5 trials, 295 participants).

The review also found no significant difference between withdrawal rates in rESWT versus exercise (RR: 3.00, 95% CI: 0.32 to 27.91) or ESWT versus TENS (RR: 0.29, 95% CI: 0.01 to 6.95), although there were too few events to be conclusive.

The review reported adverse events in the rESWT versus ultrasound-guided needling with glucocorticoids group (RR: 3.93, 95% CI: 0.53 to 28.93); ESWT versus TENS group (RR: 5.27, 95% CI: 0.67 to 41.00); and ESWT versus exercise group (RR: 1.60, 95% CI: 0.40 to 6.36), although they were not significantly different.

There was a statistically significant increase in the risk of experiencing an adverse event when comparing ESWT to ultrasound-guided percutaneous lavage at the end of the trial (RR 0.08, 95% CI: 0.00 to 1.36).

Achilles tendinopathy (Table 2)

An NMA by Rhim et al. (2020) found that there were no significant differences in tolerability between those patients treated with ESWT for midportion tendinopathy and those only treated with eccentric exercise (SMD: 0.31, 95% CI: 0.05 to 1.88).

Lateral epicondylitis (Table 5)

In a systematic review by Buchbinder et al. (2005), minimal adverse effects of ESWT were reported. Most commonly these were transient pain, reddening of the skin and nausea and in most cases did not require treatment discontinuation or dosage adjustment.

6.6.2 Plantar fasciitis/plantar heel pain (Table 6)

David et al. (2017) reported that there was no significant difference found between the number of serious and non-serious adverse events in a systematic review of patients treated with CSI versus ESWT for plantar heel pain (serious adverse events; RR: 0.11, 95% CI: 0.01 to 1.93; non serious adverse events: RR: 1.37, 95% CI: 0.58 to 3.20).

6.6.3 Osteoarthritis (Table 8)

Chen et al. (2020) did not report any serious adverse reactions in any of the trials included in the systematic review. Temporary pain, minor bruising, or transient soft tissue swelling was observed in nine out of the 32 included studies, and no adverse reactions were reported in six out of 32 studies.

We did not identify any evidence for adverse events in ESWT treatment for patellar tendinopathy, proximal hamstring tendinopathy, carpal tunnel syndrome, myofascial pain syndrome or Morton's neuroma.

6.7 Requirement for further/additional treatment after the intervention

We did not identify any evidence stating the requirement for further treatment after ESWT.

6.8 Patient satisfaction

6.8.1 Definitions of patient satisfaction outcomes

Numerous different measures of patient satisfaction were used to assess outcomes in the included studies. Figure 3 provides a list of the measures of patient satisfaction used and a brief description of each measure.

Figure 3. Description of measures of patient satisfaction

- Blazina scale: excellent to poor (lower score indicated better outcome);
- Johnson's satisfaction scale
- Likert: higher score indicates worse outcome;
- Roles and Maudsley score: lower scores indicate more favourable outcomes.

6.8.2 Tendinopathies/tendinitis

Rotator cuff disease (Table 1)

Surace et al. (2020) reported patient satisfaction in participants treated with ESWT versus other interventions. At the end of the trial, there was no between-group difference in the number of participants who reported that the treatment was successful in the ESWT group compared to those who had no treatment (RR: 6.00, 95% CI: 0.79 to 45.42). In another trial, there was no difference in the proportion of participants with no complaints for those who received rRSWT compared to those who underwent ultrasound-guided needling with glucocorticoids (RR: 1.11, 95% CI: 0.39 to 3.19). There was no statistically significant difference in treatment success (proportion of participants who were pain-free) when comparing ESWT to ultrasound-guided percutaneous lavage at the end of the trial (RR: 0.91, 95% CI: 0.81 to 1.03).

Achilles tendinopathy (Table 2)

Retrospective studies included in a meta-analysis by Mani-Babu et al. (2015) showed ESWT to be significantly better at improving outcomes, as assessed by the Roles and Maudsley score, than other non-operative therapies including rest, footwear modification, anti-inflammatory medication, and gastrocnemius-soleus stretching and strengthening (Table 2).

Patellar tendinopathy (Table 3)

We did not identify any systematic reviews investigating patient satisfaction. One RCT of 46 participants with 12 months of follow up compared platelet-rich plasma (PRP) injections with fESWT among athletes with chronic patellar tendinopathy. Patients assessed their response to treatment on the Blazina scale (excellent to poor). At 12 months, a greater proportion of patients in the PRP injection group rated their response to treatment as good or excellent (PRP: 91.3% versus ESWT: 60.8%; P = 0.035), although at earlier follow-ups the groups did not differ (Smith & Sellon 2014).

Proximal hamstring tendinopathy (Table 4)

One RCT included in a systematic review (40 patients) suggests that rESWT significantly improved the number of patients reporting satisfactory recovery compared to conservative treatment at six- and 12-month follow-ups (odds ratio: 150.33, 95% CI: 7.54 to 2,997.83) (Korakakis et al. 2018).

Lateral epicondylitis (Table 5)

In a systematic review by Buchbinder et al. (2005), three trials used the Roles and Maudsley scale, which combines assessment of pain and satisfaction with treatment into a four-point categorical scale.

There was no significant difference in patient satisfaction between ESWT and placebo at six weeks or 12 weeks, but ESWT resulted in significantly higher patient satisfaction at three weeks (RR: 0.21, 95% CI: 0.09 to 0.50) and 24 weeks (RR: 0.14, 95% CI: 0.06 to 0.33). When all the follow-up points that combined data from the two trials was reported, statistical significance is lost.

6.8.3 Plantar fasciitis (Table 6)

We did not identify any systematic reviews, but did identify a number of RCTs studying patient satisfaction following ESWT. In one RCT of 40 patients treated with either ESWT or CSI for plantar

fasciitis, satisfaction was measured before treatment, and at four weeks and eight weeks after treatment. Patient satisfaction of the treatment was evaluated using a 4-point Likert scale. Patient satisfaction with both treatments was also evaluated. Patients believed the treatment was good or excellent in 11 ESWT cases (55%) and six corticosteroid injection cases (30%) and poor or adequate in nine ESWT cases (45%) and 14 corticosteroid injection cases (70%). However, the difference was not significant (P = 0.11) (Eslamian et al. 2016).

In another RCT, 102 patients with acute plantar fasciopathy were randomly assigned to perform an eight-week plantar fascia-specific stretching program or to receive repetitive low-energy radial shock-wave therapy. Thirty-five patients (65%) in stretching group versus fourteen patients (29%) in ESWT group were satisfied with the treatment ($p < 0.001$). These findings persisted at four months but there were no significant between-group differences measured at fifteen months after baseline (Rompe et al. 2010).

Patient satisfaction was compared between ESWT versus ultrasound-guided hormone injection in an RCT of 77 patients. At six months after treatment, the patient satisfaction scores were significantly higher in the ESWT than in ultrasound guided hormone injection group (8.13±2.67 vs 6.63±3.75, P=0.048) (Huo et al. 2018).

6.8.4 Morton's neuroma (Table 11)

Thomson et al. (2020) conducted a systematic review, which included 14 participants in 1 RCT investigating ESWT, and found that ESWT did not show a significant improvement on the Johnson's satisfaction scale compared to sham.

6.8.5 Other conditions

We did not identify any evidence for patient satisfaction for greater trochanteric pain, osteoarthritis, carpal tunnel syndrome or myofascial pain syndrome.

6.9 Quality of Life

Figure 4. Description of measures of quality of life

- EuroQoL-5 Dimensions Questionnaire (EQ-5D). It consists of two parts: a descriptive system (Part I) and a visual analogue scale (VAS) (Part II). Part I of the scale consists of 5 single-item dimensions including: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Descriptive data from the 5 dimensions of Part I can be used to generate a health-related quality of life profile for the subject. Part II is scored from 0 (worst health state imaginable) to 100 (best health state imaginable).
- Foot and ankle outcome score. Scores range from 0 to 100 (with a score of 0 indicating the worst possible foot/ankle symptoms and 100 indicating no foot/ankle symptoms).
- Nottingham Health Profile. Scores can range from 0 (no distress) to 100 (severe distress).
- 12-Item Short Form (SF-12). The SF-12 embedded and used 12 questions from the SF-36 to determine patients' Physical Component Score (PCS) and Mental Component Score (MCS). Scores range from 0 to 100, with higher scores indicating better health-related quality of life.
- SF-36 (0 to 100 scale, with higher scores indicating better health-related quality of life).

6.9.1 Tendinopathies/tendinitis

Rotator cuff disease (Table 1)

Surace et al. (2020) reported that they did not identify any quality of life evidence.

Achilles tendinopathy (Table 2)

One RCT of 49 participants in systematic review by Mani-Babu et al. (2015) included quality of life evidence measured using the Euro Quality of Life. Low-energy ESWT was compared to placebo for

midportion or insertional Achilles tendinopathy with a follow-up of 3-months. No significant difference in quality of life was found in groups treated with ESWT compared to placebo ESWT (SMD of -0.21, 95% CI: -0.77 to 0.36).

Lateral epicondylitis (Table 5)

We did not identify any systematic reviews investigating quality of life in lateral epicondylitis, but we identified a number of RCTs. One RCT of 43 patients compared the effects of using photobiomodulation therapy and ESWT for lateral epicondylitis. The SF-12 Survey Physical and Mental Component Scales were used to evaluate quality of life. Patients were assessed before treatment and at a 12-week follow-up. The study did not find a significant difference between the groups (Celik & Anaforoglu Kulunkoglu 2019).

Aydin & Atic (2018) compared ESWT to wrist-extensor splints in 67 patients. Subscales of the SF-36 Health Survey were used to evaluate quality of life. In both ESWT and wrist-extensor splint groups, although there were considerably significant improvements (P<0.001) in quality of life at four, 12, and 24 weeks compared to pre-treatment values, there was no statistically significant difference between the two groups at the three time-points (P>0.05). Both ESWT and wrist-extensor applications were found to yield significantly superior results when compared to pre-treatment values. In comparison of the two groups, on the other hand, there was no statistically significant difference.

Chung & Wiley (2004) conducted an RCT of 60 subjects with previously untreated lateral epicondylitis who received either ESWT or sham ESWT. The EQ-5D was used. Mean change in quality of life over 8 weeks was an increase of 1.3 and 3.3 for sham and ESWT groups, respectively. Quality of life measured by the EQ5D thermometer score did not change significantly over time within or between groups.

6.9.2 Plantar fasciitis (Table 6)

We did not identify any systematic reviews investigating quality of life in plantar fasciitis. One RCT comparing ESWT with kinesiology taping in the treatment of plantar fasciitis in 80- patients measured quality of life were measured using the foot and ankle outcome score. At the study onset, there were no statistically significant differences between the two groups in foot and ankle outcome scores. Five weeks later, both groups showed significant improvement in all parameters (p<0.05), but no significant differences were observed between the groups (Ordahan et al. 2017).

6.9.3 Greater trochanteric pain syndrome (Table 7)

We did not identify any secondary evidence reporting quality of life. Ramon et al. (2020) conducted an RCT of 103 patients with greater trochanteric pain syndrome in which patients were randomly assigned to receive fESWT and an exercise protocol, or sham fESWT and the same exercise protocol. Quality of life was a secondary outcome, assessed using the EQ-5D, The magnitude of the change in the EQ-5D score was significantly greater for the fESWT group ($p < 0.025$ at 1 month and $p < 0.001$ for the other time points).

6.9.4 Myofascial pain syndrome

We did not identify any systematic reviews investigating quality of life. In one RCT (Gur et al. 2013), comparing ESWT to ultrasound, 66 patients with myofascial pain syndrome of the trapezius were evaluated prior to therapy at three weeks and at three months of therapy using the Nottingham Health Profile. Results demonstrated that both ultrasound and ESWT provided improvement in quality of life, and that there was higher quality of life in the ESWT group. Another RCT by Gezginaslan & Gumus Atalay (2020) showed that high-energy ESWT was more effective than treatment using hot packs, TENS and ultrasound on quality of life in people with myofascial pain syndrome after one month of treatment (Table 9).

6.9.5 Other conditions

No studies investigating quality of life for patellar or hamstring tendinopathies, osteoarthritis, carpal tunnel syndrome or Morton's neuroma were identified.

6.10 Subgroup analyses

6.10.1 Rotator cuff disease (Table 1)

Surace et al. (2020) conducted a subgroup analysis comparing outcomes for participants with and without calcification in the rotator cuff. The authors of the review pooled six-week to three-month data from five studies of people with calcific deposits (256 participants for pain, and 260 participants for function) and five studies of people without calcific deposits (253 participants). Subgroups did not appear to have clinically meaningful differences with respect to mean pain (with calcific deposits: SMD: −0.59, 95% CI −1.33 to 0.14; without calcific deposits: SMD: −0.39, 95% CI: −0.70 to −0.09), despite the 'without calcification' group achieving statistical significance. Subgroups did not appear to differ with respect to mean function (with calcific deposits: SMD: 0.84, 95% CI: −0.20 to 1.89; without calcific deposits: SMD: 0.29, 95% CI: −0.04 to 0.61).

6.10.2 Carpal tunnel syndrome (Table 10)

Xie et al. (2020) undertook a subgroup analysis comparing how rESWT and fESWT affect pain, function outcomes and symptom severity in patients with carpal tunnel syndrome. They found that rESWT, but not fESWT, was significantly effective in reducing pain and improving functional outcomes. The sensitivity analysis found a significant difference for both rESWT and fESWT, compared to controls, when reducing symptom severity.

We did not identify any subgroup analyses investigating the place of ESWT in the treatment pathway, or for acute versus chronic conditions.

Table 1. Summary of all outcome data, extracorporeal shockwave therapy for rotator cuff disease (with and without calcific deposits)

Evidence source: Cochrane review: Surace et al. (2020), systematic review of RCTs and quasi-randomised CCTs

(See bottom of table for description of outcome measurements)

Outcome	Measure	Condition	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
Pain outcomes						
Pain at 6-week follow-up	VAS	Rotator disease with calcification	One RCT, 62 participants	ESWT vs TENS	pain improvement: 3 points with ESWT vs 1.1 points with TENS	MD: −1.90 (95% CI: −2.98 to −0.82) **(favours ESWT)**
			One RCT, 201 participants	ESWT vs US-guided percutaneous lavage	N/R	MD: – 0.10 (95% CI: −0.26 to 0.06) **(no statistically significant difference between groups)**
	Likert	Rotator cuff disease	One RCT, 90 participants	rESWT vs supervised exercise	2.9 with rESWT vs 2.6 with supervised exercises	MD: 0.30 (95% CI: −0.53 to 1.13) **(no statistically significant difference between groups)**
Pain at 3-month follow-up	VAS	Rotator disease with or without calcification	Nine RCTs, 608 participants. Moderate-certainty GRADE evidence	ESWT vs placebo	3.02 points in the placebo group, and 0.78 points better (0.17 better to 1.4 better [95% CI]) or 8% better (2% to 14% better) with ESWT	SMD: −0.49 (95% CI: 0.88 to −0.11). **(little or no improvement in pain with ESWT)**
	VAS	Rotator disease with calcification	One RCT, 201 participants	ESWT vs US-guided percutaneous lavage	N/R	MD: 1.90 (95% CI: 1.54 to 2.26) **(favours lavage)**
			One RCT, 62 participants	ESWT vs TENS	4.08 points with ESWT versus – 1.74 points with TENS	MD: −2.34 (95% CI: −3.53 to – 1.15) **(favours ESWT)**
	Likert	Rotator cuff disease (subacromial shoulder pain)	One RCT, 102 participants	rESWT vs supervised exercise	2.9 points with rESWT vs 2.5 points with supervised exercises	MD: 0.40 (95% CI: −0.36 to 1.16) **(no significant difference between groups)**
	NRS	Rotator disease with calcification	One RCT , 25 participants	rESWT vs US-guided needling with glucocorticoids	N/R	MD: 1.60 (95% CI: 0.13 to 3.07) **(favours US-guided needling with glucocorticoids)**
	Participant-reported pain relief	Rotator disease without calcification	One RCT, 74 participants. Low-	ESWT vs placebo	14/34 in ESWT group compared with 15/40 in placebo.	RR: 1.10 (95% CI: 0.62 to 1.94) **(no significant difference between groups)**

Outcome	Measure	Condition	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
	of 50% or greater		certainty GRADE evidence		4% more had relief (19% fewer to 26% more) 10% more had relief (38% fewer to 94% more	
Pain at 6-month follow-up	Likert	Rotator cuff disease (subacromial shoulder pain)	One RCT, 100 participants	rESWT vs supervised exercise	2.7 points with rESWT vs 2.5 points with supervised exercises	MD: 0.20 (95% CI: −0.56 to 0.96) **(no significant difference between groups)**
	VAS	Rotator disease with calcification	One RCT, 201 participants	ESWT vs US-guided percutaneous lavage	N/R	MD: 1.80 (95% CI: 1.36 to 2.24) **(favours lavage)**
Pain at 12-month follow-up	Likert	Rotator cuff disease (subacromial shoulder pain)	One RCT, 97 participants	rESWT vs supervised exercise	2.6 points with rESWT vs 2.1 points with supervised exercises	MD: 0.50 (95% CI: −0.20 to 1.2) **(no significant difference between groups)**
	VAS	Rotator disease with calcification	One RCT, 201 participants	ESWT vs US-guided percutaneous lavage	N/R	MD 1.90 (95% CI 1.34 to 2.46) **(favours lavage)**
	NRS	Rotator disease with calcification	One RCT, 19 participants	rESWT vs US-guided needling with glucocorticoids	N/R	MD: 0.20 (95% CI: −2.05 to 2.45) **(no significant difference between groups)**
Functional outcomes						
Function at 6-week follow-up	Constant 0 to 100 scale	Rotator disease with calcification	One RCT, 62 participants	ESWT vs TENS	mean function improvement: 24.12 points with ESWT versus 9.59 points with TENS	MD: 14.53 (95% CI: 8.70 to 20.36) **(favours ESWT)**
	SPADI	Rotator cuff disease (subacromial shoulder pain)	One RCT, 90 participants	rESWT vs supervised exercise	33.5 with shock wave versus 25.8 with supervised exercises	MD: 7.70 (95% CI: −1.57 to 16.97) **(no statistically significant difference between groups)**
Function at 3-month follow-up	Constant 0 to 100 scale	Rotator disease with or without calcification	Nine studies, 612 participants. Moderate-certainty GRADE evidence	ESWT vs: placebo	Mean function 66 points with placebo and 7.9 points better (1.6 better to 14 better [95% CI]) or 8% better (ranging from 1.6% to 14%) with ESWT	SMD: 0.62 (95% CI: 0.13 to 1.11) **(little or no improvement with ESWT)**

Outcome	Measure	Condition	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
		Rotator disease with calcification	One RCT, 40 participants	ESWT vs no treatment	No treatment: mean function: 51.6 in the ESWT group and 47.8 in the no treatment group	MD 3.80, 95% CI: −6.33 to 13.93 **(No significant difference between groups)**
			One RCT, 62 participants	ESWT vs TENS	mean function improvement: 28.31 points with ESWT versus 11.86 points with TENS	MD: 16.45 (95% CI: 9.86 to 23.04) **(favours ESWT)**
			One RCT , 25 participants	rESWT vs US-guided needling with glucocorticoids	N/R	MD −11.70 (95% CI −24.79 to 1.39) **(no statistically significant difference between groups)**
		Rotator disease without calcification	One RCT , 34 participants	EWST vs US-guided hyaluronic acid injection	mean function: 76.5 (SD 20.6) with ESWT versus 81.8 with US-guided hyaluronic acid injection	SMD: −0.26 (95% CI: −0.94 to 0.41) **(no statistically significant difference between groups)**
Function at 6-month follow-up	SPADI	Rotator cuff disease (subacromial shoulder pain)	One RCT, 102 participants	rESWT vs supervised exercise	36.1 with rESWT vs 27.0 with supervised exercises	MD: 9.10 (95% CI: −1.13 to 19.33) **(no statistically significant difference between groups)**
			One RCT, 100 participants		29.2 with rESWT vs 24.5 with supervised exercises	MD: 4.70 (95% CI: −5.39 to 14.79) **(no statistically significant difference between groups)**
Function at 12-month follow-up	Constant 0 to 100 scale	Rotator disease with calcification	One RCT, 97 participants	rESWT vs US-guided needling with glucocorticoids	27.9 with rESWT vs 24.0 with supervised exercises	MD: 3.90 (95% CI: −6.08 to 13.88) **(no statistically significant difference between groups)**
			One RCT, 19 participants		N/R	MD: −4.10 (95% CI: −15.74 to 7.54) **(no statistically significant difference between groups)**
Rate of complications/AEs						
Frequency of post-treatment complications		Rotator disease with calcification	One RCT, 19 participants	rESWT vs US-guided needling with glucocorticoids	5/14 participants with rESWT versus 1/11 participants	RR: 3.93 (95% CI: 0.53 to 28.93) **(no significant difference between groups)**
			One RCT, 62 participants	ESWT vs TENS	6/33 participants with shock wave versus 1/29 with TENS	RR: 5.27 (95% CI: 0.67 to 41.00) **(No statistically significant difference between groups, but too few events to be conclusive)**

Outcome	Measure	Condition	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
			One RCT, 243 participants	ESWT vs US-guided percutaneous lavage	N/R	RR: 0.08 (95% CI: 0.00 to 1.36) **(favours ESWT)**
		Rotator cuff disease (subacromial shoulder pain)	One RCT, 102 participants	rESWT vs supervised exercise	5/52 participants with rESWT vs 3/50 participants with supervised exercise	RR: 1.60 (95% CI: 0.40 to 6.36) **(no statistically significant difference between groups)**
		Rotator disease with or without calcification	Five trials, 295 participants	ESWT vs placebo	41/156 adverse events with ESWT, 10/139 AEs in placebo group	RR 3.61 (95% CI 2.00 to 6.52) **(no statistically significant difference between groups)**
Participant withdrawals		Rotator disease with or without calcification	Seven RCTs, 581 participants	ESWT vs placebo	ESWT: 11/34 withdrawals Placebo: 13/40 withdrawals	RR: 0.75 (95% CI: 0.43 to 1.31) **(no statistically significant difference between groups)**
		Rotator cuff disease (subacromial shoulder pain)	One RCT, 104 participants	rESWT vs supervised exercise	2/52 participants with rESWT vs 1/50 participants with supervised exercise	RR: 3.00 (95% CI: 0.32 to 27.91) **(no significant difference between groups, although event rates too low to be certain)**
		Rotator disease with calcification	One RCT, 62 participants	ESWT vs TENS	0/33 participants with ESWT vs 1/29 participants with TENS	RR: 0.29 (95% CI: 0.01 to 6.95) **(No statistically significant difference between groups, but too few events to be conclusive)**
Patient satisfaction						
Number of participants who reported treatment was successful		Rotator disease with calcification	One RCT, 40 participants	ESWT vs no treatment	6/20 participants in the shock wave group versus 1/20	RR: 6.00 (95% CI: 0.79 to 45.42) **(No significant difference between groups)**
Proportion of participants with no complaints			One RCT, 19 participants	rESWT vs US-guided needling with glucocorticoids	4/9 participants with rESWT vs 4/10	RR: 1.11 (95% CI: 0.39 to 3.19) **(No significant difference between groups)**
Proportion of patients who were pain-free			One RCT, 201 participants	ESWT vs US-guided percutaneous lavage	N/R	RR: 0.91 (95% CI: 0.81 to 1.03) **(No significant difference between groups)**

Outcome	Measure	Condition	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
AOFAS: higher score is more favourable outcomes; Constant 0 to 100 scale (higher score means better function); Likert: 0 to 9 scale, with 9 indicating severe pain; NRS: 0 to 10 scale (higher score indicating worse pain); Roles and Maudsley: lower scores indicate more favourable outcomes; SPADI: 0 to 100 scale (higher score means worse function); SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments VAS: 0 to 10 scale, with 10 indicating worst pain. VISA: higher score indicates more favourable outcomes. WOMAC: higher scores indicate worse pain, stiffness, and functional limitations						
ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SDTLC: skin-derived tendon-like cells; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index						

Table 2. Summary of all outcome data, extracorporeal shockwave therapy for Achilles tendinopathy

Evidence sources: Mani-Babu et al. (2015), systematic review and meta-analysis of 7 studies (5 RCTs and 2 case control studies); Rhim et al. (2020), network meta-analysis

(See bottom of table for description of outcome measurements)

Outcome	Study	Study and patient characteristics	Comparison(s)	Relative effect
Pain outcomes (study by Mani-Babu)				
1-month VAS	1 case control, 68 participants	Mid-portion tendinopathy	ESWT vs conservative treatment	SMD: −2.97 (95% CI: −2.70 to −1.50) **(favours ESWT)**
	1 case control, 68 participants	Insertional tendinopathy		SMD: −2.10 (95% CI: −3.67 to −2.27) **(favours ESWT)**
3-month VAS	1 RCT, 49 participants	Mid-portion or Insertional Tendinopathy	Low-energy ESWT vs placebo	SMD: −0.44 (95% CI: −1.01 to 0.13 **(no significant difference between groups)**
	1 case control, 68 participants	Mid-portion tendinopathy	ESWT vs conservative treatment	SMD: −3.75 (95% CI: −4.56 to −2.95) **(favours ESWT)**
	1 case control, 68 participants	Insertional tendinopathy		SMD: −2.42 (95% CI: −3.05 to −1.78) **(favours ESWT)**
4-month VAS	1 RCT, 50 participants	Mid-portion tendinopathy	ESWT vs eccentric loading Moderate quality evidence using a modified Downs and Black checklist, and the van Tulder criteria	SMD: 0.17 (95% CI: −0.38 to 0.73) **(no significant difference between groups)**
			ESWT vs wait-and-see policy	SMD: −0.93 (95% CI: −1.52 to −0.34) **(favours ESWT)**
	1 RCT, 68 participants		ESWT + eccentric loading vs eccentric loading alone Moderate quality evidence using a modified Downs and Black checklist, and the van Tulder criteria	SMD: −0.53 (95% CI: −1.01 to −0.05) **(favours ESWT)**
	1 RCT, 50 participants	Insertional tendinopathy	ESWT vs eccentric loading Moderate quality evidence using a modified Downs and Black checklist, and the van Tulder criteria	SMD: −0.86 (95% CI: −1.44 to −0.27) **(favours ESWT)**
>12-month VAS	1 case control study, 68 participants	Mid-portion tendinopathy	ESWT vs conservative treatment	SMD: −3.42 (95% CI: −4.18 to −2.66) **(favours ESWT)**

Outcome	Study	Study and patient characteristics	Comparison(s)	Relative effect	
	1 case control study, 68 participants	Insertional tendinopathy		SMD: −2.39 (95% CI: −3.02 to −1.76) **(favours ESWT)**	
Functional outcomes (study by Mani-Babu)					
Functional Index of Lower Limb Activity	1 RCT, 49 participants	Mid-portion or Insertional Tendinopathy	Low-energy ESWT vs placebo	SMD: −1.05 (95% CI: −1.65 to −0.45) **(favours ESWT)**	
AOFAS	1 RCT, 48 participants	Mid-portion or Insertional Tendinopathy	ESWT vs placebo	SMD: −0.52 (95% CI: −1.09 to 0.06) **(no significant difference between groups)**	
VISA-A	1 RCT, 50 participants	Mid-portion tendinopathy	ESWT vs eccentric loading Moderate quality evidence using a modified Downs and Black checklist, and the van Tulder criteria	SMD: 0.29 (95% CI: −0.27 to 0.85) **(no significant difference between groups)**	
			ESWT vs wait-and-see policy	SMD: −1.03 (95% CI: −1.62 to −0.44) **(favours ESWT)**	
	1 RCT, 68 participants		ESWT + eccentric loading vs eccentric loading alone Moderate quality evidence using a modified Downs and Black checklist, and the van Tulder criteria	SMD: −0.76 (95% CI: −1.25 to −0.27) **(favours ESWT)**	
	1 RCT, 50 participants	Insertional tendinopathy	ESWT vs eccentric loading Moderate quality evidence using a modified Downs and Black checklist, and the van Tulder criteria	SMD: −1.54 (95% CI: −2.18 to −0.91) **(favours ESWT)**	
Pain and function outcomes (NMA by Rhim)					
VISA-A (3-to 12-month follow up)	2 RCTs, 143 participants	Mid-portion tendinopathy	ESWT vs ECC	SMD: -0.32 (95% CI: -0.79 to 0.16) **(no significant difference between groups)**	**NMA ranked ESWT + ECC as having the highest efficacy ranking according to SUCRA. ESWT alone was ranked 7/8.**
			ESWT plus ECC vs ECC	SMD: 0.99 (95% CI: 0.48 to 1.49) **(favours ESWT plus ECC)**	
Patient satisfaction (study by Mani-Babu)					

Outcome	Study	Study and patient characteristics	Comparison(s)	Relative effect
1-month Roles and Maudsley Score	1 case control, 68 participants	Insertional tendinopathy	ESWT vs conservative treatment	SMD: 0.99 (95% CI: 0.69 to 1.42) **(no significant difference between groups)**
	1 case control, 68 participants	Mid-portion tendinopathy		SMD: 0.37 (95% CI: 0.21 to 0.64) **(favours ESWT)**
3-month Roles and Maudsley Score	1 case control, 68 participants	Insertional tendinopathy	ESWT vs conservative treatment	SMD: 0.20 (95% CI: 0.09 to 0.46) **(favours ESWT)**
				SMD: 0.28 (95% CI: 0.13 to 0.62) **(favours ESWT)**
Likert scale <12 months	1 RCT, 50 participants	Mid-portion tendinopathy	ESWT vs eccentric loading Moderate quality evidence using a modified Downs and Black checklist, and the van Tulder criteria	SMD: 1.20 (95% CI: 0.64 to 2.25) **(no significant difference between groups)**
			ESWT vs wait-and-see policy	SMD: 0.63 (95% CI: 0.4 to 1.0) **(favours ESWT)**
	1 RCT, 68 participants		ESWT + eccentric loading vs eccentric loading alone Moderate quality evidence using a modified Downs and Black checklist, and the van Tulder criteria	SMD: 0.40 (95% CI: 0.18 to 0.91) **(favours ESWT)**
	1 RCT, 50 participants	Insertional tendinopathy	ESWT vs eccentric loading Moderate quality evidence using a modified Downs and Black checklist, and the van Tulder criteria	SMD: 0.50 (95% CI: 0.28 to 0.89) **(favours ESWT)**
Roles and Maudsley Score > 12 months	1 case control, 68 participants	Insertional tendinopathy	ESWT vs conservative treatment	SMD: 0.28 (95% CI: 0.13 to 0.62) **(favours ESWT)**
	1 case control, 68 participants	Mid-portion tendinopathy		SMD: 0.20 (95% CI: 0.09 to 0.46) **(favours ESWT)**
Quality of life (study by Mani-Babu)				
3-month follow up with Euro Quality of Life	1 RCT, 49 participants	Mid-portion or Insertional tendinopathy	Low-energy ESWT vs placebo	SMD of −0.21 (95% CI: −0.77 to 0.36) **(no significant difference between groups)**
All-cause discontinuation (tolerability: study by Rhim)				
3- to 12-month follow up	2 RCTs, 143 participants	Mid-portion tendinopathy	ESWT vs ECC	SMD: 0.31 (95% CI: 0.05 to 1.88) **(no significant difference between groups)**

Outcome	Study	Study and patient characteristics	Comparison(s)	Relative effect
AOFAS: higher score is more favourable outcomes; Constant 0 to 100 scale (higher score means better function); Likert: 0 to 9 scale, with 9 indicating severe pain; Nirschl phase rating: phase 0 to 7 (higher phase indicates worse pain and function) NRS: 0 to 10 scale (higher score indicating worse pain); Roles and Maudsley: lower scores indicate more favourable outcomes; SPADI: 0 to 100 scale (higher score means worse function); SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments VAS: 0 to 10 scale, with 10 indicating worst pain. VISA: higher score indicates more favourable outcomes. WOMAC: higher scores indicate worse pain, stiffness, and functional limitations				
ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; ECC: eccentric exercise; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SDTLC: skin-derived tendon-like cells; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index				

Table 3. Summary of all outcome data, extracorporeal shockwave therapy for patellar tendinopathy

Evidence source: Chen et al. (2019), systematic review and network meta-analysis of RCTs

(See bottom of table for description of outcome measurements)

<table>
<tr><th>Outcome</th><th>Study and patient characteristics</th><th>Comparison(s)</th><th>Relative effect</th><th>NMA treatment ratings</th></tr>
<tr><td colspan="5">Pain outcomes</td></tr>
<tr><td rowspan="14">Change in pain score (NRS or VAS)</td><td rowspan="14">10 RCTs,
370 participants</td><td>fESWT vs control</td><td>WMD: 0.13 (95% CI: -0.68 to 0.93)
(no significant difference between groups)</td><td rowspan="14"><table><tr><th>Treatment</th><th>SUCRA</th><th>Mean rank</th></tr><tr><td>LR-PRP</td><td>94.9</td><td>Not reported</td></tr></table>(only treatment with highest ranking reported, ranking of fESWT and rESWT unknown)</td></tr>
<tr><td>fESWT vs CSI</td><td>WMD: -0.67 (95% CI: -5.03 to 3.69)
(no significant difference between groups)</td></tr>
<tr><td>fESWT vs LP-PRP</td><td>WMD: 2.00 (95% CI: 0.84 to 3.16)
(favours LR-PRP)</td></tr>
<tr><td>rESWT vs fESWT</td><td>WMD: -0.10 (95% CI: -1.88 to 1.68)
(no significant difference between groups)</td></tr>
<tr><td>Ultrasound vs fESWT</td><td>WMD: -0.33 (95% CI: -1.85 to 1.19)
(no significant difference between groups)</td></tr>
<tr><td>ABI vs fESWT</td><td>WMD: 0.47 (95% CI: -1.08 to 1.19)
(no significant difference between groups)</td></tr>
<tr><td>DN vs fESWT</td><td>WMD: -0.50 (95% CI: -2.70 to 1.70)
(no significant difference between groups)</td></tr>
<tr><td>TGT vs fESWT</td><td>WMD: -0.63 (95% CI: -2.83 to 1.57)
(no significant difference between groups)</td></tr>
<tr><td>rESWT vs control</td><td>WMD: 0.03 (95% CI: -1.92 to 1.98)
(no significant difference between groups)</td></tr>
<tr><td>rESWT vs CSI</td><td>WMD: -0.77 (95% CI: -5.48 to 3.93)
(no significant difference between groups)</td></tr>
<tr><td>rESWT vs LR-PRP</td><td>WMD: 1.90 (95% CI: -0.22 to 4.02)
(no significant difference between groups)</td></tr>
<tr><td>Ultrasound vs rESWT</td><td>WMD: -0.33 (95% CI: -1.85 to 1.19)
(no significant difference between groups)</td></tr>
<tr><td>ABI vs rESWT</td><td>WMD: 0.57 (95% CI: -1.79 to 2.93)
(no significant difference between groups)</td></tr>
</table>

<table>
<tr><th>Outcome</th><th>Study and patient characteristics</th><th>Comparison(s)</th><th>Relative effect</th><th>NMA treatment ratings</th></tr>
<tr><td></td><td></td><td>DN vs rESWT</td><td>WMD: -0.40 (95% CI: -3.22 to 2.42)
(no significant difference between groups)</td><td></td></tr>
<tr><td></td><td></td><td>TGT vs rESWT</td><td>WMD: -0.53 (95% CI: -3.36 to 2.30)
(no significant difference between groups)</td><td></td></tr>
<tr><td colspan="5">Functional outcomes</td></tr>
<tr><td rowspan="14">Change in VISA scale</td><td rowspan="14">11 RCTs,
430 participants</td><td>fESWT vs control</td><td>WMD: -1.28 (95% CI: -6.25 to 3.68)
(no significant difference between groups)</td><td rowspan="14"><table><tr><th>Treatment</th><th>SUCRA</th><th>Mean rank</th></tr><tr><td>Dry needling</td><td>90.5</td><td>Not reported</td></tr><tr><td>LR-PRP</td><td>87.5</td><td>Not reported</td></tr></table>(Only treatment with highest and second highest ranking reported. From the plots, HTW inferred that fESWT is ranked 7th and rESWT is ranked 9th, but this is not reported in the text)</td></tr>
<tr><td>fESWT vs CSI</td><td>WMD: 21.72 (95 CI: 7.12 to 36.32)
(favours fESWT)</td></tr>
<tr><td>fESWT vs LR-PRP</td><td>WMD: -14.50 (95% CI: -24.15 to -4.85)
(favours LR-PRP)</td></tr>
<tr><td>rESWT vs fESWT</td><td>WMD: -5.40 (95% CI: -17.98 to 7.18)
(no significant difference between groups)</td></tr>
<tr><td>Ultrasound vs fESWT</td><td>WMD: 0.58 (95% CI: -11.06 to 12.23)
(no significant difference between groups)</td></tr>
<tr><td>ABI vs fESWT</td><td>WMD: 0.68 (95% CI: -9.33 to 10.70)
(no significant difference between groups)</td></tr>
<tr><td>DN vs fESWT</td><td>WMD: 18.80 (95% CI: -0.66 to 38.26)
(no significant difference between groups)</td></tr>
<tr><td>TGT vs fESWT</td><td>WMD: 0.38 (95% CI: -12.76 to 13.52)
(no significant difference between groups)</td></tr>
<tr><td>SDTLC vs fESWT</td><td>WMD: 11.68 (95% CI: -1.29 to 24.66)
(no significant difference between groups)</td></tr>
<tr><td>rESWT vs control</td><td>WMD: -6.68 (95% CI: -20.20 to 6.84)
(no significant difference between groups)</td></tr>
<tr><td>rESWT vs CSI</td><td>WMD: 16.32 (95% CI: -2.95 to 35.59)
(no significant difference between groups)</td></tr>
<tr><td>rESWT vs LR-PRP</td><td>WMD: -19.90 (95% CI: -35.75 to -4.05)
(favours LR-PRP)</td></tr>
<tr><td>Ultrasound vs rESWT</td><td>WMD: 5.98 (95% CI: -11.16 to 23.12)
(no significant difference between groups)</td></tr>
</table>

Outcome	Study and patient characteristics	Comparison(s)	Relative effect	NMA treatment ratings
		ABI vs rESWT	WMD: 6.08 (95% CI: -10.00 to 22.16) **(no significant difference between groups)**	
		DN vs rESWT	WMD: 24.20 (95% CI: 1.03 to 47.37) **(favours DN)**	
		TGT vs rESWT	WMD: 5.78 (95% CI: -12.41 to 23.97) **(no significant difference between groups)**	
		SDTLC vs rESWT	WMD: 17.08 (95% CI: --0.99 to 35.15) **(no significant difference between groups)**	

AOFAS: higher score is more favourable outcomes;
Constant 0 to 100 scale (higher score means better function);
Likert: 0 to 9 scale, with 9 indicating severe pain;
NRS: 0 to 10 scale (higher score indicating worse pain);
Roles and Maudsley: lower scores indicate more favourable outcomes;
SPADI: 0 to 100 scale (higher score means worse function);
SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments
VAS: 0 to 10 scale, with 10 indicating worst pain.
VISA: higher score indicates more favourable outcomes.
WOMAC: higher scores indicate worse pain, stiffness, and functional limitations

ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; HTW: Health Technology Wales; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SDTLC: skin-derived tendon-like cells; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index

Table 4. Summary of all outcome data, extracorporeal shockwave therapy for proximal hamstring tendinopathy

Evidence source: Korakakis et al. (2018), systematic review of 1 RCT

(See bottom of table for description of outcome measurements)

Outcome	Measure	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
Pain outcomes					
Pain at 3-months follow-up	NRS	1 RCT, 40 participants, Moderate quality GRADE evidence	rESWT vs traditional conservative treatment (consisting of rest, NSAIDs, physiotherapy and exercise programme for last 3 weeks)	ESWT: mean±SD was 2.1±1.9 Control: mean±SD was 6.8±2.2	MD: -4.70 (95% CI: -6.04 to 3.36) **(favours rESWT)**
	Patient-rated pain reduction			Radial ESWT: MD from baseline was 5.0 points Control: MD from baseline was 0.2 points ESWT: very much improved Controls minimally improved **(favours rESWT)**	N/R
Pain at 6-months follow-up	NRS	1 RCT, 40 participants, Moderate quality GRADE evidence	rESWT vs traditional conservative treatment (consisting of rest, NSAIDs, physiotherapy and exercise programme for last 3 weeks)	ESWT: mean±SD was 1.8±1.1 Control: mean±SD was 7.2±2.1	MD -5.40 (95% CI: -6.44 to 4.36) **(favours rESWT)**
	Patient-rated pain reduction			Radial ESWT: MD from baseline was 5.3 points Control: MD from baseline was+0.2 points ESWT: very much improved Controls: minimally worse **(favours rESWT)**	N/R
Pain at 12-months follow-up	NRS	1 RCT, 40 participants, Moderate quality GRADE evidence	rESWT vs traditional conservative treatment (consisting of rest, NSAIDs, physiotherapy and exercise programme for last 3 weeks)	ESWT: mean±SD was 1.4±0.8 Control: mean±SD was 6.8±2.3	MD -5.40 (95% CI: -6.47 to 4.33) **(favours rESWT)**
	Patient-rated pain reduction			Radial ESWT: MD from baseline was 5.7 points Control: MD from baseline was 0.2 points **(favours rESWT)**	N/R
Self-perceived recovery 6-months follow-up		1 RCT, 40 participants, Moderate quality GRADE evidence	rESWT vs traditional conservative treatment (consisting of rest, NSAIDs, physiotherapy and exercise programme for last 3 weeks)	ESWT: 16 of 20 (80%) participants reported satisfactory recovery Control: 0 of 20 (0%) participants reported satisfactory recovery	OR: 150.33 (7.54 to 2,997.83) **(favours rESWT)**

Outcome	Measure	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
Pain and function outcomes					
3-months follow-up	Nirschl phase rating	1 RCT, 40 participants, Moderate quality GRADE evidence	rESWT vs traditional conservative treatment (consisting of rest, NSAIDs, physiotherapy and exercise programme for last 3 weeks)	ESWT: mean±SD was 1.8±1.0 Control: mean±SD was 5.5±1.2	MD: -3.70 (95% CI: -4.38 to 3.02) **(no significant difference between groups)**
6-months follow-up	Nirschl phase rating	1 RCT, 40 participants, Moderate quality GRADE evidence	rESWT vs traditional conservative treatment (consisting of rest, NSAIDs, physiotherapy and exercise programme for last 3 weeks)	ESWT: mean±SD was 1.8±0.7 Control: mean±SD was 5.6±1.7	MD -3.80 (95% CI: -4.61 to 2.99) **(no significant difference between groups)**
12-months follow-up	Nirschl phase rating	1 RCT, 40 participants, Moderate quality GRADE evidence	rESWT vs traditional conservative treatment (consisting of rest, NSAIDs, physiotherapy and exercise programme for last 3 weeks)	ESWT: mean±SD was 1.0±0.6 Control: mean±SD was 5.4±2.6	MD -4.40 (95% CI: -5.57 to 3.23) **(no significant difference between groups)**
Patient satisfaction					
Self-perceived recovery 6- and 12-months follow-up		1 RCT, 40 participants, Moderate quality GRADE evidence	rESWT vs traditional conservative treatment (consisting of rest, NSAIDs, physiotherapy and exercise programme for last 3 weeks)	ESWT: 16 of 20 (80%) participants reported satisfactory recovery Control: 0 of 20 (0%) participants reported satisfactory recovery	OR: 150.33 (95% CI: 7.54 to 2,997.83) **(favours rESWT)**

AOFAS: higher score is more favourable outcomes;
Constant 0 to 100 scale (higher score means better function);
Likert: 0 to 9 scale, with 9 indicating severe pain;
Nirschl phase rating: phase 0 to 7 (higher phase indicates worse pain and function)
NRS: 0 to 10 scale (higher score indicating worse pain);
Roles and Maudsley: lower scores indicate more favourable outcomes;
SPADI: 0 to 100 scale (higher score means worse function);
SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments
VAS: 0 to 10 scale, with 10 indicating worst pain.
VISA: higher score indicates more favourable outcomes.
WOMAC: higher scores indicate worse pain, stiffness, and functional limitations

ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-

Outcome	Measure	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SDTLC: skin-derived tendon-like cells; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index					

Table 5. Summary of all outcome data, extracorporeal shockwave therapy for lateral epicondylitis

(See bottom of table for description of outcome measurements)

Outcome	Evidence source	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
Pain outcomes					
Change in pain score (VAS)	Yao et al. (2020), systematic review and meta-analysis of published prospective RCTs	14 RCTs, 950 participants	ESWT vs: placebo, ABI, CSI, laser, physiotherapy, WES, KT	N/R	WMD: -0:68 (95% CI: -1:06 to - 0:30, p = 0:0004) **(favours ESWT)**
Function outcomes					
Grip strength (most studies measured it using isometric grip force from 0-90 kg [0-200 lb])	Yao et al. (2020), systematic review and meta-analysis of published prospective RCTs	Eight RCTs, 458 participants	ESWT vs: WESs, placebo, laser, ABI, CSI	N/R	WMD: 3:36 (95% CI: 2:39 to 4:33, p < 0:00001) **(favours EWST)**
Patient satisfaction (Roles and Maudsley)					
3 weeks follow up	Buchbinder et al. (2005), systematic review and meta-analysis of RCTs	1 RCT, 100 participants	ESWT vs placebo	N/R	RR: 0.21 (95% CI: 0.09 to 0.50) **(favours ESWT)**
6 weeks follow up	Buchbinder et al. (2005), systematic review and meta-analysis of RCTs	2 RCTs, 371 participants	ESWT vs placebo	N/R	RR: 0.40 (95% CI: 0.08 to 1.91) **(no significant difference between groups)**
12 weeks follow up	Buchbinder et al. (2005), systematic review and meta-analysis of RCTs	2 RCTs, 349 participants	ESWT vs placebo	N/R	RR: 0.61 (95% CI: 0.32 to 1.16) **(no significant difference between groups)**
24 weeks follow up	Buchbinder et al. (2005), systematic review and meta-analysis of RCTs	1 RCT, 100 participants	ESWT vs placebo	N/R	RR: 0.14 (95% CI: 0.06 to 0.33) **(favours ESWT)**
12 months follow up	Buchbinder et al. (2005), systematic review and meta-analysis of RCTs	2 RCTs, 371 participants	ESWT vs placebo	N/R	RR: 0.44 (95% CI: 0.09 to 2.17) **(no significant difference between groups)**

AOFAS: higher score is more favourable outcomes;
Constant 0 to 100 scale (higher score means better function);
Likert: 0 to 9 scale, with 9 indicating severe pain;

Outcome	Evidence source	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
Nirschl phase rating: phase 0 to 7 (higher phase indicates worse pain and function) NRS: 0 to 10 scale (higher score indicating worse pain); Roles and Maudsley: lower scores indicate more favourable outcomes; SPADI: 0 to 100 scale (higher score means worse function); SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments VAS: 0 to 10 scale, with 10 indicating worst pain. VISA: higher score indicates more favourable outcomes. WOMAC: higher scores indicate worse pain, stiffness, and functional limitations					
ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SDTLC: skin-derived tendon-like cells; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index					

Table 6. Summary of all outcome data, extracorporeal shockwave therapy for plantar fasciitis/plantar heel pain

(See bottom of table for description of outcome measurements)

<table>
<tr><th>Outcome</th><th>Evidence Source</th><th>Condition</th><th>Study and patient characteristics</th><th>Comparison(s)</th><th>Relative effect</th><th>NMA treatment ratings</th></tr>
<tr><td colspan="7">Pain outcomes</td></tr>
<tr><td>VAS at 2, 3, 4 and 24 weeks</td><td>Li et al. (2019), systematic review and meta-analysis of RCTs</td><td>Plantar fasciitis</td><td>4 RCTs,
144 participants</td><td>US therapy</td><td>MD = - 13.14 (95% CI: - 14.07 to - 12.75)
P < 0.00001
(favours ESWT)</td><td></td></tr>
<tr><td rowspan="7">Short-term outcomes (1 to ≤6 weeks post-treatment)</td><td rowspan="7">Babatunde et al. (2019), systematic review and network meta-analysis of RCTs</td><td rowspan="7">Plantar heel pain</td><td rowspan="7">22 RCTs,
1,744 participants</td><td>ESWT vs Placebo</td><td>SMD: 0.55 (95% CI: -0.08 to 1.19)
(no significant difference between groups)</td><td rowspan="7"><table><tr><th>Treatment</th><th>SUCRA</th><th>Mean rank</th></tr><tr><td>ESWT</td><td>60.7</td><td>3.8</td></tr><tr><td>ESWT + orthoses</td><td>66.5</td><td>3.3</td></tr><tr><td>Exercise</td><td>24.6</td><td>6.3</td></tr><tr><td>Oral NSAID</td><td>3.7</td><td>7.7</td></tr><tr><td>Orthoses</td><td>60.5</td><td>3.8</td></tr><tr><td>Placebo</td><td>30.1</td><td>5.9</td></tr><tr><td>Steroid injection</td><td>79.5</td><td>2.4</td></tr><tr><td>Steroid injection + exercise</td><td>74.4</td><td>2.8</td></tr></table>
(ESWT is treatment with fourth highest ranking in NMA)</td></tr>
<tr><td>Steroid injection + exercise</td><td>SMD: -0.37 (95% CI: -2.12 to 1.39)
(no significant difference between groups)</td></tr>
<tr><td>Steroid injection</td><td>SMD: -0.35 (95% CI: -1.08 to 0.37)
(no significant difference between groups)</td></tr>
<tr><td>Orthoses</td><td>SMD: -0.01 (95% CI: -1.00 to 0.99)
(no significant difference between groups)</td></tr>
<tr><td>Oral NSAID</td><td>SMD: 2.24 (95% CI: 0.31 to 4.17)
(favours ESWT)</td></tr>
<tr><td>Exercise</td><td>SMD: 0.84 (95% CI: -0.57 to 2.24)
(no significant difference between groups)</td></tr>
<tr><td>ESWT + orthoses</td><td>SMD: -0.19 (95% CI: -1.80 to 1.42)
(no significant difference between groups</td></tr>
<tr><td rowspan="3">Medium-term outcomes (6 to ≤ 12 weeks post-treatment)</td><td rowspan="3">Babatunde et al. (2019), systematic review and network meta-analysis of RCTs</td><td rowspan="3">Plantar heel pain</td><td rowspan="3">23 RCTs,
2,018 participants</td><td>ESWT vs Placebo</td><td>SMD: 0.47 (95% CI: -0.53 to 1.47)
(no significant difference between groups)</td><td rowspan="3"><table><tr><th>Treatment</th><th>SUCRA</th><th>Mean rank</th></tr><tr><td>ESWT</td><td>67.2</td><td>3.6</td></tr><tr><td>ESWT + exercise</td><td>29.4</td><td>6.6</td></tr><tr><td>ESWT + orthoses</td><td>80.3</td><td>2.6</td></tr><tr><td>Exercise</td><td>26.1</td><td>6.9</td></tr></table></td></tr>
<tr><td>ESWT vs Steroid injection + exercise</td><td>SMD: 0.57 (95% CI: -2.85 to 3.99)
(no significant difference between groups)</td></tr>
<tr><td>ESWT vs Steroid injection</td><td>SMD: 0.1 (95% CI: -1.01 to 1.22)
(no significant difference between groups)</td></tr>
</table>

<table>
<tr><th>Outcome</th><th>Evidence Source</th><th>Condition</th><th>Study and patient characteristics</th><th>Comparison(s)</th><th>Relative effect</th><th>NMA treatment ratings</th></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs Orthoses</td><td>SMD: -0.11 (95% CI: -1.87 to 1.65)
(no significant difference between groups)</td><td rowspan="5"><table><tr><td>Oral NSAID</td><td>13.3</td><td>7.9</td></tr><tr><td>Orthoses</td><td>66.6</td><td>3.7</td></tr><tr><td>Placebo</td><td>48.7</td><td>5.1</td></tr><tr><td>Steroid injection</td><td>63.7</td><td>3.9</td></tr><tr><td>Steroid injection + exercise</td><td>54.7</td><td>4.6</td></tr></table>(ESWT is treatment with second highest ranking in NMA)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs Oral NSAID</td><td>SMD: 2.76 (95% CI: -0.28 to 5.80)
(no significant difference between groups)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs Exercise</td><td>SMD: 1.63 (95% CI: -1.44 to 4.70)
(no significant difference between groups)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs ESWT + orthoses</td><td>SMD: -0.82 (95% CI: -3.41 to 1.78)
(no significant difference between groups)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT + exercise</td><td>SMD: 1.54 (95% CI: -2.20 to 5.28)
(no significant difference between groups)</td></tr>
<tr><td rowspan="8">Long-term outcomes (>12 weeks post-treatment)</td><td rowspan="8">Babatunde et al. (2019), systematic review and network meta-analysis of RCTs</td><td rowspan="8">Plantar heel pain</td><td rowspan="8">10 RCTs,
778 participants</td><td>ESWT vs Placebo</td><td>SMD: 1.22 (95% CI: 0.36 to 2.07)
(Favours ESWT)</td><td rowspan="2"><table><tr><th>Treatment</th><th>SUCRA</th><th>Mean rank</th></tr><tr><td>ESWT</td><td>54.5</td><td>4.2</td></tr><tr><td>ESWT + exercise</td><td>64.2</td><td>3.5</td></tr><tr><td>Exercise</td><td>61.4</td><td>3.7</td></tr><tr><td>NSAID injection + exercise</td><td>63.3</td><td>3.6</td></tr><tr><td>Orthoses</td><td>20</td><td>6.6</td></tr><tr><td>Placebo</td><td>15.6</td><td>6.9</td></tr><tr><td>Steroid injection</td><td>58.4</td><td>3.9</td></tr><tr><td>Steroid injection + exercise</td><td>62.7</td><td>3.6</td></tr></table>(ESWT is treatment with sixth highest ranking in NMA)</td></tr>
<tr><td>ESWT vs Steroid injection + exercise</td><td>SMD: -0.53 (95% CI: -3.86 to 2.80)
(no significant difference between groups)</td></tr>
<tr><td>ESWT vs Steroid injection</td><td>SMD: -0.21 (95% CI:-1.90 to 1.48)
(no significant difference between groups)</td></tr>
<tr><td>ESWT vs Orthoses</td><td>SMD: 1.16 (95% CI:-0.67 to 2.98)
(no significant difference between groups)</td></tr>
<tr><td>ESWT vs NSAID injection + exercise</td><td>SMD: -0.64 (95% CI: -4.35 to 3.08)
(no significant difference between groups)</td></tr>
<tr><td>ESWT vs exercise</td><td>SMD: -0.39 (95% CI: -2.78 to 2.00)
(no significant difference between groups)</td></tr>
<tr><td>ESWT vs ESWT + exercise</td><td>SMD: -0.54 (95% CI: -3.45 to 2.38)
(no significant difference between groups)</td></tr>
<tr><td colspan="7">Functional outcomes</td></tr>
<tr><td rowspan="2">Short-term outcomes (1 to ≤6 weeks post-treatment)</td><td rowspan="2">Babatunde et al. (2019), systematic review and network</td><td rowspan="2">Plantar heel pain</td><td rowspan="2">14 RCTs,
868 participants</td><td>ESWT vs Placebo</td><td>SMD: 1.71 (95% CI: 0.26 to 3.15)
(favours ESWT)</td><td rowspan="2"><table><tr><th>Treatment</th><th>SUCRA</th><th>Mean rank</th></tr><tr><td>ESWT</td><td>69.5</td><td>2.5</td></tr><tr><td>Exercise</td><td>32.2</td><td>4.4</td></tr></table></td></tr>
<tr><td>ESWT vs Steroid injection + exercise</td><td>SMD: -0.12 (95% CI: -3.18 to 2.95)
(no significant difference between groups)</td></tr>
</table>

<table>
<tr><th>Outcome</th><th>Evidence Source</th><th>Condition</th><th>Study and patient characteristics</th><th>Comparison(s)</th><th>Relative effect</th><th>NMA treatment ratings</th></tr>
<tr><td></td><td>meta-analysis of RCTs</td><td></td><td></td><td>ESWT vs Steroid injection</td><td>SMD: -0.28 (95% CI: -1.87 to 1.31)
(no significant difference between groups)</td><td rowspan="4"><table><tr><td>Orthoses</td><td>31.8</td><td>4.4</td></tr><tr><td>Placebo</td><td>16.9</td><td>5.2</td></tr><tr><td>Steroid injection</td><td>78.9</td><td>2.1</td></tr><tr><td>Steroid injection + exercise</td><td>70.6</td><td>2.5</td></tr></table>(ESWT is treatment with third highest ranking in NMA)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs Orthoses</td><td>SMD: 1.24 (95% CI: -1.25 to 3.73)
(no significant difference between groups)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs Exercise</td><td>SMD: 1.12 (-1.36 to 3.61)
(no significant difference between groups)</td></tr>
<tr><td>AOFAS</td><td>Li et al. (2019), systematic review and meta-analysis of RCTs</td><td>Plantar fasciitis</td><td>2 RCTs,
76 participants</td><td>US therapy</td><td>MD = 3.19 (95% CI: - 1.72 to 8.10)
P = 0.20
(No significant difference between groups)</td><td></td></tr>
<tr><td>Medium-term outcomes (6 to ≤ 12 weeks post-treatment)</td><td>Babatunde et al. (2019), systematic review and network meta-analysis of RCTs</td><td>Plantar heel pain</td><td>11 RCTs,
811 participants</td><td>ESWT vs Placebo</td><td>SMD: 0.92 (95% CI: -0.68 to 2.53)
(no significant difference between groups)</td><td rowspan="5"><table><tr><th>Treatment</th><th>SUCRA</th><th>Mean rank</th></tr><tr><td>ESWT</td><td>65.6</td><td>2.7</td></tr><tr><td>Exercise</td><td>29.9</td><td>4.5</td></tr><tr><td>Orthoses</td><td>42.4</td><td>3.9</td></tr><tr><td>Placebo</td><td>28.1</td><td>4.6</td></tr><tr><td>Steroid injection</td><td>62.7</td><td>2.9</td></tr><tr><td>Steroid injection + exercise</td><td>71.4</td><td>2.4</td></tr></table>(ESWT is treatment with second highest ranking in NMA)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs Steroid injection + exercise</td><td>SMD: -0.22 (95% CI: -3.18 to 2.74)
(no significant difference between groups)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs Steroid injection</td><td>SMD: 0.05 (95% CI: -1.27 to 1.36)
(no significant difference between groups)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs Orthoses</td><td>SMD: 0.65 (95% CI: -1.61 to 2.91)
(no significant difference between groups)</td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs Exercise</td><td>SMD: 0.93 (95% CI: -1.72 to 3.58)
(no significant difference between groups)</td></tr>
<tr><td>Long-term outcomes</td><td>Babatunde et al. (2019), systematic review and</td><td>Plantar heel pain</td><td>5 RCTs,
312 participants</td><td>ESWT vs Placebo</td><td>SMD: 0.95 (0.50 to 1.40)
(favours ESWT)</td><td rowspan="2"><table><tr><th>Treatment</th><th>SUCRA</th><th>Mean rank</th></tr><tr><td>ESWT</td><td>72.8</td><td>2.1</td></tr></table></td></tr>
<tr><td></td><td></td><td></td><td></td><td>ESWT vs steroid injection</td><td>SMD: 0.03 (-0.51 to 0.56)
(no significant difference between groups)</td></tr>
</table>

Outcome	Evidence Source	Condition	Study and patient characteristics	Comparison(s)	Relative effect	NMA treatment ratings
(>12 weeks post-treatment)	network meta-analysis of RCTs			ESWT vs Orthoses	SMD: 0.84 (0.26 to 1.43) **(favours ESWT)**	<table><tr><td>Exercise</td><td>82.1</td><td>1.7</td></tr><tr><td>Orthoses</td><td>19.4</td><td>4.2</td></tr><tr><td>Placebo</td><td>7.3</td><td>4.7</td></tr><tr><td>Steroid injection</td><td>68.4</td><td>2.3</td></tr></table> (ESWT is treatment with second highest ranking in NMA)
				ESWT vs Exercise	SMD: -0.14 (-0.96 to 0.69) **(no significant difference between groups)**	
Pain and functional outcomes						
Foot Function Index or Plantar Fasciitis Pain and Disability Scale	Li et al. (2019), systematic review and meta-analysis of RCTs	Plantar fasciitis	2 RCTs, 66 participants	ESWT vs US therapy	SMD: -1.17 (95% CI: -4.45 to 2.10) **(No significant difference between groups)**	
Adverse events						
					Absolute effect	**Relative effect**
Serious AEs	David et al. (2017)	Plantar heel pain	4 RCTs, 305 participants. Very low certainty GRADE evidence	ESWT vs CSI	27 per 1,000 people with ESWT 3 per 1,000 people (95% CI: 0 to 52) with steroid injection	RR: 0.11 (95% CI 0.01 to 1.93) **(no statistically significant difference between groups)**
Non-serious AEs	David et al. (2017)	Plantar heel pain	3 RCTs, 245 participants. Very low certainty GRADE evidence	ESWT vs CSI	98 per 1,000 people with ESWT 134 per 1,000 people (95% CI 58 to 314) with steroid injection	RR: 1.37 (95% CI 0.58 to 3.20) **(no statistically significant difference between groups)**

AOFAS: higher score is more favourable outcomes;
Constant 0 to 100 scale (higher score means better function);
Foot Function Index – 0 to 10 scale, with higher score meaning worse pain and function;
Likert: 0 to 9 scale, with 9 indicating severe pain;
NRS: 0 to 10 scale (higher score indicating worse pain);
Roles and Maudsley: lower scores indicate more favourable outcomes;
SPADI: 0 to 100 scale (higher score means worse function);
SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments

Outcome	Evidence Source	Condition	Study and patient characteristics	Comparison(s)	Relative effect	NMA treatment ratings
VAS: 0 to 10 scale, with 10 indicating worst pain. VISA: higher score indicates more favourable outcomes. WOMAC: higher scores indicate worse pain, stiffness, and functional limitations						
ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SDTLC: skin-derived tendon-like cells; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index						

Table 7. Summary of all outcome data, extracorporeal shockwave therapy for greater trochanteric pain syndrome

Evidence sources: Koulischer et al. (2017), systematic review and meta-analysis. In addition, an RCT by Ramon et al. (2020)

(See bottom of table for description of outcome measurements)

Outcome	Measure	Study and patient characteristics	Comparison(s)	Absolute effect
Pain outcomes				
Pain at 3-month follow-up	VAS	Case control study, 66 participants	rESWT vs multimodal therapy (a combination of relative rest, anti-inflammatory medications, ice, gluteal and tensa fascia lata muscle stretching and strengthening, physiotherapy modalities, iontophoresis, a corticosteroid injection, and a local anaesthetic injection)	rESWT: VAS from 8.5 to 3.7 Multimodal therapy: VAS from 8.5 to 7 **(favours rESWT)**
Pain at 4-month follow-up	VAS	Quasi-randomised study, 229 participants	rESWT vs CSI or home training	rESWT: VAS from 6.3 to 3.2 CSI: VAS from 5.8 to 4.5 Home training: VAS from 6.2 to 5.2 **(favours rESWT)**
	Likert			CSI: 50.6% were completely recovered or much improved. Home training: 40.8% described having completely recovered or being much improved
Pain at 12-month follow-up	VAS	Case control study, 66 participants	rESWT vs multimodal therapy (a combination of relative rest, anti-inflammatory medications, ice, gluteal and tensa fascia lata muscle stretching and strengthening, physiotherapy modalities, iontophoresis, a corticosteroid injection, and a local anesthetic injection)	rESWT: VAS from 3.7 to 2.7 Multimodal therapy: VAS from 7 to 6.3 **(favours rESWT)**
Pain at 15-month follow-up	VAS	Quasi-randomised study, 229 participants	rESWT vs CSI or home training	rESWT: VAS from 6.3 to 2.4 CSI: VAS from VAS from 5.8 to 5.3 Home training: VAS from 6.2 to 2.7 **(favours rESWT or home training)**
	Likert			rESWT: 74.3% described having completely recovered or being much improved Home-training: 80.2% described having completely recovered or being much improved

Outcome	Measure	Study and patient characteristics	Comparison(s)	Absolute effect
Pain and functional outcomes				
Score at 12-month follow-up	Harris Hip Score	Case control study, 66 participants	LESWT vs multimodal therapy (a combination of relative rest, anti-inflammatory medications, ice, gluteal and tensa fascia lata muscle stretching and strengthening, physiotherapy modalities, iontophoresis, a corticosteroid injection, and a local anesthetic injection)	30.3 mean increase in Harris Hip Score of 33 patients after LESWT **(favours LESWT)** LESWT allowed 64% of patients to return to normal physical activity
Quality of life				
Baseline	EQ-5D	RCT, 103 participants	fESWT plus exercise vs sham fESWT plus exercise	fESWT + exercise (mean ± SD): 0.53 ± 0.31 Sham fESWT + exercise (mean ± SD): 0.56 ± 0.24 p value: 0.28
1-month follow up				fESWT + exercise (mean ± SD): 0.72 ± 0.22 Sham fESWT + exercise (mean ± SD): 0.62 ± 0.18 p value: 0.025 **(favours fESWT)**
2-month follow up				fESWT + exercise (mean ± SD): 0.82 ± 0.17 Sham fESWT + exercise (mean ± SD): 0.66 ± 0.22 p value: <0.001 **(favours fESWT)**
3-month follow up				fESWT + exercise (mean ± SD): 0.85 ± 0.14 Sham fESWT + exercise (mean ± SD): 0.68 ± 0.15 p value: <0.001 **(favours fESWT)**
6-month follow up				fESWT + exercise (mean ± SD): 0.83 ± 0.14 Sham fESWT + exercise (mean ± SD): 0.69 ± 0.15 p value: <0.001 **(favours fESWT)**

AOFAS: higher score is more favourable outcomes;
Constant 0 to 100 scale (higher score means better function);
EQ-5D: higher scores for higher health-related quality of life
Harris Hip Score: scores range from 0 to 100, with higher scores representing less dysfunction and better outcomes
Likert: 0 to 9 scale, with 9 indicating severe pain;
NRS: 0 to 10 scale (higher score indicating worse pain);
Roles and Maudsley: lower scores indicate more favourable outcomes;
SPADI: 0 to 100 scale (higher score means worse function);

Outcome	Measure	Study and patient characteristics	Comparison(s)	Absolute effect
SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments VAS: 0 to 10 scale, with 10 indicating worst pain. VISA: higher score indicates more favourable outcomes. WOMAC: higher scores indicate worse pain, stiffness, and functional limitations				
ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; EQ-5D: EueoQol-5 Dimensions Questionnaire; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SD: standard deviation; SDTLC: skin-derived tendon-like cells; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index				

Table 8. Summary of all outcome data, extracorporeal shockwave therapy for osteoarthritis

Evidence source: Chen et al. (2020), systematic review and meta-analysis of RCTs

(See bottom of table for description of outcome measurements)

Outcome	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
Pain outcomes				
VAS pain score	11 RCTs, 666 participants	ESWT vs placebo		SMD: -1:44 (95% CI: -1.77 to -1.10) P < 0.00001 **(favours ESWT)**
	6 RCTs, 518 participants	ESWT vs hyaluronic acid intra-articular injection		SMD: -0:39 (95% CI: -0.77 to -0.01) P = 0.04 **(favours ESWT)**
	1 RCT, 120 participants	ESWT vs PRP intra-articular injection		SMD: -0:40 (95% CI: -0.76 to -0.03) P =0:03 **(favours ESWT)**
	1 RCT, 40 participants	ESWT vs CSI intra-articular injection		SMD = -1:68 (95% CI: -2.41 to -0.95) P < 0:00001 **(favours ESWT)**
	5 RCTS, 412 participants	ESWT vs medication		SMD: -1:67 (95% CI: -2.38 to -0.97) P <0:00001 **(favours ESWT)**
	2 RCTS, 216 participants	ESWT vs ultrasound		SMD: -0:65 (95% CI: -0.92 to -0.37) P <0:00001 **(favours ESWT)**
Function outcomes				
WOMAC index function score	9 RCTS, 538 participants	ESWT vs placebo		SMD: -1:84 (95% CI: -2.47 to -1.20) P < 0.00001 **(favours ESWT)**
	5 RCTs, 460 participants	ESWT vs hyaluronic acid intra-articular injection		SMD: -0:64 (95% CI: -1.24 to -0.04) P = 0.04 **(favours ESWT)**
	1 RCT, 120 participants	ESWT vs PRP intra-articular injection		SMD: -0:02 (95% CI: -0.38 to 0.33) P = 0.89

Outcome	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
				(no significant difference between groups)
	1 RCT, 40 participants	ESWT vs CSI intra-articular injection		SMD: -7:87 (95% CI: -9.78 to -5.95) P <0.00001 **(favours ESWT)**
	3 RCTs, 306 participants	ESWT vs medication		SMD: -1:09 (95% CI: -1.33 to -0.85) P < 0.00001 **(favours ESWT)**
	2 RCTs, 198 participants	ESWT vs ultrasound		SMD: -1:48 (95% CI: -1.80 to -1.17) P < 0.00001 **(favours ESWT)**
	1 RCT, 58 participants	ESWT vs surgery		SMD: 0:31 (95% CI: -0.21 to 0.83) P = 0:24 **(no significant difference between groups)**
	1 RCT, 40 participants	ESWT vs kinesiotherapy		SMD: -2:11 (95% CI: -2.90 to -1.32) P <0:00001 **(favours ESWT)**
Adverse events				
Adverse events	32 RCTs, 2,408 participants	ESWT vs: placebo, traditional Chinese medicine, medication, US	temporary pain, minor bruising, or transient soft tissue swelling was observed in 9/32 studies	
		HA, KIN, traditional Chinese medicine	No adverse events observed in 6/32 studies	
			No mention of AEs in 17/32 studies	

AOFAS: higher score is more favourable outcomes;
Constant 0 to 100 scale (higher score means better function);
Harris Hip Score: scores range from 0 to 100, with higher scores representing less dysfunction and better outcomes
Likert: 0 to 9 scale, with 9 indicating severe pain;
NRS: 0 to 10 scale (higher score indicating worse pain);
Roles and Maudsley: lower scores indicate more favourable outcomes;
SPADI: 0 to 100 scale (higher score means worse function);
SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments
VAS: 0 to 10 scale, with 10 indicating worst pain.
VISA: higher score indicates more favourable outcomes.
WOMAC: higher scores indicate worse pain, stiffness, and functional limitations

Outcome	Study and patient characteristics	Comparison(s)	Absolute effect	Relative effect
ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SDTLC: skin-derived tendon-like cells; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index				

Table 9. Summary of all outcome data, extracorporeal shockwave therapy for myofascial pain syndrome

Evidence source: Zhang Q et al. (2020), systematic review and meta-analysis of 10 RCTs, 477 participants. In addition, results provided for an RCT by Gezginaslan & Gumus Atalay (2020)

(See bottom of table for description of outcome measurements)

Outcome		Study and patient characteristics	Comparison(s)	Relative effect
Pain outcomes (Zhang et al)				
VAS/NRS/ patient global assessment		2 RCTs, 60 participants	ESWT vs sham ESWT	SMD: -2.02 (95% CI: -2.86 to -1.17) P<.00001 **(favours ESWT)**
		2 RCTs, 99 participants	ESWT vs US	SMD: -1.20 (95% CI: -1.74 to -0.66) **(favours ESWT)**
		2 RCTs, 129 participants	ESWT vs dry needling	SMD: 0.09 (95% CI: -0.25 to 0.44) **(no significant difference between groups)**
		2 RCTs, 52 participants	ESWT vs trigger point injection	SMD: -0.57 (95% CI: -1.80 to 0.65) **(no significant difference between groups)**
		2 RCTS, 107 participants	ESWT vs laser therapy	SMD: 0.36 (95% CI: -0.34 to 1.06) **(no significant difference between groups)**
		2 RCTs, 46 participants	ESWT vs other (ESWT + exercise; proprioceptive neuromuscular facilitation)	SMD: 0.26 (95%: -1.19 to 1.71) **(no significant difference between groups)**
Functional outcomes (Zhang et al)				
Neck disability index		5 RCTs, 196 participants	ESWT vs: ESWT + exercise; laser therapy; dry needling; trigger point injection; proprioceptive neuromuscular facilitation	MD: -0.28 (95% CI: -1.01 to 0.44) **(no significant difference between groups)**
Quality of life (Gezginaslan and Gumus Atalay)				
SF-36	Physical functioning	1 RCT, 94 participants	High-energy flux density ESWT (H-ESWT) vs superficial hot pack, TENS and US	MD: 0.464 (p <0.001) **(favours ESWT)**
	Difficulty in physical role			MD: 0.167 (p <0.001) **(favours ESWT)**

	Difficulty in emotional role			MD: 0.512 (p <0.001) **(favours ESWT)**
	Vitality			MD: 0.027 (p <0.001) **(favours ESWT)**
	Mental Health			MD: 0.501 (p <0.001) **(favours ESWT)**
	Social functioning			MD: 0.372 (p <0.001) **(favours ESWT)**
	Bodily pain			MD: 0.259 (p <0.001) **(favours ESWT)**
	General health			MD: 0.239 (p <0.001) **(favours ESWT)**

AOFAS: higher score is more favourable outcomes;
Constant 0 to 100 scale (higher score means better function);
Likert: 0 to 9 scale, with 9 indicating severe pain;
Neck Disability Index: (0 to 100) a higher score means the greater a patient's perceived disability due to neck pain
NRS: 0 to 10 scale (higher score indicating worse pain);
Roles and Maudsley: lower scores indicate more favourable outcomes;
SF-36: 8 subscales of 36 items (lower score indicates more disability and lower quality of life)
SPADI: 0 to 100 scale (higher score means worse function);
SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments
VAS: 0 to 10 scale, with 10 indicating worst pain.
VISA: higher score indicates more favourable outcomes.
WOMAC: higher scores indicate worse pain, stiffness, and functional limitations

ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SDTLC: skin-derived tendon-like cells; SF-36: Short-Form-36; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index

Table 10. Summary of all outcome data, extracorporeal shockwave therapy for carpal tunnel syndrome

Evidence source: Xie et al. (2020), systematic review and meta-analysis of 10 RCTs (433 patients [501 wrists])

(See bottom of table for description of outcome measurements)

Outcome	Measure	Study and patient characteristics	Comparison(s)	Relative effect
Pain outcomes				
Pain reduction	VAS	7 RCTs, 291 participants	ESWT vs CSI, nutraceutical group, US, cryo-US; ESWT + splint vs splint, sham ESWT + splint, CSI + splint	MD: -0.60 (95% CI: -1.16 to -0.05) **(favours ESWT)**
Pain at follow up of less than 3 months		7 RCTs, 293 participants	ESWT vs CSI, nutraceutical group, US, cryo-US; ESWT + splint vs splint, sham ESWT + splint, CSI + splint	MD: -0.35 (95% CI: -0.80 to 0.10) **(no significant difference between groups)**
Pain at follow up of more than 3 months		7 RCTs, 291 participants	ESWT vs CSI, nutraceutical group, US, cryo-US; ESWT + splint vs splint, sham ESWT + splint, CSI + splint	MD: -0.60 (95% CI: -1.16 to -0.05) **(favours ESWT)**
rESWT on pain reduction		4 RCTs, 158 participants	ESWT vs CSI; ESWT + splint vs splint, sham ESWT + splint, CSI + splint	MD: -0.90 (95% CI: -1.41 to -0.38) **(favours rESWT)**
fESWT on pain reduction		3 RCTs, 133 participants	ESWT vs CSI, nutraceutical group, US, cryo-US;	MD: -0.04 (95% CI: -1.33 to 1.24) **(no significant difference between groups)**
Symptom severity				
Symptom severity	Boston carpal tunnel questionnaire	8 RCTs, 428 participants	ESWT vs CSI, nutraceutical group, US, cryo-US; ESWT (3 sessions) + splint, ESWT (1 session) + splint vs sham ESWT + splint, CSI + splint; ESWT + PRP vs sham ESWT vs PRP	MD: -2.26 (95% CI: -3.24 to -1.27) **(favours ESWT)**
Symptom severity at follow up of less than 3 months		7 RCTs, 375 participants	ESWT vs CSI, nutraceutical group, US, cryo-US; ESWT (3 sessions) + splint, ESWT (1 session) + splint, ESWT + splint vs sham ESWT + splint, CSI + splint ESWT + PRP vs sham ESWT vs PRP, CSI + splint	MD: -2.44 (95% CI: -4.19 to -0.70) **(favours ESWT)**
Symptom severity at follow up of more than 3 months		8 RCTs, 428 participants	ESWT vs CSI, nutraceutical group, US, cryo-US; ESWT (3 sessions) + splint, ESWT (1 session) + splint vs sham ESWT + splint, CSI + splint; ESWT + PRP vs sham ESWT vs PRP	MD: -2.26 (95% CI: -3.24 to -1.27) **(favours ESWT)**

rESWT on symptom severity		5 RCTs, 271 participants	ESWT vs CSI; ESWT + PRP vs sham ESWT vs PRP; ESWT (3 sessions) + splint, ESWT (1 session) + splint vs sham ESWT + splint, CSI + splint	MD: -3.95 (95% CI: -5.99 to -1.91) **(favours rESWT)**
fESWT on symptoms severity		3 RCTs, 157 participants	ESWT vs nutraceutical group, US, cryo-US; ESWT + splint vs sham ESWT + splint	MD: -0.95 (95% CI: -1.79 to -0.12) **(favours fESWT)**
Functional outcomes				
Functional status	Boston carpal tunnel questionnaire	8 RCTs, 428 participants	ESWT vs CSI, nutraceutical group, US, cryo-US; ESWT (3 sessions) + splint, ESWT (1 session) + splint vs sham ESWT + splint, CSI + splint; ESWT + PRP vs sham ESWT vs PRP	MD: -1.25 (95% CI: -2.08 to -0.43) **(favours ESWT)**
Functional status at follow up of less than 3 months		7 RCTs, 375 participants	ESWT vs CSI, nutraceutical group, US, cryo-US; ESWT (3 sessions) + splint, ESWT (1 session) + splint, ESWT + splint vs sham ESWT + splint, CSI + splint; ESWT + PRP vs sham ESWT vs PRP, CSI + splint	MD: -0.47 (95% CI: -1.41 to 0.47) **(no significant difference between groups)**
Functional status at follow up of more than 3 months		8 RCTs, 428 participants	ESWT vs CSI, nutraceutical group, US, cryo-US; ESWT (3 sessions) + splint, ESWT (1 session) + splint vs sham ESWT + splint, CSI + splint; ESWT + PRP vs sham ESWT vs PRP	MD: -1.25 (95% CI: -2.08 to -0.43) **(favours ESWT)**
rESWT on functional status		5 RCTs, 271 participants	ESWT vs CSI; ESWT + PRP vs sham ESWT vs PRP; ESWT (3 sessions) + splint, ESWT (1 session) + splint vs sham ESWT + splint, CSI + splint	MD: -2.07 (95% CI: -3.23 to -0.90) **(favours rESWT)**
fESWT on functional status		3 RCTs, 157 participants	ESWT vs nutraceutical group, US, cryo-US; ESWT + splint vs sham ESWT + splint	MD: -0.56 (95% CI: -1.53 to 0.41) **(no significant difference between groups)**

AOFAS: higher score is more favourable outcomes;
Boston carpal tunnel questionnaire: higher score indicates greater disability
Constant 0 to 100 scale (higher score means better function);
Likert: 0 to 9 scale, with 9 indicating severe pain;
Neck Disability Index: (0 to 100) a higher score means the greater a patient's perceived disability due to neck pain
NRS: 0 to 10 scale (higher score indicating worse pain);
Roles and Maudsley: lower scores indicate more favourable outcomes;
SPADI: 0 to 100 scale (higher score means worse function);
SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments
VAS: 0 to 10 scale, with 10 indicating worst pain.
VISA: higher score indicates more favourable outcomes.
WOMAC: higher scores indicate worse pain, stiffness, and functional limitations

ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SDTLC: skin-derived tendon-like cells; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index

Table 11. Summary of all outcome data, extracorporeal shockwave therapy for Morton's neuroma

Evidence source: Thomson et al. (2020), systematic review of RCTs, a comparative study and prospective cohort study

(See bottom of table for description of outcome measurements)

Outcome	Study and patient characteristics	Comparison(s)	Absolute effect
Pain outcomes			
VAS mean follow-up 2 months	2 RCTs, 27 participants	ESWT vs sham	Pooled mean pre-VAS was 6.7 and post-VAS was 3.1 ($p < 0.001$) **(favours ESWT)**
Functional outcomes			
AOFAS	1 RCT, 14 participants	ESWT vs sham	Increase in AOFAS score at 4 weeks with ESWT. However, after 4 weeks the result was not statistically significant. **(favours ESWT at 4 weeks, but no significant difference after 4 weeks)**
Patient satisfaction			
Johnson's satisfaction scale	1 RCT, 14 participants	ESWT vs sham	**(No significant difference between groups)**

AOFAS: higher score is more favourable outcomes;
Constant 0 to 100 scale (higher score means better function);
Likert: 0 to 9 scale, with 9 indicating severe pain;
Neck Disability Index: (0 to 100) a higher score means the greater a patient's perceived disability due to neck pain
NRS: 0 to 10 scale (higher score indicating worse pain);
Roles and Maudsley: lower scores indicate more favourable outcomes;
SPADI: 0 to 100 scale (higher score means worse function);
SUCRA and mean rank: higher SUCRA and lower mean rank indicate better performing treatments
VAS: 0 to 10 scale, with 10 indicating worst pain.
VISA: higher score indicates more favourable outcomes.
WOMAC: higher scores indicate worse pain, stiffness, and functional limitations

ABI: autologous blood injection; ADL: Activities of daily living; AE: adverse event; AOFAS: American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Score; CI: confidence interval; CSI: corticosteroid injection; DN: dry needling; ESWT: extracorporeal shockwave therapy; fESWT: focused extracorporeal shockwave therapy; GRADE: Grading of Recommendations, Assessment, Development and Evaluations; HA: hyaluronic acid; KIN or KT: kinesiotherapy; LEWST: low-intensity ESWT; LR-PRP: leukocyte-rich platelet-rich plasma ;MD: mean difference; NMA: network meta-analysis; NNTB: number needed to treat for an additional beneficial outcome; N/R: not reported; NRS: Numeric Rating Scale: NSAID: non-steroidal anti-inflammatory drug; OR: odds ratio: PEDro: Physiotherapy Evidence Database; PRP, platelet- rich plasma; RCT: randomised controlled trial; rESWT: radial extracorporeal shockwave therapy; RR: risk ratio; SDTLC: skin-derived tendon-like cells; SMD: Standardised mean difference; SPADI: shoulder pain and disability index; SUCRA: surface under cumulative ranking curve; TENS: transcutaneous electrical nerve stimulation; TGT: topical glyceryl trinitrate ; US: ultrasound; VAS: visual analogue scale; VISA-P: Victorian Institute of Sport Assessment Questionnaire, Patellar Tendon; VISA-A: Victorian Institute of Sport Assessment Questionnaire – Achilles; WES: wrist-extensor splint; WMD: weighted mean difference; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index

Table 12. Summary of ESWT versus no intervention/placebo/sham for different conditions

Condition	Outcome	Comparison(s)	Proportion of outcomes where little/no improvement/no statistically significant difference	Proportion of outcomes where significant difference
Tendinopathies	Pain, function, adverse events, patient satisfaction, quality of life	Placebo/sham/no intervention/wait-and-see policy	**17/25**	**8/25** (pain at 4 months, function and patient satisfaction < 12 months for Achilles tendinopathy; pain and grip strength, and patient satisfaction at 3 weeks and 24 weeks for lateral epicondylitis)
Osteoarthritis	Pain, function	Placebo	**0/2**	**2/2** (based on systematic review of RCTs with 538-666 participants)
Plantar fasciitis	Pain, function	Placebo	**3/6**	**3/6** (long-term pain, and short-term and long-term function)
Morton's neuroma	Pain, function, patient satisfaction	Placebo	**2/4**	**2/4** (pain at 2 months and function at 4 weeks)
Carpal tunnel syndrome	Symptoms and function	Sham	**0/2**	**2/2** (based on systematic review of 2 studies and 120 participants)
Myofascial pain syndrome	Pain	Sham	**0/1**	**1/1** (based on systematic review of 2 studies and 60 participants)

6.11 Ongoing trials

There are a number of ongoing systematic review and RCTs (see Appendix 3 for further details).

7. Economic evaluation

7.1 Health economic evidence review

The titles and abstracts of records identified in the search for this research question were screened and three health economic studies were deemed potentially relevant. The full texts of these studies were reviewed against the inclusion/exclusion criteria. Following consideration of the full texts, all three studies were excluded from the review. Two studies were excluded as they were reviews of existing economic evidence and none of the studies identified any economic evidence related to ESWT (CADTH 2012, Long et al. 2015).

The remaining study compared costs for ESWT and surgery in people with shoulder tendinitis (Haake et al. 2001). However, despite the relevance of this comparison to our decision problem, the study was not deemed suitable for inclusion because of limitations in the study approach and a lack of applicability to the UK NHS context. The primary limitation was that ESWT equipment costs were not included in the analysis as the only direct costs considered were those relating to hospital stay and physiotherapy. The study was deemed to lack applicability to the UK NHS context because of the societal perspective adopted in the analysis. This means that costs associated with lost workdays were included in the analysis and such costs would not be included when considering the UK NHS perspective.

8. Organisational Issues

ESWT is currently being used by some health boards in Wales.

9. Patient issues

9.1 Evidence from clinical literature

NICE Interventional Procedures Guidance for Achilles tendinopathy states (NICE 2016):

> "Twelve commentaries from patients who had experience of this procedure were received, which were discussed by the committee. The committee noted that patient commentary was mixed in terms of the benefits of the procedure and noted that some patients found the treatment painful."

NICE Interventional Procedures Guidance for refractory greater trochanteric pain syndrome states (NICE 2011):

> "NICE received 30 completed questionnaires from patients treated by the procedure. Thirty percent (9/30) stated that they would not have ESWT again; 3 of these patients reported that the procedure had made their condition worse with increased pain and decreased mobility. The remaining 70% (21/30) of patients would recommend this procedure to others."

9.2 Patient Evidence Literature Review

A patient experience literature review was undertaken, based on a dedicated search which aimed to identify and summarise any additional reports of experiences, perspectives and opinions of patients, to supplement the patient satisfaction and quality of life scores summarized in sections 6.1.6 and 6.1.7. Of the twenty-six papers found that incorporated patient experiences, twenty-four reported patient quality of life and/or satisfaction as secondary outcomes to the primary outcome of self-reported pain, and are reported in the sections above. Two papers were found that reported on patient experiences, satisfaction and quality of life related outcomes (such as returning to work) as primary outcomes: one for different types of tendinopathies, and one for subacromial pain syndrome.

9.2.1 ESWT in different types of tendinopathies

Leung et al. (2018) conducted a qualitative study of patients' knowledge, expectation and experience of radial extracorporeal shockwave therapy for the treatment of tendinopathies. The aim of this study was to understand patients' overall perspective of ESWT to manage their tendinopathy. Eleven patients with a range of tendinopathies took part in face-to-face interviews. The majority of patients had chronic conditions with previous failed surgeries. Four main themes were identified and summarised below:

- The non-invasive nature of ESWT and certain clinician factors, such as specialising in sports medicine and being knowledgeable about musculoskeletal rehabilitation, were of equal importance to patients when making treatment decisions.
- Most participants had no understanding of the proposed mechanisms of ESWT, so pre-treatment outcome expectations ranged from symptom control to complete resolution. Those patients who had more longstanding symptoms were less optimistic.
- Some participants found ESWT therapeutic whilst others found it excruciatingly painful. Side-effects experienced beyond pain were rare. Experiences of ESWT against expectations were matched for some participants but others were unsure what to expect. Patients were positive about their care under the healthcare professional, treatment personalisation, and weekly progress monitoring. A minority of individuals reported inadequate information about the procedure protocol, time-frames, side-effects and success rates. Two patients felt that the underlying cause of their tendinopathies was not addressed.
- Overall, ESWT had a positive effect for all the participants to a varying degree. Most patients made gains in continuing their daily activities, but did not attain their previous physical activity level. Many patients considered the importance of implementing lifestyle changes, modifying physical activities and maintaining specific exercises as important as improvements under ESWT.

9.2.2 ESWT in subacromial pain syndrome

Kvalvaag et al. (2018) looked at ESWT with predictors of pain, disability and return to work in patients with subacromial pain syndrome (pain in the shoulder). This RCT conducted over one year compared patients who were given ESWT followed by an exercise regime to those who were given a sham treatment with a device that looked identical but did not produce any shockwaves. In addition to being asked about various pain-related outcomes (pain medication, duration of shoulder complaint, previous episodes of shoulder pain and bilateral shoulder pain), the study also looked at patient's education level, work status, disability, emotional distress and expectations of the treatment to see if they impacted the levels of pain experienced. Results showed that low patient expectations were most strongly associated with a negative outcome. In addition, single marital status, frequent use of pain medication, not working at baseline and low self-reported general health status were associated with more pain and disability after one year. There was a reduction in the number of patients who were on sick leave from work from

baseline to one year following (27.4%to 20.2%). The study suggests that psychosocial and personal factors may be important for outcomes after treatment for subacromial pain syndrome.

9.2.3 Summary

Rates of patient satisfaction seem to vary across the type of health condition, both within and outside of the group of musculoskeletal conditions considered within this review. The evidence shows that, in addition to a noticeable improvement in their condition and a preference for the non-invasive nature of ESWT, patient satisfaction is heavily influenced by expectations before undergoing ESWT. While patient expectations can be affected by conditions such as education level and psychological factors, there is evidence that clear, concise and realistic explanations of the procedure and its outcomes by healthcare professionals is a vital element for patients to feel satisfied with their experience. However, there are currently great inconsistencies in the approach and detail of explanations patients are given by healthcare professionals.

The experience of patients undertaking ESWT was varied, with some patients finding it therapeutic and others painful. ESWT can lead to a significantly shorter duration of post-procedural pain, fewer requirements for pain medications and decreased anxiety toward repetition of the procedure if necessary. The evidence suggests that ESWT can help patients return to work sooner, can improve their ability to perform daily activities and has an overall positive effect on patients. However, patients believe that factors such as implementing lifestyle changes, modifying physical activities and maintaining specific physiotherapy exercises to be of equal importance in improving quality of life.

10. Conclusions

There is a large body of evidence assessing the clinical effectiveness of ESWT compared to other interventions for use in people with musculoskeletal conditions, particularly for tendinopathies and plantar fasciitis. The majority of evidence reported here is from systematic reviews of RCTs. However, many of the treatment comparisons within these systematic reviews comprised of single studies/studies with small numbers of participants.

Overall, the evidence we identified suggests that ESWT may be equal to or more beneficial compared to other interventions in terms of pain reduction, improvement in function, quality of life and patient satisfaction. The majority of evidence identified found no statistically significant difference between ESWT and other interventions for most outcomes. Additionally, when comparing ESWT to no intervention/placebo/sham (Table 12), the majority of the evidence showed that there was no statistically significant difference between ESWT and other interventions. Osteoarthritis was the only area where evidence with large numbers of participants that ESWT was shown to be superior to placebo.

We identified three NMAs investigating ESWT in pain and function outcomes: one in mid-portion Achilles tendinopathy, one in patellar tendinopathy, and one in plantar fasciitis/plantar heel pain. The NMAs generally suggest that ESWT alone is not superior to other interventions available. ESWT plus eccentric exercise was ranked highest for long-term pain relief and function in mid-portion tendinopathy, but ESWT alone was ranked seventh out of eight. ESWT was ranked highest for medium-term pain relief (2/9) and medium- (2/6) and long-term functional ability (2/5) in plantar fasciitis. However, the NMAs did not address differences in possible effect modifiers at baseline. Apart from the NMAs, the only evidence we identified where the comparator was favoured compared to ESWT was pain at three-months and 12-months follow up in rotator cuff disease.

A literature review for patient evidence as a primary research outcome (including patient satisfaction and quality of life) found evidence supporting the use of ESWT in tendinopathies and subacromial pain syndrome. The experience of patients undertaking ESWT was varied.

Very low certainty Grading of Recommendations, Assessment, Development and Evaluation (GRADE) evidence was identified for adverse events in plantar fasciitis/plantar heel pain. Low-certainty GRADE evidence was provided for participant-reported pain relief of 50% or greater for ESWT versus placebo in rotator disease without calcification. However, moderate-certainty GRADE evidence was provided for pain using the VAS scale for ESWT versus placebo in rotator disease with or without calcification, and for rESWT versus traditional conservative treatment for proximal hamstring tendinopathy. Moderate-quality evidence using a modified Downs and Black checklist and the van Tulder criteria was provided for Achilles tendinopathy. The other publications did not report the quality of the studies.

The evidence we identified supports NICE guidance which states that there are no major safety concerns with ESWT.

The evidence we identified for proximal hamstring tendinopathy and Morton's neuroma has limited sample sizes, highlighting the need for large scale, good quality RCTs. There are a number of ongoing RCTs and systematic reviews, some of which are in these areas.

It is apparent that the term tendinopathy is sometimes referred to as tendinitis, which made it difficult to report on the clinical effectiveness of ESWT in tendinitis.

The longest follow-up time after ESWT we identified was 15 months, with the majority of outcomes having a maximum follow up of 12 months. Longer-term data would therefore be desirable in the future. We did not identify any evidence for: the use of ESWT in children for the musculoskeletal conditions we reported; the place of ESWT in the treatment pathway; the use of ESWT in acute versus chronic conditions; the requirement for further treatment after ESWT. We did not identify any relevant economic evidence.

11. Contributors

This topic was proposed by R. Emmanuel, Physiotherapy, Swansea Bay University Health Board, and Z. Brewster, Physiotherapy, Cwm Taf Morgannwg University Health Board.

The HTW staff and contract researchers involved in writing this report were:

- J. Washington – literature search
- J. Williams – clinical author
- G. Hopkin – clinical author
- M. Prettyjohns – health economics author and lead author
- D. Jarrom – editor
- H. Britton – project management
- A. Evans – patient information input

The HTW Assessment Group advised on methodology throughout the scoping and development of the report.

A range of clinical experts from the UK provided material and commented on a draft of this report. Their views were documented and have been actioned accordingly. All contributions from reviewers were considered by HTW's Assessment Group. However, reviewers had no role in authorship or editorial control, and the views expressed are those of Health Technology Wales.

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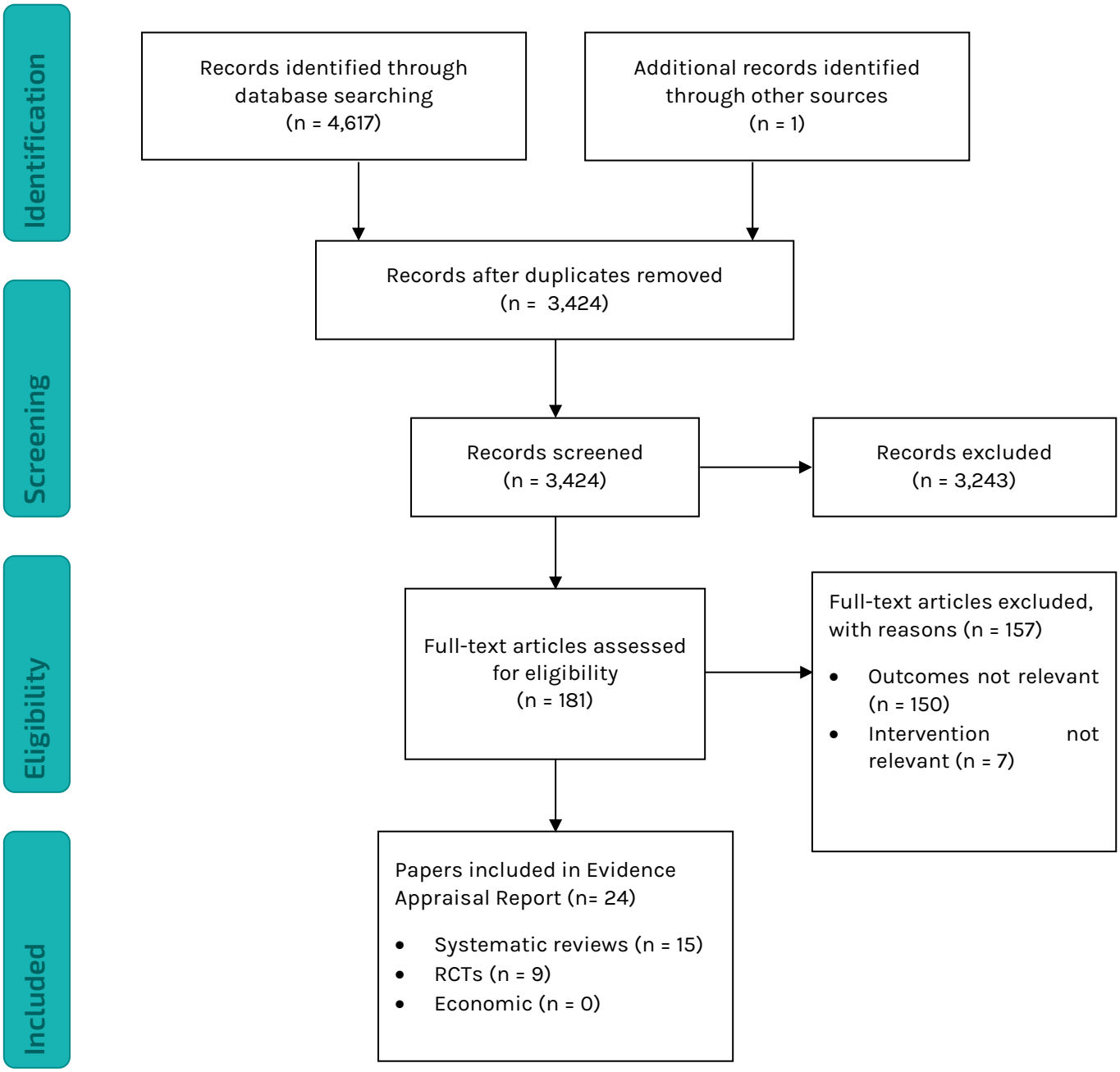
Appendix 1. PICO framework

Research Question	What is clinical and cost effectiveness of extracorporeal shockwave therapy as a treatment for musculoskeletal conditions?

	Inclusion criteria	**Exclusion criteria**
Population	People with tendinopathies or other musculoskeletal conditions referred for physiotherapy and/or podiatry services. Specific conditions of interest include, but are not limited to: • Upper or lower limb tendinopathies • Tendinitis • Tendinosis • Plantar fasciitis • Greater trochanteric pain syndrome • Epicondylosis Where possible, we will report evidence by subgroup according to: • The specific condition treated • Place in treatment pathway/previous treatments received/refractory disease • Acute versus chronic conditions/length of time with condition/amount of treatment already had	
Intervention	Extracorporeal shockwave therapy (including focused extracorporeal shockwave therapy, low-intensity extracorporeal shockwave therapy, radial extracorporeal shockwave therapy)	
Comparison/ Comparators	Standard care. This will vary according to the specific condition treated and the point in the treatment pathway.	
Outcome measures	Recovery or changes in symptoms Treatment success Functional outcomes, measured using any validated instrument Change in pain (any measure) Adverse events or complications from treatment Requirement for further or additional treatment after the intervention Patient satisfaction with/experience of treatment Quality of life Cost or resource use Cost effectiveness	

Study design	We will include the following clinical evidence in order of priority: • Systematic reviews. • Randomised trials. • Non-randomised trials. We will only include evidence for “lower priority” evidence where outcomes are not reported by a “higher priority” source. We will also search for economic evaluations or original research that can form the basis of an economic assessment.
Search limits	We will only include evidence published in English language No date limits will be applied
Other factors	Where relevant, we will include comparisons of different types of ESWT to each other as well as to standard care

Appendix 2. PRISMA flow diagram outlining selection of papers for clinical and cost effectiveness (to 19 October 2020)



Appendix 3. Summary of ongoing randomised controlled trials

Rotator cuff disease

Hanniel Han Rong Lim. Effects of shockwave therapy on pain and disability in individuals with rotator cuff tendinosis: a protocol for systematic review of randomized controlled trial. PROSPERO 2020 CRD42020160166 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020160166

Comparator: Any other forms of intervention which may include placebo, medication, ultrasound and/or exercises. The primary outcome includes pain intensity. It can be assessed by the visual analogue scale or other pain score tools. The secondary outcomes comprise functional status and quality of life outcomes. The functional status can be measured by the Disabilities of the Arm, Shoulder and Hand Questionnaire or other related tools. The quality of life, and psychological outcomes can be examined by the 36-Item Short Form Health Survey, respectively, or any other associated scales.

Anticipated completion date 31 Dec 2020.

Gerdeany Mendes da Rocha, Lívia Pogetti. Effect of shockwave treatment on pain and function in patients with rotator cuff tendinopathy. PROSPERO 2020 CRD42020162617 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020162617

RCTs and quasi-RCTs comparing ESWT with placebo or no treatment. These included pain at rest and with activities and resisted movements, shoulder movement, function/disability, quality of life, return to work, complete activities or performance.

Anticipated completion date 30 Nov 2020

Achilles tendinopathy

Xiaoxi Mou. Clinical efficacy of extracorporeal shock wave in the treatment of Achilles tendinopathy: a meta-analysis. PROSPERO 2020 CRD42020139411 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020139411

ESWT vs drugs or other treatments for Achilles tendinopathy. Main outcome: Visual Analogue Score (VAS) as measure of pain. Additional outcomes: The Numerical Rating Scale (NRS), the Victorian Institute of Sport Assessment-Achilles (VISA-A) questionnaire and American Orthopaedic Foot and Ankle Society (AOFAS).

Anticipated completion date: 18 Nov 2019 but was registered on PROSPERO on 20 Jan 2020 and status is review ongoing.

Nitin Kumar Arora, Saurabh Sharma. The impact of eccentric exercises on pain and strength performance on comparison with physical agent modalities: a systematic review and meta analysis. PROSPERO 2020 CRD42020151305 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020151305

Main outcomes: Validated and reliable outcome measures of functional status, pain, load-induced pain and tendon thickness were included. The VISA- A is a self- related outcome measure which includes questions on Achilles tendon pain, stiffness and functional capacity.

Anticipated completion date: 01 November 2019 but review is ongoing.

Hongshi Huang. Effectiveness of Ultrasound-guided injection treating the chronic mid-portion Achilles tendinopathy. PROSPERO 2020 CRD42020162703 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020162703

Ultrasound versus ESWT. Main outcomes: mean duration of symptoms. Additional outcomes: pain scores such as visual analogue score (VAS) and the secondary outcome was functional score such as Victorian institute of sports assessment for Achilles tendon (VISA-A).

Anticipated completion data 6 March 2020. Review is ongoing.

Patellar tendinopathy

Xinchao Shi, Guozhong Zhang, Feng Qi, Pengyu He, Xiao Ye, Hua Song, Longyu Zhang, Zemao Wang, Jiao Xu, Lijun Ding. The effectiveness of extracorporeal shock wave therapy in patellar tendinopathy: a systematic review and meta-analysis. PROSPERO 2020 CRD42020157920 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020157920

A meta-analysis of RCTs. Sham, placebo or non-surgical treatment interventions will be the comparator(s). Measures will include Visual Analog Scale (VAS) or Numerical Pain Rating Scale (NRS). Victorian Institute of Sport Assessment-Patella (VISA-P) or other function or disability measure.

Anticipated completion date 30 April 2020

Proximal hamstring tendinopathy

Matthew Willett. Effectiveness of injection therapy in the management of proximal hamstring tendinopathy: a systematic review . PROSPERO 2017 CRD42017084828 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42017084828

How effective are different forms of injection therapy in the management of proximal hamstring tendinopathy pain and functional outcomes? Injection therapy administered to the proximal hamstring tendon including platelet-rich plasma, autologous blood, corticosteroid, sclerotherapy, hyaluronic acid, aprotinin, prolotherapy, polidocanol. All comparators included such as traditional physiotherapy, extra-corporeal shockwave therapy, non-steroidal anti-inflammatories, placebo. Change in pain score from baseline to the last available follow-up, measured using any pain outcome measure. Additional oiutcomes: Functional outcome measures from baseline to the last available follow up, measured using any functional outcome score.

Anticipated completion date 29 June 2018. But review ongoing

Lateral elbow tendinopathy

Stefanos Karanasios, Konstantinos Michopoulos, Georgios Tsamasiotis, Georgios Gioftsos. The effectiveness of shockwave therapy in patients with lateral elbow tendinopathy. A systematic review. PROSPERO 2020 CRD42020175443 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020175443

The comparator can include another intervention or combination of other interventions such as massage, manual therapy, treatment modalities (shockwave, ultrasound, electrophysical agents

etc.), corticosteroid injections, braces, surgical treatments, placebo or a control group. The primary outcome measures were: i) Patient-rated Tennis Elbow Evaluation (PRTEE); Tennis Elbow Function Scale (TEFS); Nirschl/Pettrone pain score; the Disability of the Arm, Shoulder and Hand questionnaire (DASH); Pain Free Function Questionnaire (PFFQ), ii) global rating of improvement (GROC), iii) pain reduction in visual analogue scale (VAS) or numeric pain rating scale (NPRS), and iv) pain-free grip strength (PFGS).

Anticipated completion date June 2020

Hanniel Han Rong Lim, Jewel Jing Yi Wee, Zhi Yin Tang. Effects of Shockwave Therapy on Pain and Disability in Individuals With Chronic Lateral Elbow Tendinosis: A Protocol for Systematic Review of Randomized Controlled Trial. PROSPERO 2020 CRD42020165719 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020165719

Comparator will be any other forms of intervention which may include placebo, medication, ultrasound and/or exercises. The primary outcome include pain intensity assessed by the visual analogue scale or other pain score tools. The secondary outcomes comprise functional status and quality of life outcomes

Anticipated completion date: 31 December 2020

Plantar fasciitis

Rebecca Jessup, Matthew Oates, Renea Johnston, Rachelle Buchbinder. Shockwave therapy for plantar heel pain (plantar fasciitis) [Cochrane protocol]. PROSPERO 2020 CRD42020169086 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020169086

Study will include RCTs or controlled clinical trials with quasi-randomised methods of allocating participants to treatment. Comparators will include placebo, no treatment, physical therapies, including exercise and stretches, glucocorticoid injections, other types of injections (e.g. autologous whole blood or platelet rich plasma); foot orthoses, night splints, surgery. Outcomes will include mean overall pain, mean function, treatment success, quality of life, adverse events

Anticipated publication date 30 June 2020.

Greater trochanteric pain syndrome

Leonard Joseph, Joe Rook, Lenny Vasanthan, Richard Kirubakaran. Physiotherapy for pain and function in greater trochanteric pain syndrome: a protocol for a systematic review and meta-analysis. PROSPERO 2020 CRD42020165514 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020165514

Study will include studies utilising any modality of physiotherapy intervention deemed relevant for the treatment of GTPS. Physiotherapy interventions will include: exercise, manual therapy, electrotherapy, patient education, dry needling, taping. The comparator may include placebo or sham, no treatment, any other type of specific intervention. The primary outcome will be pain, function or disability, quality of life, treatment success measured by participant reported a global rating of change.

Anticipated completion date: August 2020

Aaron Gazendam, Seper Ekhtiari, Daniel Axelrod. Comparative Effectiveness of conservative management strategies for greater trochanteric pain syndrome: A Systematic Review and Network Meta-analysis. PROSPERO 2020 CRD42020167654 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42020167654

RCTs comparing any combination of conservative management strategies: exercise and physiotherapy; corticosteroids, platelet-rich plasma, hyaluronic acid injections; fenestrations; ESWT. The outcome measures of interest are change from baseline in pain and function scores reported at 3-month follow-up, and adverse events.

Anticipated completion date 31 March 2020

Osteoarthritis

Jia Wei Qin, Yi Zhang, Zexiang He, Lijian Wu, Yiheng Lin, Qiuxiang Lin. The efficacy of extracorporeal shock wave for chronic musculoskeletal pain conditions: systematic review and meta-analysis of randomized controlled trials. PROSPERO 2019 CRD42019148814 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42019148814

RCTs of patients who have had chronic musculoskeletal pain conditions which last for at least 3 months, including osteoarthritis. Comparators will be usual care/none/other therapy. Main outcomes will be pain, function, quality of life and adverse events.

Anticipated completion date: 31 March 2020

Myofascial pain syndrome

Ji Hyun Jun, Choong Sik Chae, Geun-Young Park. The effect of extracoporeal shock wave therapy on pain relief of myofascial pain syndrome. PROSPERO 2019 CRD42019137459 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42019137459

ESWT vs Conservative care, injection method such as trigger point injection or ultrasound therapy. Primary outcome will be pain intensity scale. Secondary outcomes will be neck disability (such as neck disability index) and pressure pain threshold measured by commonly used devices.

Anticipated completion date: 4 September 2019

Carpal tunnel syndrome

We did not identify any ongoing relevant SRs or RCTs for carpal tunnel syndrome

Morton's neuroma

Nguyen Tien Huy, Hieu Truong Hong, Muhammed Khaled Elfaituri, Ahmed Saber Abdelrahman, Mayada Awadallah Refaey, Nada Gaballa Ibrahim, Fatma Sadik, Mostafa Ebraheem Morra. Treatment of Morton's neuroma: a systematic review and meta-analysis. PROSPERO 2018 CRD42018087535 Available from: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42018087535

To assess the outcomes of the different types of Morton's neuroma treatment modalities, and to evaluate their effectiveness in terms of patient satisfaction, improvement in pain and other

symptoms in these patient populations. To evaluate and compare the different types of Morton's neuroma treatment in terms of pain and other symptoms, and to determine whether any of the approaches can provide a higher rate of success that the other treatments. Additional outcomes: Hospital costs, patient-important outcomes, non-invasiveness, adverse effects, recurrence and failure rates for each treatment, mortality and morbidity, and combination with various other treatments in the prediction of patient-related outcomes. Anticipated completion date: 5 March 2018

Appendix 4. Systematic review characteristics

Green indicates outcomes reported; amber indicates outcomes searched for but no, or very limited, evidence identified; red indicates outcomes not reported

Author (Year)	Selection criteria (type of condition/any other notable criteria)	Comparison(s)	Participant characteristics	ESWT place in therapy mentioned?	Functional outcomes, measured using any validated instrument	Change in pain (any measure)	Adverse events or complications from treatment	Requirement for further or additional treatment after the intervention	Cost or resource use	Quality of life	Patient satisfaction
Babatunde et al. (2019)	Plantar heel pain including plantar fasciitis, plantar fasciopathy, plantar fasciosis) / RCTs/ NMA	NMA included: exercise therapy, corticosteroid injections, orthoses, NSAIDs and ESWT, placebo/sham/usual care	Adults, non-professional athletes not mentioned	No	Yes	Yes	No	No	No	No	No
Buchbinder et al. (2005)	Lateral epicondylitis/meta-analysis of RCTs/only used for patient satisfaction as used another meta-analysis for pain and function	ESWT vs placebo	Adults (mean age 45.4 years), men and women, non-professional athletes not mentioned	Yes – participants had failed at least 6 months of conservative treatment (NSAIDs, brace/tape/cast, radiotherapy. Participants had to have previously received at least 3 local steroid injections.	No	No	Yes	No	No	No	Yes

Author (Year)	Selection criteria (type of condition/any other notable criteria)	Comparison(s)	Participant characteristics	ESWT place in therapy mentioned?	Functional outcomes, measured using any validated instrument	Change in pain (any measure)	Adverse events or complications from treatment	Requirement for further or additional treatment after the intervention	Cost or resource use	Quality of life	Patient satisfaction
Chen et al. (2019)	Patellar tendinopathy/ RCTs/ NMA for pain and functional outcomes	Systematic review studied focused ESWT vs: control, radial ESWT, LR-PRP NMA included: ABI; CSI, DN, focused ECSW; LR-PRP, radial ECSW; SDTLC, TGT, ultrasound	295 males and 75 females. Average age of the participants was 21 to 42 years. Unsure whether participant were athletes	Yes. duration of symptoms varied from 7 months to 4 years. Participants who had received surgery, corticosteroid injection, ESWT, or other interventions	Yes	Yes	Yes	*No*	No	*No*	*Yes*
Chen et al. (2020)	Osteoarthritis/meta-analysis of RCTs	ESWT vs: placebo, hyaluronic acid intra-articular injection, PRP intra-articular injection, CSI, medication, ultrasound, surgery, kinesiotherapy, traditional Chinese medicine	Aged ≥ 45 years.Non-professional athletes not mentioned	No	Yes	Yes	Yes	No	No	No	No
David et al. (2017)	Plantar heel pain/meta-analysis of RCTs/ only used for adverse events as used another meta-analysis for pain and function	ESWT vs corticosteroid injection	Mean ages ranged from 34 to 59 years. Non-professional athlete not mentioned.	Most had pain for several months	No	No	Yes	No	No	No	No

Author (Year)	Selection criteria (type of condition/any other notable criteria)	Comparison(s)	Participant characteristics	ESWT place in therapy mentioned?	Functional outcomes, measured using any validated instrument	Change in pain (any measure)	Adverse events or complications from treatment	Requirement for further or additional treatment after the intervention	Cost or resource use	Quality of life	Patient satisfaction
Xie et al. (2020)	Carpal tunnel syndrome/meta-analysis of RCTs/ subgroup analysis comparing rESWT to fESWT	ESWT vs: CSI, sham, wrist splint, supplement, ultrasound	Mean ages ranged from 46 to 60 years old. Non-professional athlete not mentioned	No	Yes	Yes	No	No	No	No	No
Korakakis et al. (2018)	Proximal hamstring tendinopathy/systematic review/moderate GRADE	rESWT vs traditional conservative treatment	Male and female adults, involved in all types of activities. Unsure whether athletes	No. They set no limit for duration of symptoms.	Yes	Yes	No	No	No	No	Yes
Koulischer et al. (2017)	Greater trochanteric pain syndrome/systematic review including case control studies and quasi-randomised studies	rESWT vs: multimodal therapy, CSI, home training. LESWT vs multimodal therapy	Included athletes	No	Yes	Yes	No	No	No	No	No
Li et al. (2019)	Plantar fasciitis (short-term outcome [change in pain at 1 ,2 , and 3 months] and long-term outcome [change in pain at 6-months])/ prospective studies or RCTs/ NMA	NMA included: NSAIDs, CSI, autologous whole blood, PRP, ESWT, ultrasound therapy, botulinum toxin, DN	Adults. Non-professional athletes not mentioned	No	No	Yes	No	No	No	No	No

Author (Year)	Selection criteria (type of condition/any other notable criteria)	Comparison(s)	Participant characteristics	ESWT place in therapy mentioned?	Functional outcomes, measured using any validated instrument	Change in pain (any measure)	Adverse events or complications from treatment	Requirement for further or additional treatment after the intervention	Cost or resource use	Quality of life	Patient satisfaction
Mani-Babu et al. (2015)	Achilles tendinopathy/11 studies included in systematic review/ 5 RCTs included in meta-analysis of functional outcomes, and 4 RCTs and 2 case control studies for pain	ESWT vs: conservative treatment, placebo, eccentric loading, wait-and-see policy	Unsure whether athletes	No	Yes	Yes	No	No	No	Yes	Yes
Rhim et al. (2020)	Achilles tendinopathy/2 RCTs, 143 participants/NMA of pain, function and tolerability	ESWT vs eccentric exercise	Adults. Unsure whether athletes	Excluded studies were those involving patients who had undergone surgeries for AT; patients who received dietary supplements or oral pharmacotherapies	Yes	Yes	Yes	No	No	No	No

Author (Year)	Selection criteria (type of condition/any other notable criteria)	Comparison(s)	Participant characteristics	ESWT place in therapy mentioned?	Functional outcomes, measured using any validated instrument	Change in pain (any measure)	Adverse events or complications from treatment	Requirement for further or additional treatment after the intervention	Cost or resource use	Quality of life	Patient satisfaction
Surace et al. (2020)	Rotator disease with or without calcification/ RCTS and quasi-randomised CCTs/ high- and low-dose ESWT were compared/ dual session shock wave therapy to single and different delivery methods of shock wave therapy were studied	ESWT vs: ultrasound-guided glucocorticoid needling, ultrasound-guided hyaluronic acid injection, TENS, no treatment or exercise session therapy. Main comparison was shock wave therapy versus placebo	Men and women. Average age 52 years old	Average duration of condition was 33 months. Included studies where there was a failure to respond to conservative treatment, and where patient hadn't previously received an intervention	Yes	Yes	Yes	No	No	Yes	Yes
Thomson et al. (2020)	Morton's neuroma/systematic review of RCTS, a comparative study and prospective cohort study	ESWT versus sham	Adults. Non-professional athletes not mentioned	No	Yes	Yes	No	No	No	No	Yes
Yao et al. (2020)	Lateral epicondylitis/prospective RCTs only/meta-analysis of pain evaluation and grip strength	EWST vs: placebo, ABI, CSI, laser, physiotherapy, WESs, KT	Adults. Non-professional athletes not mentioned	No	Yes	Yes	Yes	No	No	No	No
Zhang Q et al. (2020)	Myofascial pain syndrome/meta-analysis of 10 RCTs	ESWT vs: sham ESWT, ultrasound, dry needling, trigger point injection, laser therapy, exercise	Adults. Non-professional athletes not mentioned	No	Yes	Yes	No	No	No	No	No