Keele UNIVERSITY
Impact Accelerator Unit

NHS
Leeds Community Healthcare
NHS Trust

Critically Appraised Topic

Clinical Question:
In adults with Greater Trochanteric Pain Syndrome (GTPS) is shockwave therapy (ESWT) more effective at reducing pain and improving function compared with usual care?

Clinical bottom line

The evidence regards shockwave therapy for Greater Trochanteric Pain Syndrome has several limitations. Consequently, any conclusions drawn should be interpreted carefully and in the context of the available research and its weaknesses.

Focused shockwave therapy appears more effective than other treatments at two to four months post administration at reducing pain. However, this benefit is not seen at time points beyond this. The evidence reports no significant reduction in pain with the use of radial shockwave therapy over other treatments. Lower extremity function scale scoring improved at two to four, beyond four and at six-month post focused shockwave therapy, however, whilst statistically significant the difference did not reach the minimal nine-point difference that is evaluated as clinically meaningful.

Any recommencement of ESWT provision will require clinicians to ensure they understand current evidence to facilitate shared-decision making with patients. This critically appraised topic will be shared with the senior leadership team and musculoskeletal colleagues.

Plain Language Summary

Pain on the outside of the hip can happen when the soft tissues and tendons become irritated. This is called Greater Trochanteric Pain Syndrome. One possible treatment is shockwave therapy.

One type of shockwave, called focused shockwave, may be better at reducing pain two to four months after treatment compared to other treatments, but this benefit does not seem to last longer. Focused shockwave may also help people find it a bit easier to do everyday activities that involve using their legs, but it is unclear if the improvement is big enough to make a real difference.

Another type of shockwave, called radial shockwave, does not appear to work better than other treatments.

Overall, there is limited research, so more studies are needed to understand how well shockwave therapy really works.

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Why is this important?

Leeds Community Healthcare Trust (LCHT) provides community musculoskeletal (MSK) diagnostic and treatment services for adults in Leeds, West Yorkshire. GTPS is a common diagnosis among patients presenting with persistent lateral hip pain (Stephens et al. 2019)

Until September 2025, standard GTPS management included education, activity modification, progressive loading, and/or corticosteroid injection (CSI) or radial shockwave therapy (r-ESWT) as second line options. Evidence from Dean et al. (2014) highlights potential long-term tendon harm from corticosteroid injection (CSI), while ESWT is considered safe but with uncertain efficacy (NICE 2011).

Whilst our service uses only r-ESWT, focused shockwave therapy (f-ESWT) utilises different technology and is widely used in the treatment of GTPS elsewhere. Radial shockwaves, generated through pneumatic pressure, treat broader, more superficial areas of tissue at a maximum depth of three to four centimetres. Whereas focussed shockwaves are delivered at higher energy intensities to more concentrated areas and can penetrate up to 12 centimetres below the surface of the skin (Li et al. 2021)

The differing mechanism of action between r-ESWT and f-ESWT potentially have different therapeutic effects on GTPS, however NICE guidelines currently do not differentiate between the two.

Current ESWT for GTPS provision is paused in LCHT due to an intermediate care board (ICB) review.

An internal audit of 41 GTPS patients (see Table 1) receiving a total of three sessions of r-ESWT showed 53% reported no improvement on the MSK-HQ at eight weeks, while 47% reported subjective improvement of 30–100%.

In September 2025, LCH MSK leadership paused ESWT pending an NHS West Yorkshire ICB decision on potential de-commissioning, citing the need to align services across trusts. As a result, CSI is now the only pathway option for GTPS unresponsive to other conservative care.

These service changes and questions about the clinical and cost-effectiveness of ESWT for GTPS prompted this critically appraised topic (CAT), aiming to identify evidence published since the 2011 NICE guidance to support evidence-based practice and improve shared decision-making for GTPS management.

Table 1:

Reported percentage of improvement at eight weeks following three r-ESWT sessions. Parameters: 3.0 bar pressure, 2000 impulses, 20 Hz frequency.

Reported percentage of improvement at 8 weeks post treatment	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Individuals with GTPS (Total 41)	22	0	0	4	5	2	4	1	1	0	2

Search timeframe: from 2010 to present to capture evidence published since last NICE guidance in 2011.

Table 2: Search criteria and search terms used

Population Intervention Comparison Outcomes (PICO)	Description	Search terms
Population and setting	Adults with greater trochanteric pain syndrome (GTPS)	• Adults AND • GTPS • Greater trochanter pain syndrome • Greater trochanteric pain syndrome • Gluteal tendinopathy or tendinitis • Trochanteric bursitis
Intervention or Exposure	Extracorporeal shockwave therapy	• Extracorporeal shockwave therapy AND • ESWT

		• Shockwave
Comparison	Usual care that might be offered in our MSK service	• Physiotherapy • Exercise • Tendon loading • Strengthening • Activity • Non-surgical • Lifestyle change/ modification • Advice • Education • Analgesic/analgesia • Medical/ medication • Pain relief • No treatment • watchful wait(ing) • Placebo
Outcomes of interest	Pain, functional outcome measures	• Pain • Function
Types of studies	• Clinical guidelines • Systematic Reviews +/- meta-analysis • RCTs If insufficient evidence from above, look at observational studies	

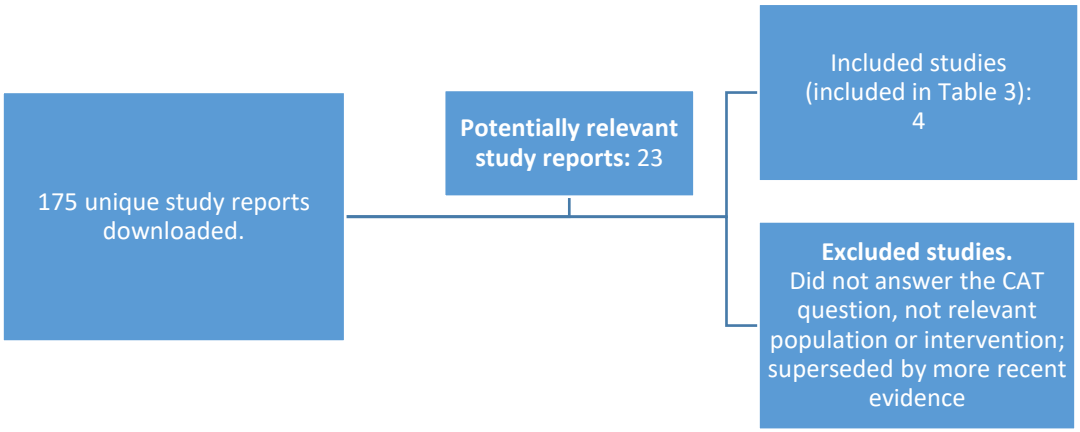
Databases searched

Medline, Emcare, Embase, CINAHL, Cochrane

Date of search

2010 to 23rd September 2025.

Figure 1. Results of the search



Prior to deduplication there were 309 studies returned (Medline: 58, Emcare: 68, Embase: 136, CINAHL: 29 and Cochrane: 18 including trials). Once deduplicated there were 175 unique downloaded studies, 23 being potentially relevant studies. There were 4 studies included and their critical appraisal is included in Table 3. 19 studies were excluded.

Table 3 - Detail of included studies

Study (first author, year of publication, study type)	Population and setting	Intervention evaluated and outcomes measured	Study results (reported harms/ adverse events)	Quality
Anand, A. et al (2025) Extracorporeal Shockwave Therapy in Greater Trochanteric Pain Syndrome: A Systematic Review and Meta-Analysis **Systematic Review and Meta-Analysis**	Patients diagnosed with GTPS. English language studies up until March 2024. 5 Randomized Controlled Trials, 1 Quasi randomized control trial and 1 Randomized Cross-over trial assessing the effects of Extracorporeal Shockwave Therapy (ESWT) on GTPS in humans. 7 trials analysed equally 714	**Intervention:** Extracorporeal shockwave therapy radial and focused (r-ESWT and f-ESWT) applied once per week for 3 sessions. **Comparison:** Placebo-controlled, usual care, corticosteroid injections, physiotherapy/exercise therapy, or other non-surgical treatment such as Ultrasound (US). **Outcomes:** Pain, lower extremity function scale (LEFS), and treatment satisfaction for short- and long-term follow-ups using the Roles-Maudsley Scale (RMS). Follow-up periods defined as;	For meta-analysis all comparators were pooled then compared with r and f-ESWT. r-ESWT therapy did not have any statistically significant effect in decreasing the **pain** intensity in patients with GTPS compared to the control/alternative group, (SMD= -0.03; 95%CI -0.41 to 0.35; Z = 0.16, P = 0.87) across short, medium, and long-term follow-ups (pooled effect estimates). At all 3 separate time points no significant difference was reported. Included 3 studies 2 comparing ESWT with CSI, 1 with exercise. f-ESWT therapy has a statistically significant effect in decreasing the **pain** intensity in patients with GTPS compared to the	Relevant to CAT. However, one of the included studies compared US to f-ESWT and US is not a usual treatment provided within our service. Clearly outlined PICO/question. Range of databases searched but not all, for example Cochrane library omitted. No clear reason why only 6/7 studies included in

	participants, 6 included (the randomized cross-over trial was excluded) in the meta-analysis. Studies included 3 r-ESWT, 4 f-ESWT. 3 r-ESWT and 3 f-ESWT used in the Meta-analysis.	-short-term: 1 month or less -medium term: 2-4 months -long-term: > 4months.	control/alternative group at medium- and long-term follow-ups (SMD = -1.96; 95%CI -3.22 to -0.71; Z = 3.06, p = 0.002. I^2 = 96%). At separate time points there was significant difference reported at medium-term (SMD = -1.18; 95%CI -1.72 to -0.64; Z = 4.30, P <0.0001. I^2 = 72%) but not long-term. 3 studies with f-ESWT compared with US, exercise and CSI (pooled effects estimates). f-ESWT was significantly better than control/alternative interventions in the medium and the long-term in improving **LEFS** in GTPS (SMD = 0.61; 95%CI 0.41 to 0.81; Z = 6.02 p < 0.00001), pooled analysis. Two studies were included in the meta-analysis comparing f-ESWT to US and f-ESWT and exercise to sham f-ESWT and exercise. Qualitative analysis reported no significant difference of ESWT on lower extremity function at any follow-up when compared with US, while a statistically significant improvement was observed in the f-ESWT and exercise group compared with sham f-ESWT with exercise at short, medium and long-term. In a third study, the randomised cross over study the LEFS scores between f-ESWT and eccentric exercises did not show any significant differences at any time points. **RMS** was used in 2 studies. Qualitative analysis revealed in one study (f-ESWT and exercise v's sham ESWT and exercise) statistically significantly higher patient **satisfaction levels** was reported in the second (r-ESWT v's exercise) no statistically significant difference was seen. f-ESWT demonstrated superior efficacy in alleviating pain and enhancing physical function compared to r-ESWT.	the meta-analysis; why the randomised cross over trial was excluded. Overall, well conducted review with its limitations discussed. The meta-analysis is based on a relatively small number of studies with limited sample sizes, variability in ESWT treatment protocols across the included studies, as well as differences in interventions administered to the comparator groups, contribute to the observed high heterogeneity in the meta-analysis results. Significant heterogeneity was recognised within the review, the level of statistical heterogeneity/I^2 was calculated. Good use of Funnel plots, 3 produced; pooled analysis for pain intensity r-ESWT v's control and f-ESWT v's control, and f-ESWT v's LEFS. Results need to be taken in context of the level of high heterogeneity which impacts the generalizability of the findings along with the risk of publication bias due to the small number of studies.

Bremer T. et al (2025) The efficacy of gluteal tendinopathy treatments: A systematic review **Systematic review**	A randomised controlled trial was included if the participants were clinically diagnosed as having gluteal tendinopathy. 6/11 studies = imaging used to diagnose 4/11 = clinical diagnosis. 934 participants studied. 97.4% of participants were female. 6/11 studies required GTPS symptoms to be present >3 months. Search included published RCT's and also those that did not reach full publication; in any language up until August 2024.	**Intervention:** Within this systematic review, four studies evaluated the efficacy of shockwave therapy as a primary intervention. **Comparison:** **Carlisi (2018):** Ultrasound vs f-ESWT. **Heaver (2021):** f-ESWT plus exercise vs CSI plus exercise. **Ramon (2020):** f-ESWT plus exercise. vs Sham f-ESWT plus exercise. **Wheeler (2021)** r-ESWT (recommended dose) vs r-ESWT (minimal dose) plus exercise programme. **Outcomes:** **Pain:** Visual Analogue Scale Numeric pain rating scale **Function:** Hip Harris Score, Victorian institute sports assessment (VISA) gluteal (G), Lower Extremity Functional Scale.	Secondary proof of efficacy on pain and function for shockwave therapy was derived from Heaver et al. 2021 only. Unclear why the other studies were omitted. **Short term:** Moderate strength evidence of no difference in effect of focused shockwave therapy on pain in the short-term compared to corticosteroid injection (SMD 0.16, 95% CI [−0.24, 0.56]). There was moderate strength evidence of no difference in effect of focused shockwave therapy on function in the short term compared to corticosteroid injection (SMD 0.23, 95% CI [−0.17, 0.62]). **Long term:** Moderate strength evidence with a large effect size (SMD 5.77, 95% CI [4.84, 6.71])37 of superiority of focused shockwave therapy on pain in the long-term. No data for log-term effect on function. Patient-reported outcomes in a demographic of chronic gluteal tendinopathy patients are largely favourable of the use of shockwave for pain.	Not a specific question, but clear PICO. Appropriate databases were searched. Thorough search strategy; reference lists of all included studies were used to identify trials not already identified by the search strategy. Additionally, the International Clinical Trials Registry Platform of the WHO was searched for relevant reports. Rompe study was not included, unclear why, possibly due to it being a Quasi-RCT rather than RCT. Methodological quality clearly assessed, and risk of bias assessment completed. Of the four studies which assessed ESWT methodological quality was high across all four (PEDro range 6–9/10; risk of bias range some concern – low risk). Studies deemed to have poor methodological quality <4/10 PEDro score or high risk of bias were omitted. Metanalysis not possible due to heterogeneity between studies. In this review; 97.4% of participants were female. GTPS is

				more prevalent in females, with the distribution estimated to be 73% female to 27% male (Reil et al 2019) // so generalisability is possible but with some caution. Radial ESWT assessed in 1 of 4 studies included) but the results were omitted from the discussion and commentary re: main findings.
Rau, O.R. et al (2025) Extracorporeal Shockwave Therapy for Tendinopathies Around the Hip and Pelvis: A Systematic Review **Systematic Review**	Looked at patients with hip and groin tendinopathies, including Proximal Hamstring Tendinopathy (PHT), GTPS and Calcific tendinopathy (CT). Search performed on 1st November 2024. Altogether, studies included 927 individuals (682 females, 245 males), with an average age of 50.7 years. Of these, 586 (431 females, 155 males) were treated with ESWT (average age: 51.5 years). Five studies focused on active populations (average age: 39.4 years), including runners presenting to a running medicine clinic, professional athletes, a para-swimmer, and an ultra-marathon runner. The remaining 13 studies included patients of all activity	**Focussed ESWT (f-ESWT)** 5 studies compared a f-ESWT intervention with other treatment modalities to treat GTPS. **Interventions studied:** **Carlisi (2019)** (RCT) compared US therapy vs ESWT RCT. Heaver (2023) (RCT) compared Cortico-steroid injection (CSI) vs f-ESWT. **Notarnicola (2023)** (prospective RCT) compared Exercise vs f-ESWT. **Ramon (2020)** (RCT) f-ESWT plus exercise vs sham f-ESWT plus exercise. **Seo (2018)** (retrospective cohort study) looked at 38 patients with MRI-confirmed-GTPS who were treated with f-ESWT (most other studies patients were clinically diagnosed). **<u>Frequency:</u>** 4/5 studies involved 3 sessions of f-ESWT at weekly intervals, 1 study (Seo 2018) used up to 11 weekly sessions.	**Focussed ESWT (f-ESWT)** **Results:** **Carlisi (2019)** reported clinically significant decrease in pain (NRS) at 2 months and 6 months with ESWT. Statistically significant greater pain reduction with r-ESWT compared to US. A marked improvement in function (LEFS) but no SS difference between f-ESWT and US. **Heaver (2023)** All outcome measures for pain and function showed SS improvement at 3 and 12 months. Statistically significant greater improvement in pain (VAS) and function (HHS) post f-ESWT compared with CSI at 12 m. greater likelihood of negative Trendelenburg test post-ESWT vs. CSI. **Notarnicola (2023)** All outcome measures showed SS improvement at 2, 4, 6 months; no differences between PT, f-ESWT, and cross-over groups. **Ramon (2020)** Statistically significant improvement at 1, 3, 6 months; Treatment satisfaction (RM) success rate: 64.2%.	Appropriate databases were searched and reference lists were reviewed for relevant studies. Non-English language studies were excluded and did not include un-published studies. The report analysed a wide variety of treatments not just ESWT. Quite broad scope: looking at multiple pathologies (GTPS, CT, PHT) as such many of the findings were not relevant to our own clinical question. The 8 RCTs were assessed using the Risk of Bias Tool RoB2: 3 had a low risk of biased judgment (including Heaver and Carlisi), 2 had some concerns for risk (Ramon and Wheeler), and 3 had a high risk (including Notarnicola and Rompe). No discussion beyond this regarding

	levels (average age: 54.8 years). Nearly all studies assessed patients experiencing chronic tendinopathy, defined by a period of either 3 or 6 months.	**Intensity:** ESWT parameters varied among studies. **Radial ESWT** 3 studies compared a r-ESWT intervention with other treatment modalities to treat GTPS. **Interventions studied:** **Furia et al (2009)** (Case control study) compared Physiotherapy (PT) only vs one session of r-ESWT without PT (1 session; 2000 pulses; 4 bar; 1 Hz; discouraged concurrent interventions for 3 m). **Rompe et al (2009)** (RCT) compared a standard PT home exercise programme (HEP) vs CSI vs 3 sessions of r-ESWT (with an exercise intervention that was not administered simultaneously). **Wheeler et al (2022)** (RCT) compared 3 sessions of r-ESWT vs 3 sessions of "minimal-dose" r-ESWT, which employed lower numbers of pulses and bars of pressure. **Frequency:** 2 r-ESWT studies involved 3 to 4 sessions at weekly intervals (Rompe 2009, Wheeler (2022), but 1 study (Furia 2009) used only 1 session of r-ESWT to treat GTPS, **Intensity:** The number of pulses administered per session ranged from 2000 to 3000, with frequencies ranging from 8 Hz to 20 Hz. Bar pressure ranged from 2.0 to 4.5 bar. **Timescale for follow up:**	Statistically significant greater improvement in outcomes (except LEFS at 1 m) with f-ESTW compared with sham ESWT at 1, 3, 6 months. **Seo (2018)** Statistically significant improvement in pain (NRS) post f-ESWT at immediate and long-term follow-up. Positive treatment satisfaction (RM) success rates: (83.3% at immediate follow up and 55.6% at long-term follow up). **Reported harms:** No major complications following f-ESWT were reported. Side effects were uncommon (1%; n = 2/175) and included increased or lasting pain necessitating pain medication. **Radial ESWT** All 3 RCT's reported improvement in symptoms at all timepoints for the r-ESWT groups. **Rompe (2009)** Using the Likert scale of recovery (LSR) reported success rates of: 68% at 4 months, 74% at 15 months (both ESWT and PT). Statistically significant difference in favour of ESWT over PT at 4 months but no difference between PT and r-EWST groups at 1month and at 15 months. **Furia (2009)** Clinically significant improvement in all measures, at 1, 3, 12 months; with a greater improvement post- f-ESWT vs. PT group. **Wheeler et al (2022)** Statistically significant improvement in pain, function, and sleep at 6 weeks, 3 months, and 6 months in both groups; no	assessment of quality of the methodology. The authors declared no potential conflicts of interest. The authors decided due to Heterogeneity in reported ESWT protocols prevented ability to quantitatively synthesize the data.

		Outcomes for r-ESWT studies were assessed at various timepoints up to 15 months. **<u>Outcomes measured (both f-ESWT and r-ESWT)</u>** Numerical rating (NRS) scale, Roles and Maudsley (RM) treatment satisfaction scale (SS), VAS: Visual analogue scale (VAS) Harris hip score (HHS), Lower-extremity functional scale (LEFS), EQ-5D EuroQol-5.	between-group differences in outcomes. All 3 studies reported improvement in symptoms at all timepoints for the r-ESWT groups. 1 of the study's included (GTPS and r-ESWT) was a case study. all 3 studies reported some minor adverse reactions, including skin irritation, bruising, and increased pain immediately following treatment. Short term, resolved with analgesia.	
Rhim H.C. et al (2024) Extracorporeal Shockwave Therapy for Greater Trochanteric Pain Syndrome: A Systematic Review with Meta-Analysis of Randomized Clinical Trials **Systematic Review with Meta-Analysis of Randomized Clinical Trials**	Patients with GTPS. RCT's up to 1.3.2024 published in English and Chinese. 8 RCT's (all the same as Anand et al (2025) plus Shi et al 2012) involving 754 patients (169 male, 585 female patients). 5 RCTs investigated f-ESWT, and 3 r-ESWT.	**Intervention**: r- and f-ESWT. In all 8 studies, f-ESWT or r-ESWT was applied once per week for 3 sessions. **Comparison:** Physical/exercise therapy (n=3), corticosteroid injection CSIs (n=3), sham shockwave, and therapeutic ultrasound. **Outcomes:** Visual analogue scale (VAS) pain scores (n=8), Lower Extremity Functional Scale (LEFS) (n=3) and Harris hip score (HHS) (n=3). Follow-ups at 2 to 4 months, 6 months, only 2 RCTs followed up at 12 and 15 months.	For meta-analysis, ESWT type was pooled and compared with other comparators then subgroup analysis of ESWT v's CSI, ESWT v's exercise and f-ESWT v's r-ESWT against pooled comparators was conducted. **VAS**: At 2 to 4 months, patients treated with ESWT had significantly lower pain VAS than other treatments (SMD = -0.431; 95% CI, -0.82 to -0.039; I^2 = 83%). Included 8 studies. At 6 months, a meta-analysis of 4 RCTs showed no significant difference between ESWT and other treatments (SMD = -0.51; 95% CI, -1.27 to 0.25; I^2 =87.2%). **LEFS**: 3 studies reported LEFS. At baseline and at 2 months, there was no significant difference in LEFS between ESWT and other treatments (WMD= -4.24; 95% CI, -14.85 to 6.37; I^2 = 79.6% and WMD = 3.396; 95% CI,-5.924 to 12.716; I^2 = 79.6%, respectively). At 6 months, patients treated with ESWT showed significantly higher LEFS scores than those of other treatments WMD = 6.68; 95% CI,3.11-10.25; I^2 = 0%). **HHS**: 3 RCT's. There were no significant differences between ESWT and other treatments at baseline, 2 to 4 months, or 6 months. <u>Subgroup Analysis</u> **ESWT vs. CSI** At 1 month, a meta-analysis of 2 RCTs showed that patients treated	Relevant to CAT. However, one of the included studies compared US to f-ESWT and US is not a usual treatment provided within our service. Clear PICO and study design evident, explanation to why certain statistical measures not evaluated e.g. publication bias not calculated due to there being less than 10 studies. Heterogeneity was assessed with Q and I^2 statistics. Only one funnel plot presented for the initial pooled analysis of ESWT v's other treatments in terms of VAS at 2-4 months. Limitations relating to heterogeneity were acknowledged and how the subgroup analysis attempted to address the variability in the first pooled analysis. However, limitations remained due to; small number of studies, 754 participants with

			with CSI had lower pain **VAS** than those treated with ESWT (SMD = 0.773, 95% CI, 0.013-1.533; I^2 5 83.7%). At 2 to 4 months, a meta-analysis of 3 RCTs demonstrated that there was no significant difference between ESWT and CSI (SMD= -20.241, 95%CI, -0.823 to 0.342; I^2 = 83.7%). At 12 to 15 months, a meta-analysis of 2 RCTs showed that there was no significant difference between ESWT and CSI **(**SMD = -3.345, 95% CI, -8.165 to 1.475; I^2 = 99.0%). **ESWT vs. Exercise Therapy** At 2 to 4 months, a meta-analysis of 5 RCTs demonstrated that patients treated with ESWT had significantly lower pain **VAS** than that of exercise therapy alone (SMD = -0.59, 95% CI, -1.13 to -0.05; I^2 = 86.4%). **f-SWT vs. r-SWT** When subgroup analysis was conducted based on the type of ESWT used, F-SWT appeared to have greater benefits of **pain** reduction over other treatments (SMD = -0.62, 95% CI, -1.11 to -0.13; I^2 = 77.6%) while there was no significant difference between R-SWT and other treatments (SMD= -0.14, 95% CI, -0.80 to 0.51; I^2 = 88.2%) at 2 to 4 months. 3 weekly sessions of ESWT may be safe and effective treatment for reducing pain in patients with GTPS at 2 to 4 months following the last session.	subgroup analysis and later follow-up points containing less studies e.g. 2 studies in some cases for 12-15/12 follow-up. 7 of the included RCTs had high risk of bias, with the most common sources of bias being, missing outcome data, risk of bias in measurement of the outcome, and risk of bias in selection of the reported result. Results must be view with the limitations of the studies and subsequent meta-analysis in mind.

Table 4: details of which primary studies are included in the individual systematic reviews and systematic reviews and meta-analyses detailed in Table 3

Systematic Review/Systematic review and meta-analysis	Rau et al., 2025	Bremer et al., 2025	Anand et al., 2025	Rhim et al., 2024
Carlisi et al., 2019	Y	Y	Y	Y
Furia et al., 2009*	Y	N	N	N
Heaver et al., 2023	Y	Y	Y	Y
Notarnicola et al., 2023*	Y	Y	Y ***	Y
Ramon et al, (2020)	Y	Y	Y	Y
Rompe et al., 2009*	Y	N	Y	Y

Seo et al., 2018 *	Y	N	N	N
Shi et al., 2021**	N	N	N	Y
Wheeler et al., 2022	Y	Y	Y	Y
Yağcı et al., 2023	Y	Y	Y	Y

*All RCT's except, Furia et al., 2009 which is a case control study, Notarnicola et al., 2023 a prospective randomized clinical trial with cross-over, Rompe et al., 2009 a Quasi RCT and Seo et al., 2018 a retrospective review.

**All English language studies except Shi et al., 2021 which is Chinese.

*** Included in the qualitative review but not in the meta-analysis component.

Summary

Since 2011, the last NICE guidance regards ESWT for GTPS, new evidence has been published. Four studies are included in this CAT review, two are meta-analyses. Although Anand et al. (2025) was published a year after Rhim et al. (2024), both reviews applied identical search date criteria, which justified the inclusion of each. They conducted different subgroup analyses, which provided additional rationale for retaining both. However, the high heterogeneity, small number of included studies, particularly within subgroup analyses, and concerns regarding risk of bias means that conclusions and the generalisability of findings should be interpreted with caution. Two systematic reviews were also included, as their search periods extended beyond those of the meta-analyses and thus had potential to capture more recent evidence. Table 4 presents the overlap of primary studies across the included reviews.

Pain scores:

Both meta-analyses reported that f-ESWT demonstrated greater efficacy than r-ESWT. At 2–4 months, Anand et al. (2025) and Rhim et al. (2024) each found that f-ESWT produced a statistically significant reduction in pain intensity for patients with GTPS compared with other comparators. This effect was not seen at longer-term follow-up, Anand et al. (2025), defined long-term follow-up as beyond four months, whereas Rhim et al. (2024) assessed outcomes at six months and again at 12–15 months. r-ESWT did not have any statistical effect in reducing pain over other treatments.

ESWT versus CSI: Rhim et al. (2024) reported in their subgroup analysis that at one month, patients treated with CSI had lower VAS scores than those treated with ESWT. No significant differences were observed at any subsequent time points. All three included studies in this comparison administered r-ESWT.

ESWT versus exercise therapy: Rhim et al. (2024) found that, at two to four months, a meta-analysis of five RCTs, three using f-ESWT and two using r-ESWT, showed that ESWT resulted in significantly lower pain VAS scores compared with exercise therapy alone.

LEFS scores:

Anand et al. (2025) reported f-ESWT was significantly better than control/alternative interventions in the medium (two to four months) and the long-term (greater than four months) in improving LEFS. This correlates with Rhim et al (2024) who reported that six months post ESWT patients showed significantly higher LEFS scores than those of other treatments. However, Rhim et al (2025) notes the difference did not exceed the minimally clinically important difference which limits clinical relevance of the findings.

The systematic reviews of Bremer et al (2025) and Rau et al (2025) did not reveal any newer studies than that included in the meta-analysis's reviews. Bremer et al (2025) based their conclusions on one high-quality RCT Heaver et al (2021) which met their threshold for demonstrating 'proof of efficacy' for f-ESWT on improving pain and function for GTPS which aligns with Anand et al (2025) and Rhim et al (2024) findings. Rau et al (2025) study reports similar results for both focused and radial being superior to normal care but arguably does not recognise sufficiently the limitations of the studies which support the use of r-ESWT.

Implications for practice

Whilst new studies have been published since the 2011 NICE guidance, limitations of recent studies mean caution should be exercised in generalising findings. The NICE Clinical Knowledge Summaries on greater trochanteric pain syndrome (2023) makes no reference to the use of ESWT.

f-ESWT shows greater efficacy in reducing VAS scores in patients with GTPS at two to four months when compared with alternative interventions. Additionally, LEFS scores improve post f-ESWT at two to four, four and six months but notably not more than the nine points required to be minimally clinically significant.

LCHT MSK service utilises r-ESWT. If ESWT is to be continued consideration should perhaps be given the use of f-ESWT rather than r-ESWT for GTPS. This would have cost implications of procuring a new ESWT machine and weighing up whether the current evidence available is strong enough to balance the benefit to the patients and service. It may be that due to the limitations of the evidence r-ESWT still has a role as although r-ESWT does not show greater pain reduction over other

treatments, in patients whose GTPS pain remains recalcitrant despite usual treatments, it may still provide benefit. Additionally, local ESWT audit data compiled in accordance with NICE (2011) guidance is likely to feature in commissioning conversations. To further facilitate the ICB review collating patients' experiences of ESWT maybe valuable as the current LCHT MSK referral criteria for ESWT consideration is that other conservative treatments have been exhausted so without ESWT there is currently nothing else the MSK can offer patients with recalcitrant symptoms.

Further good quality RCT's are required that include long-term follow-up to better understand ESWT efficacy. A study within our returned search results and on the Cochrane Central Register of Controlled Trials titled "Shock Wave Therapy Combined with Strengthening Exercise of Hip Abductor Muscles in the Greater Trochanteric Pain Syndrome: A Randomized Controlled Trial" started in 2024 may yield further evidence regards the efficacy of ESWT in patients with GTPS.

This CAT review will be shared with our clinical teams locally including the senior management team who continue their discussions with the ICB about future ESWT commissioning/provision. The CAT will be made available on the Keele CAT website.

CAT image	Evidence quality	Checkbox
	Good quality evidence to support use….	☐
	Insufficient or poor-quality evidence OR substantial harms suggest intervention used with caution after discussion with patient…	☑
	No good quality evidence, do not use until further research is conducted OR Good quality evidence to indicate that harms outweigh the benefits….	☐

What would you post on social media?

Since NICE guidance in 2011, more research on extracorporeal shockwave therapy (ESWT) for refractory GTPS has emerged, but evidence remains limited in quantity and quality. Recent studies suggest focused ESWT outperforms radial ESWT. Focused ESWT significantly reduces pain scores at two to four months and improves lower extremity function scores at two to four, beyond four and six months compared

with other interventions. However, the clinical relevance of improved lower extremity function score is questionable as improvement does exceed the minimally clinically important difference of nine points. Shared decision-making conversations need to continue to reflect current literature findings, their limitations and need for further research.

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