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Original article

A survey of physiotherapy practice (2018) in the United Kingdom for patients with greater trochanteric pain syndrome

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ABSTRACT

Purpose: Greater Trochanteric Pain syndrome (GTPS) is a debilitating condition causing lateral hip pain. It affects up to 23.5% of women and 8% of men between 50 and 75 years old. Sufferers report comparable quality of life and functional performance to patients with end stage osteoarthritis of the hip. Understanding of optimal management strategies for GTPS remains limited. Hence, the purpose of this cross-sectional survey was to describe current UK physiotherapy practice so as to understand current practice and inform the systematic development of a physiotherapy intervention.

Methods: An online survey was developed and distributed via Twitter, the interactive Chartered Society of Physiotherapy website, Musculoskeletal Association of Chartered Physiotherapists and the professional networks of the authors via email. Responses were collected over a four-week period, this was finalised in April 2018.

Results: A total of 409 surveys were submitted; 382 were eligible for use. Nearly all physiotherapists were either somewhat, or very confident diagnosing (372/382; 97.4%) and treating (372/382; 97.4%) patients with GTPS. The management strategies most commonly used were: education on load management (377/381; 98.7%) and self-management strategies (375/381; 98.4%). Strengthening exercises (376/382; 98.4%) were commonly used and targeted to the hip abductors (355/379; 93.7%). Most frequently these exercises were delivered using a combination of home exercise programme (380/380; 100%) and one-to-one exercise sessions (344/377; 91.2%).

Conclusion: The data from this large survey highlights that physiotherapists in the UK most commonly use education on load management and self-management strategies, alongside strengthening exercises targeting the hip abductors for patients with GTPS.

1. Introduction

Greater Trochanteric Pain syndrome (GTPS) is a debilitating condition causing lateral hip pain (Grimaldi and Fearon, 2015). It affects up to 23.5% of women and 8% of men between 50 and 75 years old (Segal et al., 2007). Patients with GTPS report difficulty sleeping and moderate to severe pain and disability (Fearon et al., 2013). Sufferers report comparable quality of life and functional performance, to people with advanced osteoarthritis of the hip (Fearon et al., 2014). On top of this many cases are recalcitrant, with a high proportion of patients still experiencing symptoms twelve months from onset (Rompe et al., 2009). Originally considered an inflammatory condition of the trochanteric bursa; recent imaging, surgical and histology studies have suggested it to be, most commonly, a condition associated with tendinopathy of the gluteus medius and gluteus minimus tendons at the site of their insertion onto the greater tuberosity of the femur (Fearon et al., 2010; Long. et al., 2013). However, as an associated array of pathologies are witnessed on imaging (including tendinopathy, partial and full thickness tendon tears, bursitis and iliotibial band abnormalities) and imaging of asymptomatic individuals reveals many false positives (Ganderton et al., 2017; Ramirez et al., 2014; Woodley et al., 2008), the term greater trochanteric pain syndrome (GTPS) is used clinically to describe

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the uncertainty surrounding the definitive pain source from these associated pathologies.

Despite the burden associated with GTPS, until recently, little was known about the optimal ways to manage the condition. Two recent high-quality randomised controlled trials reported significant global rating of change with interventions that encouraged postural reduction of the compressive loads on the gluteal tendons, alongside exercise therapy to improve the capacity of the tendons to withstand these compressive loads (Ganderton et al., 2018; Mellor et al., 2018). The mechanisms of action of these interventions are not well understood. Mellor et al. (2018) found that whilst subjects receiving the intervention achieved strength gains, these were not significantly different to groups receiving injection therapy or wait and see approaches. Ganderton et al. (2018), reported that a specific exercise protocol, was no more effective than a non-specific 'sham' exercise protocol for GTPS. It is plausible that the education component, combined with the general effects of exercise, rather than specific strength gains, contributed to the improvements observed.

The results from Mellor et al. (2018) are encouraging and provide what can be considered current best practice. However the population examined in this study were community dwellers (not individuals seeking healthcare) who did not demonstrate co-existing osteoarthritis of the hip or low back pain. It is plausible then that this population is not entirely representative of the patient presenting to secondary and tertiary care with GTPS (Tan et al., 2018; Segal et al., 2007; Tortolani et al., 2002; Collee et al., 1991). Equally, the authors surmise that the exercise intervention tested may not be pragmatic for clinicians, as fourteen individual sessions of exercise over eight weeks may be beyond the scope of most services (Mellor et al., 2018).

Whilst these studies significantly improve our understanding of best care for patients with GTPS. Further research is required to establish pragmatic interventions for the individual seeking care for GTPS in the UK. This survey aimed to determine current physiotherapy practice for GTPS in the UK and explored the views of UK physiotherapists around the causes, diagnosis and management of GTPS. This data will inform the development of a physiotherapy intervention for evaluation in future research into pragmatic interventions for patients seeking care with GTPS.

2. Methods

2.1. Survey development and validity testing

The survey tool was designed with reference to an international survey of current practice which completed in December 2018 (French et al., ahead of publication). The survey was adapted to meet the needs of this research; meaning some questions were the same in both surveys, and some were unique to this one. Decisions around which questions from the original survey were used, along with the wording and emphasis of new questions, were discussed amongst the authors (GS, SON, CL) until they were agreed upon. The survey tool was then agreed upon by the wider study group and piloted by five physiotherapists at the lead authors' place of work. Clinicians completed the survey twice; two days apart and fed back to the lead author about time to complete, flow of the survey and any corrections they would like to see. The suggestions from this process fed into the development of the final survey tool which was agreed upon by the study group.

Due to the original understanding of GTPS as a condition of the trochanteric bursa and the non-specific nature of the clinical term GTPS, no predefined diagnosis of GTPS was determined in the survey. Respondents were asked to select a definition of the term GTPS, from a multiple choice list to explore the range of opinions which exist.

The final survey consisted of forty five questions; however respondents did not answer all questions as some were hidden in response to previous answers. The answers received were largely quantitative as a response to multiple choice questions and Likert scales.

2.2. Dissemination and data analysis

Ethical approval to conduct this research was granted by the University Ethics Sub-Committee for Medicine and Biological Sciences, The University of Leicester (14955-so59-ls/ah:physiotherapy). The survey was disseminated using Survey Monkey and distributed online using Twitter, interactive Chartered Society of Physiotherapy website (iCSP) and the Musculoskeletal Association of Chartered Physiotherapists (MACP) websites. Post-graduate physiotherapy students on the mailing lists of the authors were sent an email link to the survey. The survey was open for a four-week period (13th March – 11th April 2018).

Data were mostly analysed descriptively. Responses were achieved for all questions, but not all respondents answered every question. Results are displayed as a proportion of those who answered the question. The diagnostic criteria and treatments utilised by those respondents with a specialist interest were compared to those without a specialist interest in GTPS; using chi-squared analysis. Statistical significance was set at $p = < 0.05$.

Respondents were excluded if they did not provide information about their job setting and a secondary question, asking respondents to name one of the hamstring muscles was asked in an attempt to ensure that participants were UK chartered physiotherapists.

The survey aimed to describe which interventions were used most frequently by physiotherapists using a Likert scale ranging from 'never' to 'always'. The number of respondents who used an intervention 'often' or 'always' have been combined to describe the most commonly prescribed treatments. All references to 'commonly' prescribed, used or utilised treatments refer to this.

2.3. Inclusion criteria

The survey was open to currently practicing physiotherapists in the UK with self-reported experience of treating patients with GTPS.

3. Results

3.1. Study response

A total of 552 physiotherapists responded to the survey. Forty-five participants failed to meet the eligibility criteria as they either worked outside of the UK or they reported that they did not treat patients with GTPS. One hundred and twenty-five eligible respondents failed to complete the survey, leaving 382 eligible surveys in the final analysis. Only completed surveys were included in the final analysis to help eliminate responses from those who were not engaged.

3.2. Clinical setting and role

Newly qualified physiotherapists in the National Health Service (NHS), work in Band 5 roles; whilst experienced therapists and those working with extended scope, mostly occupy Band 7 and 8a roles. Most respondents (301/382; 78.8%) worked in the National Health Service, in Band 6 (131/301; 43.5%) and Band 7 roles (85/301; 28.2%); with significantly less respondents in Band 5 (32/382; 8.4%) and 8a roles and above (53/382; 14.9%). Physiotherapists not employed by the NHS, worked in private practice (56/382; 14.7%), sport (7/382; 1.8%), independent hospitals (6/382; 1.6%); and education/research (2/382; 0.5%).

3.3. Experience and qualifications

Almost half of the respondents (183/382; 47.9%) had more than 10 years of clinical experience (Table 1). Similar numbers of respondents had less than 5 years clinical experience (100/382; 26.2%) as those who had over 16 years of clinical experience (108/382; 28.3%).

Table 1
Respondents experience, practice settings and level of interest.

	SI (n)	NSI(n)	Total (n)	Total (%)
Specialist interest in GTPS	88	294	382	
Years qualified				
< 5 years	16	84	100	26.2%
6 years–10 years	23	76	99	25.9%
11 years–15 years	16	59	75	19.6%
16 years–20 years	21	28	49	12.8%
> 21 years	12	47	59	15.4%
NHS Band 5	5	27	32	8.4%
NHS Band 6	25	106	131	34.3%
NHS Band 7	20	65	85	22.3%
NHS Band 8a and above	16	37	53	13.9%
Private Practice	15	41	56	14.7%
Independent Hospital	2	4	6	1.6%
Sports club	2	5	7	1.8%
Education/Research	1	1	2	0.5%
Other	2	8	10	2.6%

SI = Specialist interest.
NSI = No specialist interest.
NHS = National Health Service (UK).

Over half of the sample had post-graduate qualifications (196/382; 51.3%), with more than a quarter having achieved an MSc (108/382; 28.3%) and fewer, a post-graduate diploma (57/382; 14.9%).

3.4. Physiotherapists with a specialist interest in GTPS

Almost a quarter of respondents (88/382; 23.0%) had a specialist interest in GTPS (Table 1). The term 'specialist interest' referred to a self-reported interest in the diagnosis and management of GTPS and did not relate to clinical role, expertise or experience. Of those, 75.0% (66/88) were based in the NHS and 17.0% (15/88) were based in private practice. Respondents with a specialist interest in GTPS were more likely to have over 16 years of clinical experience (33/88; 37.5%) than those without a specialist interest in GTPS (75/294; 25.5%) and were also more likely to have post-graduate qualifications than those without a specialist interest (Fig. 1).

3.5. Definition and diagnosis

Most respondents understood GTPS as either primarily (209/382; 54.7%) or solely (13/382; 3.4%) a condition of the gluteal tendons. Over a third of respondents (138/382; 36.1%) viewed GTPS as an 'overarching term used to describe lateral hip pain of unknown origin' and a small number believed it to be a condition of the trochanteric bursa (20/382; 5.2%).

Only 2.6% (10/382) claimed they were not confident to diagnose GTPS and very few felt the need to routinely use radiological imaging to confirm their diagnosis (13/382; 3.4%). Of those who use radiological imaging, diagnostic ultrasound (11/13; 84.6%) and MRI scan (8/13; 61.5%) were utilised most often, with the goal of identifying pathological changes in the tendon (11/13; 84.6%) and excluding hip joint pathology (8/13; 61.5%).

Although radiological imaging was rarely used to diagnose GTPS; a wide range of diagnostic criteria were utilised by respondents.

Patient reports of lateral hip pain in side lying (309/382; 80.9%) and with loading activities (291/382; 76.2%) were the most commonly used criteria from the history to inform diagnosis (Appendix 1).

Physiotherapists favoured pain on palpation of the greater trochanter (324/382; 84.8%), lateral hip pain reproduced with single leg stance (251/382; 65.7%) and palpation of the gluteal tendon (242/382; 63.4%) as the clinical tests to diagnose GTPS (Appendix 2).

3.5.1. Physiotherapists with a specialist interest in GTPS

More than double the percentage of respondents with a specialist interest in GTPS (Appendix 3) were very confident in their ability to diagnose condition (64.8%), than those without (30.3%). They were also more likely to view GTPS as a condition affecting the gluteal tendons (64/88; 72.7%), than those without a special interest (158/294; 53.7%).

Respondents with a specialist placed less importance on patient reports of lateral hip pain aggravated by loading activities ($p = 0.021$) and self-reported lateral hip pain (Appendix 1), although this was not statistically significant ($p = 0.05$). In terms of clinical testing (Appendix 2), they were more likely to use the single leg stand test ($p = 0.002$), FABER test ($p = 0.001$) and the resisted external de-rotation test ($p = 0.01$); whereas those without a specialist interest favoured resisted hip abduction in neutral ($p = 0.01$).

3.6. Treatment

Most respondents felt somewhat or very confident (Appendix 3) to

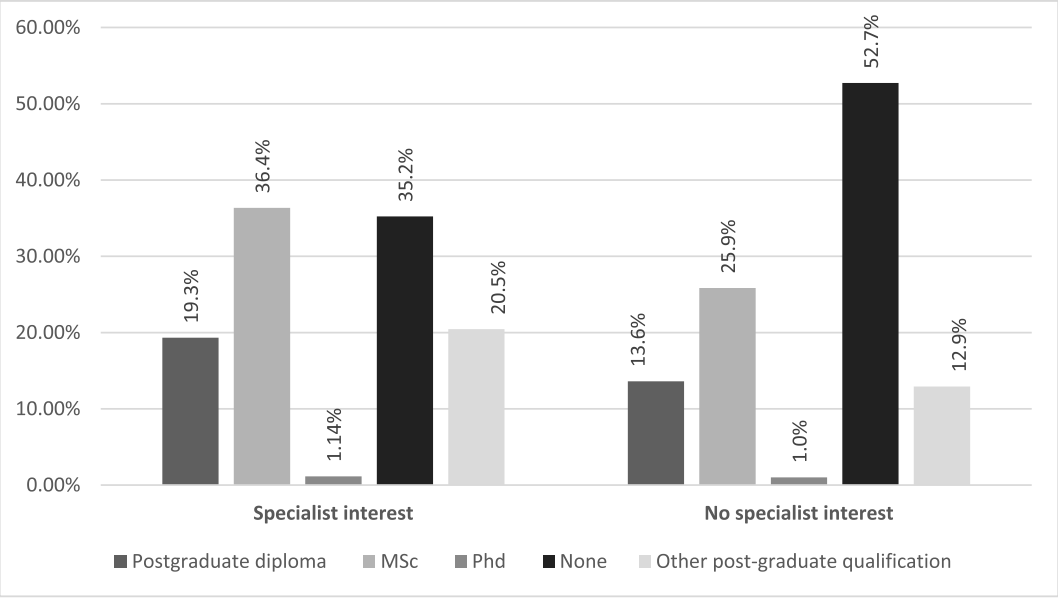

Fig. 1. Educational level of physiotherapists with a specialist interest in GTPS compared to those without.

Table 2
The interventions most commonly used by respondents for patients with GTPS.

Treatment	Number of respondents (/382)	Percentage of respondents	Percentage using commonly[a]
Education	382	100%	[b]
Exercise therapy	382	100%	99.7%
Injection therapy	306	80.1%	2.4%
Manual Therapy	254	66.5%	10.5%
Advice on the use of thermal modalities	251	65.5%	14.2%
Acupuncture	127	33.1%	2.4%
Shockwave therapy	108	28.3%	1.8%
Taping	107	27.6%	1.1%
Dry needling	92	23.7%	2.9%
Electrotherapy[c]	71	18.6%	1.1%
Ultrasound therapy	53	13.2%	1.6%

[a] Commonly defined as the number of respondents who used the treatment 'often' or 'always'.
[b] Respondents were not asked how frequently they educated their patient as it was assumed this is done with all consultations.
[c] Devices delivering ctric current.

treat GTPS (372/382; 97.4%). Respondents considered using a wide variety of treatments to manage the condition, however, most treatments were utilised infrequently, except education and exercise therapy (Table 2).

3.6.1. Education

All respondents stated they would educate a patient with GTPS on load management (382/382; 100%). Similarly all respondents who answered the question on pain education stated they would consider using this as part of their management (372/372, 100%). The most commonly used education topics (Appendix 4) were load management strategies (377/382; 98.7%), self-management strategies (375/381; 98.4%), physiotherapy treatment options (362/380; 95.3%), pain (352/372; 94.6%) and the theory of GTPS pathology (351/381; 92.1%).

3.6.2. Exercise

All respondents (382/382; 100%) reported prescribing exercise therapy for patients with GTPS and 89.5% (342/382) always used exercise. Physiotherapists utilised combinations of home exercise programmes (380/380; 100%), one-to-one exercise (374/377; 99.2%) and class-based exercise (164/333; 49.2%) to deliver exercise interventions. Whilst home exercise (380/380; 100%) and one-to-one exercise (344/377; 91.2%) programmes were used commonly, few reported commonly using classes (31/333; 9.3%).

3.6.2.1. Exercise prescription. A wide range of exercises were considered by physiotherapists when managing patients with GTPS. All respondents reported using strengthening exercises (382/382; 100%) and 81% (308/382; 80.6%) used them always. By comparison, very few respondents always used neuro-muscular control (58/382; 15.2%), range of movement (10/382; 2.6%) and stretching exercises (16/382; 4.2%) with patients suffering GTPS (Appendix 5).

3.6.2.2. Strengthening exercises. Respondents prescribed strengthening exercises using functional exercises (376/377; 99.7%), concentric/eccentric exercises (363/367; 98.9%), isometric (364/369; 98.6%) and non-weight bearing exercises (348/356; 97.8%). Functional (333/377; 88.3%) and concentric/eccentric (296/367; 80.7%) exercises were prescribed most often (Fig. 2).

Nearly all respondents claimed that their aim was to target the hip abductors with strengthening exercises (378/379; 99.7%) with 93.7% (355/379) saying they would aim to target them commonly (Appendix 6). Respondents stated, they also frequently aimed to target hip extensors (310/375; 82.7%) and hip external rotators (282/371; 76.0%).

Most respondents stated that they aimed for improved functional performance (347/382; 90.8%), pain relief (343/382; 89.8%), and improved capacity of the musculotendinous unit (329/382; 86.1%) with their strengthening exercises.

3.6.2.3. Neuromuscular control exercises. Neuro-muscular control (NMC) exercises were defined as exercises which re-train a movement. Although few physiotherapists claimed to always (58/382; 15.2%); use these exercises for patients with GTPS; only 3.9% (15/382) stated that they would not prescribe them at all (Appendix 5), with most physiotherapists stating they would use the exercises commonly (199/382; 52.1%).

Most commonly, physiotherapists applied these exercises (Appendix 7) by retraining a functional movement (224/362; 61.9%), balance retraining (200/365; 54.8%) and strategies to bias the deep gluteal muscles over the superficial muscles (186/362; 51.4%).

Respondents used NMC exercises to improve functional performance (347/382; 90.8%), reduce pain (257/382; 67.3%) and increase the capacity of the musculotendinous unit (246/382; 64.4%).

3.6.2.4. Range of movement exercises. The majority of respondents used range of movement exercises rarely (162/340; 47.6%). The hip (312/340; 91.8%) and lumbar spine (229/340; 67.4%) were targeted most often. Physiotherapists aimed to improve functional performance (264/340; 77.6%), reduce stiffness (225/340; 66.2%) and provide pain relief (184/340; 54.1%) when prescribing ROM exercises.

3.6.2.5. Stretching exercises. Stretching exercises were the least frequently prescribed form of exercise (Appendix 5), with most tending to use them rarely (146/271; 53.9%). The hip flexors were the most commonly targeted (Appendix 8) muscle group (231/255; 90.6%). When implementing stretching exercises, respondents aimed to improve functional performance (181/271; 66.8%), reduce stiffness (168/271; 62.0%) and provide pain relief (143/271; 52.8%).

3.6.3. Corticosteroid injections

Most respondents would recommend injection therapy rarely (172/306; 56.2%) or sometimes (125/306; 40.8%) and would not offer a patient more than two injections over a 12 month period (127/306; 41.5%). Approximately a third of respondents would offer a maximum of three injections (111/306; 36.2%), with only two respondents offering four or more injections in a 12-month period. Respondents used corticosteroid injection to provide a window of opportunity for exercise (251/306; 82.0%), reduce pain (224/306; 73.2%) and reduce inflammation (166/306; 54.2%).

3.6.4. Treatments other than exercise and education

Very few respondents (Fig. 3) commonly used thermal modalities (54/380; 14.2%), manual therapy (40/382 10.5%), dry needling (11/381; 2.9%), acupuncture (9/381; 2.4%), ultrasound therapy (6/379; 1.6%) and taping (4/380; 1.1%).

Respondents used manual therapy to provide pain relief (229/254; 90.2%), reduce stiffness 115/229; 50.2%) and improve functional performance (95/254; 37.4%). The survey did not ask patients to explain their usage of acupuncture, dry needling, thermal modalities or taping.

3.6.5. Electro-physical agents

Shockwave therapy (Appendix 9) was offered as a treatment by nearly 40% of respondents (108/274; 39.4%), but not used commonly (7/382; 1.8%). Similarly, small numbers (4/382; 1.1%) of respondents commonly offered other electrotherapy modalities (devices delivering electric current) or ultrasound (6/382; 1.6%). The stated aim of shockwave therapy was to reduce pain (92/108; 85%), improve the

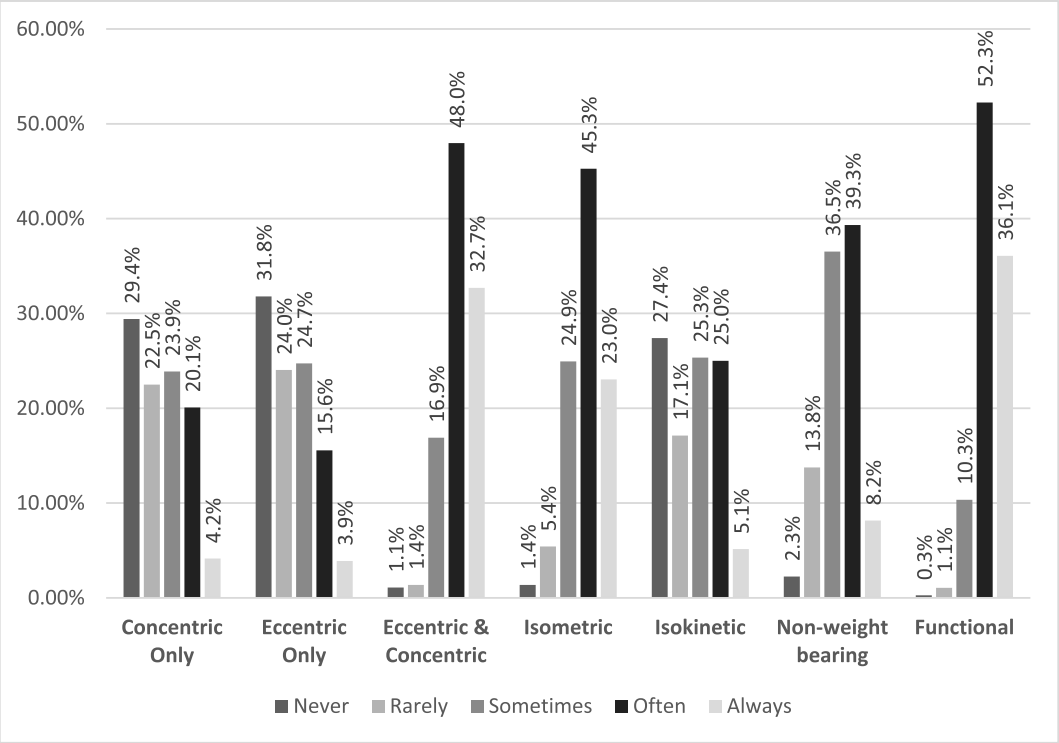

Fig. 2. Frequency with which respondents prescribed different types of strengthening exercises.

structure of the gluteal tendons (34/108; 32%) and to reduce inflammation (17/108; 16%).

3.7. Physiotherapists with a specialist interest in GTPS

More than twice the percentage of physiotherapists with a specialist interest (Appendix 1) in GTPS, were very confident (55/88; 62.5%) to treat the condition compared to those without (83/294; 28.2%); however the treatments used were similar (Appendices 10 and 11). The biggest discrepancies were that physiotherapists with a specialist interest were more likely to commonly prescribe concentric only strengthening exercises (p = 0.05), NMC exercises thought to bias the deep gluteal muscles over the superficial ones (p = 0.007), manual therapy (p = 0.007) and shockwave (p = 0.03).

4. Discussion

This paper reports the findings of a cross sectional survey of UK physiotherapy practice for GTPS. The responders to this survey report using a wide variety of diagnostic tools, educational topics and treatment strategies in the management of GTPS. However, some common practices were identified.

Most physiotherapists felt confident to diagnose GTPS with very few using radiological imaging in this process. Clinically (subjective and

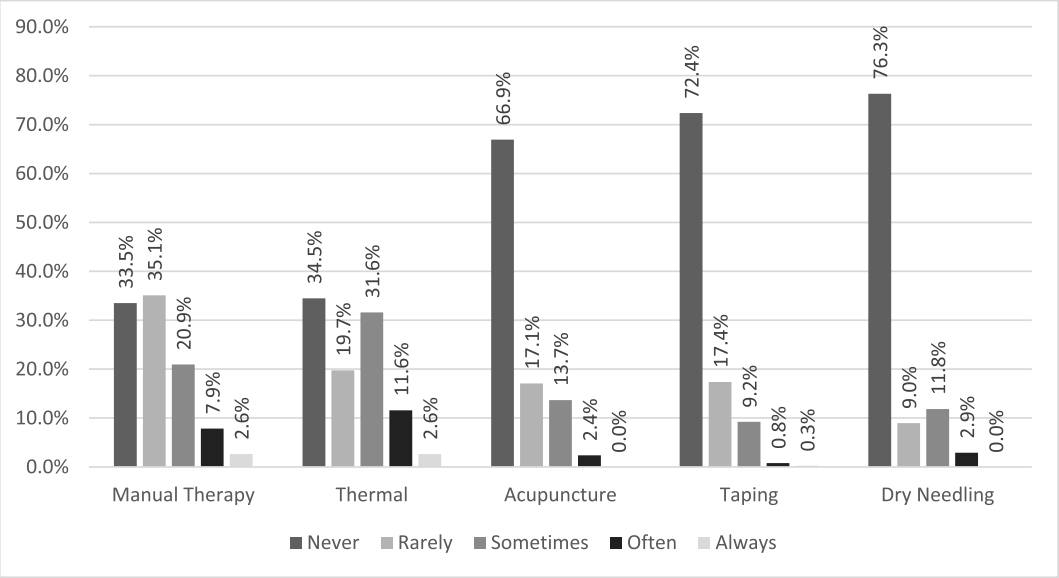

Fig. 3. Most commonly used treatments other than exercise and education.

objective findings), pain on palpation of the greater trochanter, pain in side lying and pain increased by loading (e.g. walking) were the diagnostic criteria therapists used most often. Research investigating the diagnostic accuracy of clinical tests for GTPS, support the use of palpation of the greater trochanter; whilst also demonstrating the accuracy of the FABER test, resisted hip abduction test and resisted external de-rotation test (Ganderton et al., 2017; Grimaldi et al., 2017; Fearon et al., 2013; Woodley et al., 2008). Whilst this survey suggests these diagnostic tests are not used frequently in UK clinical practice, the resisted external de-rotation test was favoured by those with a specialist interest in GTPS, whereas the hip abduction test was favoured was more likely to be used by those without a specialist interest.

Contemporary reports describe GTPS as a condition primarily of gluteal tendinopathy (Long et al., 2013; Fearon et al., 2010); a view supported by 58% of the respondents in this survey. However, over one third of physiotherapists (36%) in this survey viewed GTPS as an 'overarching term used to describe lateral hip pain of unknown origin'. This could reflect the ambiguity in the term 'GTPS' as it exists in clinical practice to reflect the fact that the source of trochanteric pain is not definable from the range of associated pathologies seen on imaging. However, it could also demonstrate that physiotherapists feel that the source of symptoms in GTPS is non-specific, as is the case with other common musculoskeletal pain presentations (O'Sullivan et al., 2016). The survey did not extrapolate this understanding. Interestingly, physiotherapists who understand GTPS as a condition primarily of tendinopathy were more confident in their diagnosis and treatment of the condition.

This survey describes some of the uncertainty around the use of the term GTPS in clinical practice. Gluteal tendinopathy is the preferred term used in contemporary research (Grimaldi and Fearon, 2015). Further research is required to understand the factors contributing to pain in GTPS and the relevance of the associated pathologies observed on imaging and their relevance to treatment.

Physiotherapists used a variety of treatments for patients with GTPS; however exercise and education were the cornerstones of physiotherapy management. Nearly all physiotherapists educated their patients on load management, self-management, physiotherapy treatment options, the theory of GTPS pathology and pain. This emphasis is supported by recent randomised controlled trials where education and exercise interventions led to significant improvements for patients with GTPS (Ganderton et al., 2018; Mellor et al., 2018). The advice given in these studies educated participants on how to control their symptoms by reducing the time spent in hip adduction and deep hip flexion; thereby reducing the compressive load on the gluteal tendons. These interventions have provided more successful short to mid-term pain relief than cortico-steroid injection for individuals with gluteal tendinopathy (Mellor et al., 2018). Whilst education on load management was commonly issued by respondents in this survey, postural correction was issued infrequently. However, this may be due to the ambiguity in the term 'postural correction' itself.

As in persistent low back pain, psychological factors such as pain catastrophising, low self-efficacy and depression are predictive of pain severity and disability in patients with GTPS (Plinsinga et al., 2018). Respondents in this survey, frequently educate their patients about pain and self-management strategies. Further research is required to determine the effectiveness of education and tailored physiotherapy interventions addressing these factors.

All physiotherapists in this survey prescribed exercise therapy for patients with GTPS. Most commonly, functional exercises which target the hip abductor and extensor muscles, with the aim of improving functional performance and the capacity of the musculotendinous unit. These exercise interventions are in keeping with a recent randomised controlled trial (Mellor et al., 2018). The exercise prescriptions in this trial (the LEAP Trial) and another recent trial (the GLoBE trial), improved the strength and functional performance of participants receiving the interventions (Ganderton et al., 2018; Mellor et al., 2018). However, no significant difference was witnessed in the hip abductor strength of participants receiving the intervention compared with groups receiving wait-and-see, corticosteroid injection and non-specific exercise (Ganderton et al., 2018; Mellor et al., 2018). This is despite patients working at high perceived rates of exertion with exercises proven to load the musculotendinous unit (Mellor et al., 2018). This finding could be a result of a limitation in the way strength was recorded as part of the trial. However, further understanding of the mechanisms by which these education and exercise interventions achieved their successes will help improve clinical practice and allow for further development of pragmatic treatment options for patients with GTPS.

Neuro-muscular control exercises which are thought to bias the deep gluteal muscles were favoured by physiotherapists with a specialist interest in GTPS in this survey. The purpose of this form of exercise has been described (Grimaldi and Fearon, 2015) and was included in the LEAP trial exercise programme (Mellor et al., 2018). While there is evidence that those with GTPS display motor control disturbance with respect to both kinematics and gluteal muscle recruitment patterning (Allison et al., 2016), further research is required to elucidate the contribution of specific elements of the LEAP study education and exercise intervention arm to clinical outcomes.

Physiotherapists commonly considered using corticosteroid injection with the aim of providing a window of opportunity for exercise via pain relief. Interestingly, in a recent randomised controlled trial, the most significant improvements in short term pain relief occurred in the education and exercise group, rather than the injection group (Mellor et al., 2018). Corticosteroids are potent anti-inflammatories that have been linked with poorer long-term outcomes for lateral epicondalgia (Coombes et al., 2013). Corticosteroid injection has also been linked to deleterious effects on tendon structure (Dean et al., 2014). The safety and effectiveness of corticosteroid injections for individuals with GTPS remains unclear. As there is little evidence demonstrating that corticosteroid injection is superior to other interventions in the longer term, the role of injection therapy in the management of GTPS remains contentious (Brinks and Denman, 2011; Rompe et al., 2009).

Shockwave therapy, whilst not used commonly, was the most frequently used electro-physical modality for patients with GTPS, and more likely to be used by those with a specialist interest. Whilst the clinical effectiveness of shockwave therapy may hold some promise in the management of GTPS, approximately a third of respondents using shockwave therapy aimed to improve the condition of the gluteal tendons, despite little evidence supporting this (Waugh et al., 2015; Mani-Babu et al., 2015; Al Abbad and Simon, 2013).

4.1. Limitations

This survey was limited to UK physiotherapists, largely recruited via Twitter and other social media. As with any survey study, the results only reflect a small proportion of practicing physiotherapists. The percentage of physiotherapists actively engaged with social media is unclear, as it is a relatively new way of sharing professional ideas and development tools. Therefore, it may be that this means of recruitment has targeted physiotherapists engaged in innovative ways of professional development, yet excluded physiotherapists who do not have the time for social media, or who engage in different platforms. Equally using the authors email lists of post-graduate students biases the sample due to familiarity and elevating the number of physiotherapists with post-graduate qualifications.

Lastly, a lack of definition in the terms used in this survey may reflect some of the variability in the results. The breadth covered in this

survey meant that the authors decided not to provide these definitions to improve the user experience and enhance the number of completed surveys. However terms such as 'self-management', 'load-management' and 'postural correction' do not necessarily mean the same thing to all clinicians. Further research could look to standardise these terms as a reference for future surveys of current practice.

5. Conclusion

The data from this large survey highlight some consistency regarding the physiotherapy management of GTPS; with the focus of interventions being patient education on load management and self-management strategies, and strengthening exercises targeting the hip abductors and extensors. Robust clinical trials testing the success of these interventions in care-seeking individuals with GTPS in the UK are required to inform the development of effective, pragmatic interventions for these patients in the future.

1. Conflicts of interest

None declared.

2. Ethical approval

Ethical approval to conduct this research was granted by the University Ethics Sub-Committee for Medicine and Biological Sciences, The University of Leicester (14955-so59-ls/ah:physiotherapy).

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Appendix 1. Subjective diagnostic criteria used by respondents to confirm a diagnosis of GTPS

Diagnostic Criteria	Total/382	SI Total/88	NSI Total/294	p-value < 0.05*
Lateral hip pain aggravated by side-lying	309 80.9%	73 83.0%	236 80.3%	0.574
Lateral hip pain aggravated by loading activities e.g. walking	291 76.2%	59 67.1%	232 78.9%	0.021
Lateral hip pain	237 62.0%	47 53.4%	190 64.6%	0.057

SI = Specialist interest.
NSI = No specialist interest.
*Statistical significance set at < 0.05.

Appendix 2. The clinical tests used by respondents to confirm a diagnosis of GTPS

Diagnostic Criteria	Total/382	SI Total/88	NSI Total/294	p-value < 0.05
Pain on palpation of the greater trochanter	324 84.8%	73 83.0%	251 85.4%	0.578
Lateral hip pain produced by single leg stance	251 65.7%	70 79.6%	181 61.6%	0.002
Pain on palpation of the gluteal tendon	242 63.4%	54 61.6%	188 64.0%	0.659
Lateral hip pain reproduced with resisted hip abduction in neutral	213 55.8%	39 44.3%	174 59.2%	0.013
Lateral hip pain reproduced with resisted external de-rotation test	135 35.3%	41 46.6%	94 32.0%	0.011
Lateral hip pain reproduced with resisted hip abduction in end range adduction (Obers position)	132 34.6%	36 40.9%	96 32.7%	0.153
Lateral hip pain reproduced with FADER/R: (Hip flex/Add/Ext Rot ± Isometric internal rotation).	130 34.0%	36 40.9%	94 31.97%	0.120
Lateral hip pain reproduced with passive adduction (Obers position)	104 27.2%	17 19.3%	87 29.6%	0.057
Lateral hip pain reproduced with FABER test (Hip Flex/Abd/Ext Rotation)	84 22.0%	30 34.1%	54 18.4%	0.001
Other	27 7.1%	5 5.7%	22 7.5%	N/A

SI = Specialist interest.
NSI = No specialist interest.
*Statistical significance set at < 0.05.
N/A = not applicable.

Appendix 3. A comparison of the confidence of respondents with and without a specialist interest in GTPS to diagnose and treat the condition

	Diagnosis		Treatment	
	Specialist Interest	No specialist interest	Specialist Interest	No specialist Interest
Somewhat confident	31/88	195/294	33/88	201/294
	35.2%	66.3%	37.5%	68.4%
Very confident	57/88	89/294	55/88	83/294
	64.8%	30.3%	62.5%	28.2%
Not confident	0/88	10/294	0	10/294
	0.0%	3.4%	0.0%	3.4%

Appendix 4. The education topics used by respondents for patients with GTPS

	Never	Rarely	Sometimes	Often	Always	Total/382
Load management	0	0	5	60	317	382
	0%	0%	1.3%	15.7%	83.0%	100%
Non-physiotherapy treatment options	35	78	147	77	45	382
	9.2%	20.4%	38.5%	20.2%	11.8%	100%
Assistive devices eg. walking aids	31	136	155	44	16	382
	8.1%	35.6%	40.6%	11.5%	4.9%	100%
Self-management	1	1	4	51	324	381
	0.3%	0.3%	1.1%	13.4%	85.0%	99.7%
Theory of GTPS pathology	1	7	22	97	254	381
	0.3%	1.8%	5.8%	25.5%	66.7%	99.7%
Physio treatment options	2	1	15	82	280	380
	0.5%	0.3%	4.0%	21.6%	73.7%	99.5%
Postural correction strategies	55	91	84	92	53	375
	14.9%	24.3%	22.4%	24.5%	14.1%	98.2%
Pain	0	0	20	109	243	372
	0%	0%	5.4%	29.3%	65.3%	97.4%

Appendix 5. The types of exercises prescribed by respondents for patients with GTPS.

	Never	Rarely	Sometimes	Often	Always	Total/382
Strengthening	0	1	5	68	308	382
	0%	0.3%	1.3%	17.8%	80.6%	100%
Neuro-Muscular control exercises	15	47	121	141	58	382
	3.9%	12.3%	31.7%	36.9%	15.2%	100%
Range of Movement exercises	42	162	129	39	10	382
	11.0%	42.4%	33.8%	10.2%	2.6%	100%
Stretching	111	146	76	33	16	382
	29.1%	38.2%	19.9%	8.6%	4.2%	100%

Appendix 6. The muscles targeted with strengthening exercises by respondents for patients with GTPS.

	Never	Rarely	Sometimes	Often	Always	Total/382
Hip abductors	1	2	21	93	262	379
	0.3%	0.5%	5.5%	24.5%	69.1%	99.2%
Hip extensors	2	9	54	165	145	375
	0.5%	2.4%	14.4%	44.0%	38.7%	98.2%
Hip external rotators	5	17	67	161	121	371
	1.4%	4.6%	18.1%	43.4%	32.6%	97.1%
Knee extensors	32	85	115	90	24	346
	9.3%	24.6%	33.2%	26.0%	6.9%	90.6%
Knee flexors	42	122	120	45	12	341
	12.3%	35.8%	35.2%	13.2%	3.5%	89.3%
Hip internal rotators	35	111	103	62	30	341
	10.3%	32.6%	30.2%	18.2%	8.8%	89.3%
Other						17
						4.5%

Appendix 7. The Neuro-motor control exercises prescribed by respondents for patients with GTPS

	Never	Rarely	Sometimes	Often	Always	Total/382
Balance retraining	10	42	113	156	44	365
	2.7%	11.5%	31.0%	42.7%	12.1%	95.5%
Re-training of a functional movement (eg. sit to stand)	8	22	108	177	47	362
	2.2%	6.1%	29.8%	48.9%	13.0%	94.8%
Strategies to bias the deep gluteal muscles (eg Gluteus Med/Min) over the superficial muscles (eg. ITB/Gluteus Maximus)	41	46	89	135	51	362
	11.3%	12.7%	24.6%	37.3%	14.1%	94.8%
Gait re-education (running or walking)	8	51	128	140	34	361
	2.2%	14.1%	35.5%	38.8%	9.4%	94.5%
Strategies to bias the deep abdominal muscles (eg Transversus Abdominus) over the superficial muscles (eg. Rectus Abdominus)	16	85	74	29	7	358
	45.5%	23.7%	20.7%	8.1%	2.0%	93.7%
Plyometrics	32	97	162	56	11	358
	8.9%	27.1%	45.3%	15.6%	3.1%	93.7%
Other (please specify)						11
						2.9%

Appendix 8. The muscles targeted with stretching exercises by respondents for patients with GTPS

	Never	Rarely	Sometimes	Often	Always	Total/382
Hip flexors	24	52	114	54	11	255
	9.4%	20.4%	44.7%	21.2%	4.3%	66.8%
Hip internal rotators	56	91	66	27	6	246
	22.8%	37.0%	26.8%	11.0%	2.4%	64.4%
Hip external rotators	50	80	67	40	9	246
	20.3%	32.5%	27.2%	16.3%	3.7%	64.4%
Knee extensors	45	85	86	26	4	246
	18.3%	34.6%	35.0%	10.6%	1.6%	64.4%
Knee flexors	43	88	90	23	2	246
	17.5%	35.8%	36.6%	9.4%	0.8%	64.4%
Hip adductors	54	84	85	16	5	244
	22.1%	34.4%	34.8%	6.6%	2.1%	63.9%
Hip abductors	62	83	57	33	6	241
	25.7%	34.4%	23.7%	13.7%	2.5%	63.1%
Hip extensors	39	83	75	37	5	239
	16.3%	34.7%	31.4%	15.5%	2.1%	62.6%

Appendix 9. The electrotherapy devices used by respondents for patients with GTPS.

	Never	Rarely	Sometimes	Often	Always	Total/382
Electrotherapy (any electrotherapy modality excluding shockwave and acupuncture)	311	40	27	4	0	382
	81.4%	10.5%	7.1%	1.1%	0.0%	
Shockwave therapy	274	60	41	7	0	382
	71.7%	15.7%	10.7%	1.8%	0.0%	
Ultrasound therapy	329	27	17	6	0	379
	86.8%	7.1%	4.5%	1.6%	0.0%	

Appendix 10. The most commonly* used exercises by respondents with and without a specialist interest in GTPS.

	Specialist Interest	No specialist interest	P-value < 0.05**
Concentric only strengthening exercises	25/71	45/218	0.005
	35.2%	20.6%	
Eccentric only strengthening exercises	15/66	40/217	0.420
	22.7%	18.4%	
Concentric and eccentric strengthening exercises	69/85	227/282	0.813
	81.2%	80.5%	
Isometric strengthening exercises	67/86	202/283	0.180
	77.9%	71.4%	
Isokinetic strengthening exercises	20/69	68/223	0.937
	29.0%	30.5%	
Non-weight bearing strengthening exercises	42/81	127/275	0.453
	51.9%	46.2%	
Functional strengthening exercises	80/87	253/290	0.232
	92.0%	87.2%	

Balance retraining	47/85 55.3%	153/280 54.6%	0.822
Re-training of a functional movement (eg. sit to stand)	51/83 61.4%	173/279 62.0%	0.882
Strategies to bias the deep gluteal muscles (eg Gluteus Med/Min) over the superficial muscles (eg. ITB/Gluteus Maximus)	54/86 62.8%	132/276 47.8%	0.007
Gait re-education (running or walking)	47/85 55.3%	127/276 46.0%	0.092
Strategies to bias the deep abdominal muscles (eg Transversus Abdominus) over the superficial muscles (eg. Rectus Abdominus)	11/83 13.3%	25/275 9.1%	0.260
Plyometric exercises	16/85 18.8%	51/273 18.7%	0.857
Range of movement exercises	12/88 13.6%	37/294 12.6%	0.796
Stretching exercises	12/88 13.6%	37/294 12.6%	0.796

*Commonly defined as the number of respondents who used the treatment 'often' or 'always'.
**Statistical significance set at < 0.05.

Appendix 11. The most commonly* used treatments other than exercise by respondents with and without a specialist interest in GTPS.

	Specialist Interest	No specialist interest	p-value < 0.05**
Manual Therapy	16/88 18.2%	24/294 8.2%	0.007
Electrotherapy	1/88 1.1%	3/294 1.0%	0.925
Shockwave	4/88 4.5%	3/294 1.0%	0.030
Corticosteroid injection	4/88 4.5%	5/294 1.7%	0.122
Ultrasound therapy	1/86 1.2%	5/293 1.7%	0.708
Thermal modalities	9/88 10.2%	45/292 15.4%	0.230
Acupuncture	3/87 3.4%	6/294 2.0%	0.458
Dry needling	4/87 4.6%	7/293 2.4%	0.286
Taping	0/88 0.0%	4/88 4.5%	0.271

* Commonly defined as the number of respondents who used the treatment 'often' or 'always'.
**statistical significance set at < 0.05.

Appendix 12. The confidence of physiotherapists to diagnose and treat GTPS based on whether they defined GTPS primarily as gluteal ten or a non-specific diagnosis

	Diagnosis		Treatment	
	Non-specific Lateral hip pain	Gluteal tendinopathy	Non-specific Lateral hip pan	Gluteal tendinopathy
Somewhat confident	93/138 67.4%	117/222 52.7%	94/158 59.5%	123/222 55.4%
Very confident	38/138 27.5%	103/222 46.4%	39/158 24.7%	95/222 42.8%
Not confident	7/138 5.1%	2/222 0.0%	5/158 3.2%	4/222 0.0%

References

Al-Abbad, H., Simon, J.V., 2013. The effectiveness of extracorporeal shock wave therapy on chronic achilles tendinopathy: a systematic review. Foot Ankle Int. United States 34 (1), 33–41. https://doi.org/10.1177/1071100712464354.

Allison, K., et al., 2016. Single Leg Stance Control in Individuals with Symptomatic Gluteal Tendinopathy, vol. 49. Gait & posture, England, pp. 108–113. https://doi.org/10.1016/j.gaitpost.2016.06.020.

Brinks, A., Denman, M., 2011. Corticosteroid injections improved short term, but not long-term, recovery and pain in the greater trochanteric pain syndrome. Ann. Intern. Med. https://doi.org/10.7326/0003-4819-155-8-201110180-02009.

Collee, A., et al., 1991. Greater trochanteric pain syndrome (trochanteric bursitis) in low back pain. Scand. J. Rheumatol. 20 (4), 262–266.

Coombes, B.K., et al., 2013. Effect of corticosteroid injection, physiotherapy, or both on clinical outcomes in patients with unilateral lateral epicondylalgia: a randomized controlled trial. JAMA. United States 309 (5), 461–469. https://doi.org/10.1001/jama.2013.129.

Dean, B.J.F., et al., 2014. Glucocorticoids induce specific ion-channel-mediated toxicity in human rotator cuff tendon: a mechanism underpinning the ultimately deleterious effect of steroid injection in tendinopathy? Br. J. Sports Med. Engl. 48 (22), 1620–1626. https://doi.org/10.1136/bjsports-2013-093178.

Fearon, A.M., et al., 2010. Does ultrasound correlate with surgical or histologic findings in greater trochanteric pain syndrome? A pilot study. Clin. Orthop. Relat. Res. https://doi.org/10.1007/s11999-009-1174-2.

Fearon, A.M., et al., 2013. Greater trochanteric pain syndrome: defining the clinical syndrome. Br. J. Sports Med. Engl. 47 (10), 649–653. https://doi.org/10.1136/bjsports-2012-091565.

Fearon, A.M., et al., 2014. Greater trochanteric pain syndrome negatively affects work, physical activity and quality of life: a case control study. J. Arthroplasty. https://doi.org/10.1016/j.arth.2012.10.016.

Ganderton, C., et al., 2017. Demystifying the clinical diagnosis of greater trochanteric

pain syndrome in women. J. Wom. Health. https://doi.org/10.1089/jwh.2016.5889.
Ganderton, C., et al., 2018. Gluteal loading versus sham exercises to improve pain and dysfunction in postmenopausal women with greater trochanteric pain syndrome: a randomized controlled trial. J. Wom. Health 0 (0). https://doi.org/10.1089/jwh.2017.6729. jwh.2017.6729.
Grimaldi, A., Fearon, A., 2015. Gluteal tendinopathy: integrating pathomechanics and clinical features in its management. J. Orthop. Sports Phys. Ther. https://doi.org/10.2519/jospt.2015.5829.
Grimaldi, A., et al., 2017. Utility of clinical tests to diagnose MRI-confirmed gluteal tendinopathy in patients presenting with lateral hip pain. Br. J. Sports Med. https://doi.org/10.1136/bjsports-2016-096175.
Long, S.S., Surrey, D.E., Nazarian, L.N., 2013. Sonography of greater trochanteric pain syndrome and the rarity of primary bursitis. Am. J. Roentgenol. https://doi.org/10.2214/AJR.12.10038.
Mani-Babu, S., et al., 2015. The effectiveness of extracorporeal shock wave therapy in lower limb tendinopathy: a systematic review. Am. J. Sports Med. 43 (3), 752–761. https://doi.org/10.1177/0363546514531911.
Mellor, R., et al., 2018. Education plus exercise versus corticosteroid injection use versus a wait and see approach on global outcome and pain from gluteal tendinopathy: prospective, single blinded, randomised clinical trial. bmj 361. https://doi.org/10.1136/bmj.k1662.
O'Sullivan, P., et al., 2016. Unraveling the complexity of low back pain. J. Orthop. Sports Phys. Ther. United States 46 (11), 932–937. https://doi.org/10.2519/jospt.2016.0609.
Plinsinga, M.L., et al., 2018. Psychological factors not strength deficits are associated with severity of gluteal tendinopathy: a cross-sectional study. Eur. J. Pain (Lond. Engl.). Engl. https://doi.org/10.1002/ejp.1199.
Ramirez, J., et al., 2014. Ultrasound evaluation of greater trochanter pain syndrome in patients with spondyloarthritis: are there any specific features? Rheumatol. Int. Ger. 34 (7), 947–952. https://doi.org/10.1007/s00296-014-2947-9.
Rompe, J.D., et al., 2009. Home training, local corticosteroid injection, or radial shock wave therapy for greater trochanter pain syndrome. Am. J. Sports Med. 37 (10), 1981–1990. https://doi.org/10.1177/0363546509334374.
Segal, N.A., et al., 2007. Greater trochanteric pain syndrome: epidemiology and associated factors. Arch. Phys. Med. Rehabil. https://doi.org/10.1016/j.apmr.2007.04.014.
Tan, L.A., et al., 2018. High prevalence of greater trochanteric pain syndrome among patients presenting to spine clinic for evaluation of degenerative lumbar pathologies. J. Clin. Neurosci. 53, pp89–91. https://doi.org/10.1016/j.jocn.2018.04.030.
Tortolani, P.J., Carbone, J.J., Quartararo, L.G., 2002. Greater trochanteric pain syndrome in patients referred to orthopedic spine specialists. Spine J. Offic. J. North Am. Spine Soc. United States 2 (4), 251–254.
Waugh, C.M., et al., 2015. In vivo biological response to extracorporeal shockwave therapy in human tendinopathy. Eur. Cells Mater. 29, 268–280. https://doi.org/10.22203/eCM.v029a20.
Woodley, S.J., et al., 2008. Lateral hip pain: findings from magnetic resonance imaging and clinical examination. J. Orthop. Sports Phys. Ther. 38 (6), 313–328. https://doi.org/10.2519/jospt.2008.2685.