**Rotator cuff disorders: a survey of current (2016) UK physiotherapy practice**

**Keywords:** Shoulder pain; Rotator cuff; Physiotherapy; Survey; Knowledge mobilisation

**ABSTRACT**

**Background** Shoulder pain is a common musculoskeletal presentation, with disorders of the rotator cuff (RC) regarded as the most frequent cause. Conservative treatment is often the initial management however, findings from a previous survey showed considerable variations in clinical practice, including the use of modalities that are not supported in the literature; suggesting that research is not impacting on practice.

**Objectives** Tosurvey current UK physiotherapy practice for the management of RC disorders and to determine whether this has changed over the five-year period since the last survey was conducted.

**Methods** Cross-sectional online survey of UK physiotherapists.

**Results** 191 respondents completed the survey which showed that advice/education and some form of exercise therapy are most commonly used as a management strategy for RC disorders. There is a lack of agreement however regarding exercise prescription. The survey suggests less use of passive modalities, indicating that practice has advanced over the last 5 years in line with the current evidence.

**Discussion** This study has highlighted that the clinical practice of the survey respondents was in line with current recommendations from research. Hence, in contrast to the survey five years previously, research appears to be impacting on practice, which is a positive finding.

**INTRODUCTION**

Shoulder pain is one of the most common musculoskeletal disorders [1] with prevalence in the range of 7-26% [2]. The rotator cuff (RC) is implicated as the cause in approximately 70% of patients [3,4]. Subsequent pain and functional difficulties can impact on daily activities, including the ability to work and engage with leisure and sporting activities [2,5]. For a significant proportion of patients, this is not a self-limiting or short-lasting problem with over 40% of people reporting on-going or recurrent symptoms 12 months after onset [3,6,7].

Conservative treatment, including physiotherapy, is widely accepted as a first-line management approach but there is considerable variation in physiotherapy practice for this disorder [4,8–11].

A survey of UK physiotherapy practice for the management of RC disorders was conducted in 2011 [12]. The study highlighted great variability in how physiotherapists managed this condition, including the use of interventions not supported by research evidence. Overall the survey highlighted a translational gap between research evidence and practice emphasising a lack of effective knowledge mobilisation (KM).

In the last 5 years, since the previous survey, there has been a proliferation of research in this area and hence a greater evidence-base on which to establish best practice [9,13–16]. Therefore this present study aimed to repeat the survey in order to establish current UK physiotherapy practice for the management of RC disorders and to identify if practice has changed in response to current evidence.

**MATERIALS AND METHODS**

**Study design**

A cross-sectional online survey was developed by adapting the original survey utilised in 2011 [12].

To replicate the previous survey a clinical scenario was used to describe a typical patient with signs and symptoms of a RC disorder [12,17] on which survey responses were based. The use of a vignette has previously been shown to be a valid tool for eliciting information on clinical practice and increasing the chance of a reflective response[18,19]; this is shown in box 1.

Box 1. Clinical scenario of a typical patient with a RC disorder

A 54 year old man presents to you with a 9-month history of right shoulder pain of gradual, insidious onset.  The pain is located over the anterolateral aspect of his shoulder, with no radiation of symptoms.  He describes the pain as intermittent, made worse by reaching up, lifting, reaching behind his back and lying on this side.  Symptoms ease with rest.  He has had no previous treatment or investigations for this problem so far and is otherwise in good general health.  His occupation as a warehouse operative involves some heavy lifting onto shelves, which he is continuing to do. On examination, observation is unremarkable.  Cervical spine range of movement is full and pain-free.  Active shoulder movements are full, but with a painful arc on active abduction between 60° and 120°.  Passive shoulder movements are largely maintained.  Isometric muscle testing produced pain on abduction and lateral rotation, with a power of 4/5 noted for both.

The survey was piloted by three clinicians, resulting in minor amendments, before the full version was disseminated (available as supplemental information).

Sampling and recruitment

The inclusion criteria were UK physiotherapists who treat RC disorders. Potential participants were invited to complete the survey through a range of sources; the interactive Chartered Society of Physiotherapy (iCSP) website (an online discussion forum open to UK chartered physiotherapists), Frontline magazine (available to chartered physiotherapists registered with the CSP), Twitter and email using the researcher’s professional contacts. Informed consent was implied through voluntary completion and submission of the survey and therefore written consent was not requested.

Sample size

An appropriate sample size was established from the previous survey of 110 participants, in which a comparative number of responses were considered to be acceptable.

**Data collection**

The survey was available via survey monkey for a one month period during March 2016. Littlewood, Lowe et al [12] previously reported this as a reasonable period of time for data collection as no further requests to complete the survey were apparent after this time.

**Data analysis**

Descriptive statistics were created by survey monkey and downloaded into Microsoft Excel (2010); these were separated into those who considered themselves as having a special interest (SI) in RC disorders and those who had no special interest (NSI). Chi-square tests were completed using IBM SPSS Statistics for Windows, version 24, to investigate any differences in these SI and NSI responses.

Any further comments made after a closed question are summarised as narrative text. Qualitative data generated from the open-ended questions were analysed using a thematic approach and coded into categories/subcategories.

**RESULTS**

Overall, 314 physiotherapists accessed the survey. The majority accessed this through Twitter (65%; n=205), followed by email contact (21%; n=66) and the iCSP website or Frontline magazine advert (14%; n=43). Six surveys were excluded on the basis that they were non-UK physiotherapists and a further 117 were excluded as only the demographic details had been completed. The remaining 191 surveys were used in the data analysis.

Table 1 shows the respondents had a wide range of experience and practice settings, but with the majority in a NHS band 6 role, which is comparable to the original survey. There was a balanced representation of those with a special interest versus no special interest in RC disorders.

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | SI (n) | NSI (n) | Total (%) | Total (n) |
| Years qualified (191) | | | | |
| <5 years | 19 | 22 | 21.5% | 41 |
| 5-10 years | 15 | 31 | 24.1% | 46 |
| 10-15 years | 18 | 24 | 22.0% | 42 |
| 15-20 years | 13 | 15 | 14.7% | 28 |
| >20 years | 14 | 20 | 17.8% | 34 |
| Role/practice setting (191) | | | | |
| NHS Band 5 | 6 | 10 | 8.4% | 16 |
| NHS Band 6 | 20 | 41 | 31.9% | 61 |
| NHS Band 7 | 16 | 16 | 16.8% | 32 |
| NHS Band 8a & above | 14 | 15 | 15.2% | 29 |
| Private practice | 15 | 23 | 19.9% | 38 |
| Independent hospital | 2 | 1 | 1.6% | 3 |
| Sports club | 1 | 1 | 1.0% | 2 |
| Education/research | 2 | 1 | 1.6% | 3 |
| Other | 3 | 4 | 3.7% | 7 |
| Special interest in RC disorders (191) | | | | |
| Yes | | | 41.4% | 79 |
| No | | | 58.6% | 112 |

NHS, National Health Service; RC, rotator cuff; SI, respondents who

stated a special interest in rotator cuff disorders; NSI, respondents

who stated no special interest in rotator cuff disorders.

**Would you request any further information or undertake any further clinical tests?**

This results of this question are displayed in figure 1, which shows that the 67% (121/180; 41 SI, 80 NSI) of UK physiotherapists would carry out further physical examination tests, 53% (96/180; 47 SI, 49 NSI) would undertake further rehabilitation classification, for example the shoulder symptom modification procedure (SSMP), and 51% (92/180; 44 SI, 48 NSI) would require more subjective information. Only 9% (16/180; 10 SI, 6 NSI), would request further investigation at this point.

The difference between the responses of those grouped as SI and NSI who would undertake further physical examination tests was statistically significant (Chi-squared= 8.753 p = 0.033), with those with greater experience less likely to undertake further testing.

**[INSERT FIGURE 1]**

One hundred and forty one respondents qualified their answers. Those who would request further subjective information most commonly referred to more detail about the following: hobbies & sports; lifestyle (risk factors for degenerative cuff disease); lifting/work activities (amount & frequency of load); pain characteristics; onset (any changes in activity, trauma, life events); management so far; previous problems with the shoulder, neck or tendons generally; past medical history for red flags; psychosocial information for prognostic confounders; expectations of physiotherapy; and their beliefs in relation to the problem.

Further physical examination tests that would be carried out included assessment of other joints such as the cervical and/or thoracic spine; specific muscle tests, including loading capacity; special tests, including cuff integrity, instability and impingement tests; scapular assessment; capsular and muscle length tests; palpation; neural dynamics; and functional assessments including balance, kinetic chain and core stability.

Only a few comments were made in relation to further investigation, which included carrying out an ultrasound scan; X-ray to rule out malignancy, osteoarthritis or calcification; and an MRI scan.

Rehabilitation classification was qualified further by the use of SSMP or improvement tests.

**Which management strategies would you typically recommend for this patient?**

Figure 2 shows that multiple treatments are used by UK physiotherapists, but with most opting for advice/education (173/191, 91%; 73 SI, 100 NSI), and some form of exercise therapy. Within the types of exercises 67% (128/191; 58 SI, 70 NSI) would use isotonic exercises, 53% (102/191; 42 SI, 60 NSI) would prescribe isometric exercises, 50% (96/191; 50 SI, 46 NSI) would incorporate a global exercise approach and lastly 50% (95/191; 31 SI, 64 NSI) would include scapular exercises. A greater proportion of those classified as SI would use a global exercise approach, and a greater proportion of NSI would use scapular exercises. This was not found to be statistically significant (Chi-squared = 16.436, p = 0.562).

All other modalities were much less frequently used. A corticosteroid (CCS) injection was less frequently recommended than advice and exercise, with 16% (31/191; 14 SI, 17 NSI) suggesting this and only 9% (17/191; 8 SI, 9 NSI) would suggest referral on for further investigation/opinion.

**[INSERT FIGURE 2]**

**When prescribing exercises, what instructions do you generally give to the patient?**

This was an open-ended question. In relation to pain, the vast majority of UK physiotherapists would expect some level of pain during exercise but the level of this varied, ranging from what is acceptable to the patient (34/188, 18%; 13 SI, 11 NSI), to below a certain value on a numerical pain rating scale (45/188, 24%; 19 SI, 26 NSI), to the post-exercise response (53/188, 28%; 20 SI, 33 NSI). Exercising in the pain-free range was expressed by 20% (37/188; 12 SI, 25 NSI) of the respondents, of which a higher proportion were those with a NSI. A minority (4/188, 2%; 3 SI, 1 NSI) mentioned they would specifically work into pain.

In relation to the load, a common view amongst the respondents was the use of a low load/level of resistance for exercises (40/182, 22%; 12 SI, 28 NSI), but largely guided by pain (57/182, 31%; 30 SI, 27 NSI), whilst a smaller proportion mentioned using a heavy load (9/182, 5%; 2 SI, 7 NSI) or alternating between a heavy and low load (3/182, 2%; 2 SI, 1 NSI).

In relation to repetitions, up to 10 (47/186, 25%; 15 SI, 32 NSI) or 15 repetitions (42/186, 23%; 13 SI, 29 NSI) and up to 3 sets (29/186, 16%; 10 SI, 19 NSI) were the predominant themes when prescribing exercises. This was largely guided by fatigue (49/186, 26%; 30 SI, 19 NSI).

In relation to frequency, a common view amongst the respondents was to prescribe exercises to be completed up to two (40/184, 22%; 12 SI, 28 NSI) or three (35/184, 19%; 12 SI, 23 NSI) times a day, on a daily basis (48/184, 26%; 20 SI, 28 NSI). Some respondents would suggest every other day for completing exercises (22/184, 12%; 6 SI, 16 NSI).

In relation to position, some answered in terms of the range or movement of the shoulder and others answered in terms of the body position. Most respondents suggested they would prescribe exercises in a neutral (15/178, 8%; 3 SI, 12 NSI) and/or most comfortable position (20/178, 11%; 12 SI, 8 NSI) with a ‘good posture’ (21/178, 12%; 5 SI, 16 NSI). In terms of body position, standing was the most common theme (55/178, 31%; 21 SI, 34 NSI). Only a small number of respondents reported using the movement of most discomfort (6/178, 3%; 1 SI, 5 NSI).

In relation to quality of movement, largely this was answered as slow, controlled and/or smooth (65/168, 39%; 26 SI, 39 NSI). The importance of this was recognised by many respondents and only a small minority of respondents did not instruct on this or think it was important (9/168, 5%; 2 SI, 7 NSI).

In relation to fatigue four broad themes were identified with the largest proportion of respondents encouraging exercises to fatigue (80/160, 50%; 35 SI, 45 NSI), but for some this would still be guided by pain (17/160, 11%; 4 SI, 13 NSI) or quality of the movement (10/160, 6%; 5 SI, 5 NSI).

In relation to the progression of exercises, for most it came up that exercises would be progressed as pain allows (31/172, 18%; 11 SI, 20 NSI) and this would largely be done by increasing the load (71/172, 41%; 34 SI, 37 NSI) or the repetitions (47/172, 27%; 19 SI, 28 NSI).

In relation to the regression of exercises the majority of respondents expressed they would regress the exercises if the symptoms flared-up or were worsening (67/165, 41%; 30 SI, 37 NSI); this would be done in the same way as reported for the progression of exercises by reducing either the load (40/165, 24%; 15 SI, 25 NSI) or the repetitions (41/165, 25%; 17 SI, 24 NSI).

**What advice would you typically offer this patient?**

In response to this question UK physiotherapists would give a combination of advice about a range of topics (figure 3). The use of written advice was less prevalent. In the ‘other’ category, further comments were made which included the use of web resources; reasons for and against surgery; self-progression/regression; lifestyle; pathology; and likely timescales for improvement.

**[INSERT FIGURE 3]**

Table 2 shows how the respondents would typically deliver treatment for the patient detailed in the clinical scenario. The majority would use a combination of face-to-face appointments and a home-based programme, see this patient up to 3-4 times and over a 3 month period.

**Table 2** Treatment delivery

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | SI (n) | NSI (n) | Total (%) | Total (n) |
| Treatment setting (190) | | | | |
| Face-to-face appointments | 21 | 35 | 29.5% | 56 |
| Home-based programme | 4 | 6 | 5.3% | 10 |
| Face-to-face & home-based programme | 69 | 86 | 81.6% | 155 |
| Group class(es) | 18 | 9 | 14.2% | 27 |
| Other | 4 | 2 | 3.2% | 6 |
| No. of times typically seen (189) | | | | |
| Once | 0 | 1 | 0.5% | 1 |
| Twice | 1 | 3 | 2.1% | 4 |
| 3-4 times | 46 | 69 | 60.8% | 115 |
| 5-6 times | 27 | 35 | 32.8% | 62 |
| 7-8 times | 2 | 2 | 2.1% | 4 |
| 9-10 times | 2 | 1 | 1.6% | 3 |
| More than 10 times | 0 | 0 | 0.0% | 0 |
| Typical duration of treatment (190) | | | | |
| Up to 3 weeks | 0 | 2 | 1.1% | 2 |
| Up to 6 weeks | 3 | 13 | 8.4% | 16 |
| Up to 8 weeks | 15 | 30 | 23.7% | 45 |
| Up to 3 months | 48 | 47 | 50.0% | 95 |
| Up to 6 months | 6 | 15 | 11.1% | 21 |
| Up to 12 months | 2 | 0 | 1.1% | 2 |
| Other | 4 | 5 | 4.7% | 9 |

SI, respondents who stated a special interest in rotator cuff disorders;

NSI, respondents who stated no special interest in rotator cuff disorders.

**Would you expect this person to recover with the prescribed physiotherapy?**

In response to this question, 44% (82/188; 32 SI, 50 NSI) felt this person would recover within 3 months and 43% (80/188; 36 SI, 44 NSI) within 6 months, which made up the majority of responses. Two respondents with a SI (2/188, 1%) felt they wouldn’t improve with physiotherapy. These results are displayed in figure 4.

**[INSERT FIGURE 4]**

**What would be your main treatment goals for this patient?**

This was an open-ended question. One hundred and eighty-six (77 SI; 109 NSI) respondents provided at least one treatment goal for this patient. The most commonly reported themes were areduction in pain/symptoms; an increase in the pain-free range or reduction of the painful arc; increased strength; and pain-free function.

**Would you consider referring this patient for a surgical opinion and if so, when?**

This was another open-ended question. A common theme was that most would consider referral on for a surgical opinion, and several subthemes emerged such as only following a specified period of conservative treatment first or with certain stipulations. A quarter of the respondents (47/186, 25%; 21 SI; 26 NSI) expressed they would not refer this patient for a surgical opinion at any stage.

**Do you think that research could benefit your practice with regard to rotator cuff disorders?**

The vast majority of respondents (174/189, 92%; 77 SI, 97 NSI) felt that further research could benefit their practice and 8% (15/189; 2 SI, 13 NSI) felt that it wouldn’t.

One hundred and thirty-three respondents suggested areas for further research. Predominantly the comments were focused around exercise prescription and the optimal parameters of this, particularly with regards to pain. Several respondents commented on the effectiveness of eccentric exercises with tendon pathology in other areas of the body and why this is different to the shoulder. Another recurring suggestion was the development of subgroups with prognostic factors to predict outcomes.

**DISCUSSION**

**Summary of findings**

The results of this survey suggest that UK physiotherapists use a broad selection of interventions, but principally advice and some form of exercise therapy. The parameters around which exercise was prescribed were less clear; particularly in relation to the subject of pain.

In this survey, with reference to the clinical examination, 67% of respondents felt they would carry out further physical tests in order to help with the management of this patient. Although the further comments related to this question included items such as examination of the cervical/thoracic spine, neural dynamics and functional assessment, a third of respondents specifically mentioned they would want to perform some kind of orthopaedic/special tests. This is contrary to the evidence regarding the value of including these in the assessment process. Several systematic reviews summarise the poor diagnostic accuracy and reliability of these tests [20–22]. In spite of the findings in this survey, reassuringly this is significantly lower when compared to the figure of 82%, as reported by Littlewood, Lowe et al [12]. The difference in these findings may be explained by the emerging evidence over the last 5 years regarding the limited use of these tests and consequently may signify that UK physiotherapists are relying less on these in the decision-making process. Interestingly, more physiotherapists with a NSI would undertake these. This may demonstrate that those with a SI place less value on these special tests as part of their examination, in line with current evidence.

Just over half of the physiotherapists (53%) would incorporate a rehabilitation classification approach as part of their clinical examination; this apparent shift is interesting and might reflect recognition of the aforementioned limitations of tests and procedures undertaken within the pathoanatomic framework. Nonetheless, the rehabilitation classification systems reported still require evaluation to establish their clinical utility [23,24].

Undoubtedly, a notable finding in this survey was that only 9% of respondents would request further investigation to support the clinical examination. This is a significant contrast to Littlewood, Lowe et al [12] in which 30% of respondents felt this was required. It is plausible to propose that this difference in findings is in recognition to current evidence that disputes the relevance of imaging to inform both diagnosis and treatment. It has become more uncertain in the literature that structural findings from imaging studies direct us to the source of the pain; this is in light of consistent results across several studies of abnormal pathology in individuals without any pain [25–30].

In terms of the management strategies used by UK physiotherapists, advice/education and exercise therapy in some form was most commonly used. This is in keeping with the findings by Littlewood, Lowe et al [12] and remains the essence of treatment; underpinned by the evidence demonstrating the effectiveness of exercise [21,31–35].

However there was a clear decline in the use of all other modalities in comparison to the findings from Littlewood, Lowe et al [12]. This was most notable for acupuncture (18% versus 6%), electrotherapy (16% versus 3%), CCS injection (35% versus 16%), mobilisation (35% versus 23%), and massage (38% versus 18%). These findings reflect current research evidence in relation to the lack of clinical effectiveness of these modalities.

It is apparent from these findings that there is uncertainty regarding the optimal parameters of exercise, which reflects the paucity of evidence in this area. It is also not surprising, given the lack of detailed instructions regarding exercise dosage in many studies [35]. This increases our awareness of the lack of guidance in this area and the need for further research.

**Limitations**

This survey was limited to UK physiotherapists, which might limit generalisability beyond the UK. One strength of the study however was the use of a range of sources to recruit participants reflected in the wide range of roles/settings, experience, and a mix of those with a SI versus a NSI; which may increase the representativeness of the sample.

The majority (65%) of responses came from Twitter users; which was not used as a method for recruiting participants in the previous survey. As a forum for disseminating research findings and discussing best practice, it may be questioned if these physiotherapists are more likely to transfer knowledge into clinical practice and therefore be unrepresentative of the sample population. However, this method of data collection was felt to be justified to reflect the increasing use of social media by professional communities and to capitalise on the accessibility of these groups.

**Conclusion**

This study found that advice and exercise were the main strategies used by UK physiotherapists for treating RC disorders, reflecting the current literature, but there was a lack of consensus on exercise prescription. By repeating this survey, we have highlighted that practice has changed since the previous survey was conducted.

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**REFERENCES**

1. Urwin M, Symmons D, Allison T, et al. Estimating the burden of musculoskeletal disorders in the community: the comparative prevalence of symptoms at different anatomical sites, and the relation to social deprivation. *Ann Rheum Dis* 1998;57(11):649–55.

2. Luime J, Koes B, Hendriksen I, et al. Prevalence and incidence of shoulder pain in the general population; a systematic review. *Scand J Rheumatol* 2004;33(2):73–81.

3. Van der Windt DA, Koes BW, Boeke AJ, et al. Shoulder disorders in general practice: prognostic indicators of outcome. *Br J Gen Pract* 1996;46(410):519–23.

4. Michener L a, Walsworth MK, Burnet EN. Effectiveness of rehabilitation for patients with subacromial impingement syndrome: a systematic review. *J Hand Ther* 2004;17(2):152–64.

5. Linsell L, Dawson J, Zondervan K, et al. Prevalence and incidence of adults consulting for shoulder conditions in UK primary care; patterns of diagnosis and referral. *Rheumatol* 2006;45(2):215–21.

6. Kooijman M, Swinkels I, van Dijk C, et al. Patients with shoulder syndromes in general and physiotherapy practice: an observational study. *BMC Musculoskelet Disord* 2013;14(1):128.

7. Winters JC, Sobel JS, Groenier KH, et al. The long-term course of shoulder complaints: a prospective study in general practice. *Rheumatol* 1999;38(2):160–3.

8. Dorrestijn O, Stevens M, Diercks RL, et al. A new interdisciplinary treatment strategy versus usual medical care for the treatment of subacromial impingement syndrome: a randomized controlled trial. *BMC Musculoskelet Disord* 2007;8:15.

9. Hallgren HCB, Holmgren T, Oberg B, et al. A specific exercise strategy reduced the need for surgery in subacromial pain patients. *Br J Sports Med* 2014;48(19):1431–6.

10. Kuhn JE. Exercise in the treatment of rotator cuff impingement: A systematic review and a synthesized evidence-based rehabilitation protocol. *J Shoulder Elb Surg.* 2009;18(1):138–60.

11. Littlewood C, Malliaras P, Chance-Larsen K. Therapeutic exercise for rotator cuff tendinopathy: a systematic review of contextual factors and prescription parameters. *Int J Rehabil Res* 2015;1.

12. Littlewood C, Lowe A, Moore J. Rotator cuff disorders: a survey of current UK physiotherapy practice. *Shoulder Elb* 2012;4(1):64–71.

13. Blume C, Wang-Price S, Trudelle-Jackson E, et al. Comparison of Eccentric and Concentric Exercise Interventions in Adults With Subacromial Impingement Syndrome. *Int J Sports Phys Ther* 2015;10(4):441–55.

14. Mulligan EP, Huang M, Dickson T, et al. the Effect of Axioscapular and Rotator Cuff Exercise Training Sequence in Patients With Subacromial Impingement Syndrome: a Randomized Crossover Trial. *Int J Sports Phys Ther* 2016;11(1):94–107.

15. Littlewood C, Bateman M, Brown K, et al. A self-managed single exercise programme versus usual physiotherapy treatment for rotator cuff tendinopathy: A randomised controlled trial (the SELF study). *Clin Rehabil* 2015;30(7):686-696.

16. Marzetti E, Rabini A, Piccinini G, et al. Neurocognitive therapeutic exercise improves pain and function in patients with shoulder impingement syndrome: a single-blind randomized controlled clinical trial. *Eur J Phys Rehabil Med* 2014;50(3):255–64.

17. Seagger RM, Wallace AL. (i) Degenerative rotator cuff disease and impingement. *Orthop Trauma* 2011;25(1):1–10.

18. Bryman A. Social research methods. 4th ed. New York, Open University Press 2012.

19. Peabody JW, Luck J, Glassman P, et al. Comparison of vignettes, standardized patients, and chart abstraction: A prospective validation of 3 methods of measuring quality. *Jama*. 2000;283(13):1715–22.

20. Hegedus, E. Which physical examination tests provide clinicians with the most value when examining the shoulder? Update of a systematic review with meta-analysis of individual tests. *Br J Sports Med.* 2012;46:964–978.

21. Diercks R, Bron C, Dorrestijn O, et al. Guideline for diagnosis and treatment of subacromial pain syndrome. *Acta Orthop* 2014;85(3):314–22.

22. Cadogan A, Laslett M, Hing W, et al. Interexaminer reliability of orthopaedic special tests used in the assessment of shoulder pain. *Man Ther* 2011;16(2):131–5.

23. Kidd J. Treatment of shoulder pain utilizing mechanical diagnosis and therapy principles. *J Man Manip Ther* 2013;21(3):168–73.

24. Lewis J. Masterclass Rotator cuff related shoulder pain: Assessment, management and uncertainties. *Man Ther* 2016;23:57–68.

25. Bouju Y, Bouilleau L, Dubois de Montmarin G, et al. Do subacromial ultrasonography findings predict efficacy of intra-bursal injection? Prospective study in 39 patients. *Orthop Traumatol Surg Res* 2014;100(8):S361–4.

26. Daghir AA, Sookur PA, Shah S, et al. Dynamic ultrasound of the subacromial-subdeltoid bursa in patients with shoulder impingement: A comparison with normal volunteers. *Skeletal Radiol.* 2012;41(9):1047–53.

27. Girish G, Lobo LG, Jacobson JA, et al. Ultrasound of the shoulder: Asymptomatic findings in men. *Am J Roentgenol.* 2011;197(4):713–9.

28. Cadogan A, Laslett M, Hing W, et al. A prospective study of shoulder pain in primary care: prevalence of imaged pathology and response to guided diagnostic blocks. *BMC Musculoskelet Disord* 2011;12(1):119.

29. Yamamoto A, Takagishi K, Kobayashi T, et al. Factors involved in the presence of symptoms associated with rotator cuff tears: A comparison of asymptomatic and symptomatic rotator cuff tears in the general population. *J Shoulder Elb Surg* 2011;20(7):1133–7.

30. Minagawa H, Yamamoto N, Abe H, et al. Prevalence of symptomatic and asymptomatic rotator cuff tears in the general population: From mass-screening in one village. *J Orthop* 2013;10(1):8–12.

31. Littlewood C, May S, Walters S. A review of systematic reviews of the effectiveness of conservative interventions for rotator cuff tendinopathy. *Shoulder Elb* 2013;5:151–67.

32. Dong W, Goost H, Lin X-B, et al. Treatments for shoulder impingement syndrome: a PRISMA systematic review and network meta-analysis. *Medicine* 2015;94(10):e510.

33. Gebremariam L, Hay EM, van der Sande R, et al. Subacromial impingement syndrome--effectiveness of physiotherapy and manual therapy. *Br J Sports Med* 2014;48(16):1202–8.

34. Abdulla SY, Southerst D, Côté P, et al. Is exercise effective for the management of subacromial impingement syndrome and other soft tissue injuries of the shoulder? A systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMa) Collaboration. *Man Ther*. 2015;20(5):646–56.

35. Hanratty CE, McVeigh JG, Kerr DP, et al. The Effectiveness of Physiotherapy Exercises in Subacromial Impingement Syndrome: A Systematic Review and Meta-Analysis. *Semin Arthritis Rheum*. 2012;42(June):297–316.