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## Seven Key Themes in Physical Therapy Advice for Patients Living With Subacromial Shoulder Pain: A Scoping Review

**P**atient education is an important component of managing persistent musculoskeletal pain.<sup>38,79,90</sup> The health literacy, expectations of treatment, and personal attributes (such as self-efficacy) of patients may have an important influence on treatment outcomes.<sup>19,94</sup> Patients who understand their health condition are empowered to share in the decision-making process and take greater responsibility for the self-management of their condition,<sup>87</sup> and show improvements in health status, well-being, quality of life, and satisfaction with health care.<sup>88,93,94</sup> Patients with poor

understanding of their condition and how to self-manage it (poor health literacy) may have poorer health outcomes, increased emergency care use, and lower use of preventive health care.<sup>6,13,94</sup> Failing

to provide applicable advice and education may facilitate dependence on the clinician, reduce self-efficacy or compliance with rehabilitation, and increase fear and anxiety.

Shoulder pain is the third most common musculoskeletal disorder seen in primary care physical therapy.<sup>59</sup> Subacromial shoulder pain, the largest contributor to cases of shoulder pain, encompasses a variety of conditions and symptoms, including partial and full rotator cuff tears, inflammation of the rotator cuff tendons and bursa, and subacromial impingement syndrome.<sup>22</sup> Subacromial shoulder pain can affect sleep, movement, participation in activities of daily living, and employment.<sup>32,62</sup> The person-related burden of potentially decreased quality of life and increased suffering adds to the overall costs of subacromial shoulder pain.<sup>92</sup>

To address central mechanisms and psychosocial influences that may be associated with persistent shoulder pain, a management approach with a wider focus than physical symptom modification is indicated. This wider approach may include techniques to boost patient understanding and beliefs about persistent shoulder pain, or “cognitive training.”

- **OBJECTIVE:** To systematically scope the reported advice and education in physical therapy management of patients with subacromial shoulder pain, and to define key themes of the advice and education.
- **DESIGN:** Scoping review.
- **LITERATURE SEARCH:** We searched MEDLINE, Scopus, Web of Science, and CINAHL, with publication dates from 2007 to September 2019.
- **STUDY SELECTION CRITERIA:** We included quantitative and qualitative research that reported on physical therapy interventions for subacromial shoulder pain.
- **DATA SYNTHESIS:** We performed a qualitative synthesis that identified items included in patient advice and education.
- **RESULTS:** Of 89 original studies included, there were 61 randomized controlled trials; 5 prospective

studies; 16 nonrandomized observational intervention studies or case series; and 7 surveys, audits of physical therapy patient records, and focus groups with physical therapists. We identified 7 key themes for advice and education: exercise intensity and pain response, activity modification advice, posture advice, pain self-management advice, pathoanatomical and diagnosis information, behavioral approaches, and pain biology advice.

● **CONCLUSION:** While advice focused predominantly on the local tissue pathology model, 10% of studies included information about pain neuroscience education, psychosocial factors, motor imagery, or behavior change. *J Orthop Sports Phys Ther* 2020;50(6):285-293. doi:10.2519/jospt.2020.9152

● **KEY WORDS:** advice, patient education, rotator cuff, shoulder pain

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Such techniques may be part of an overall approach that includes pain education; self-management strategies to improve self-efficacy, coping, and resilience; and exercises and physical activity to decrease nervous system sensitivity.<sup>51,52,67,68,88</sup>

Effective self-management strategies may help reverse the escalating health- and person-related costs of subacromial shoulder pain. Advice and education as part of a biopsychosocial approach may contribute to effective self-management.<sup>50,51</sup> Advice and education may overlap with the behavioral or psychosocial approach of physical therapy and enhance the patient's understanding of pain neurophysiology, address potential fear-avoidance behavior, and modify general health behavior. Although patient education is widely accepted as part of management of persistent musculoskeletal pain,<sup>51</sup> the content and mode of delivery of such patient education for subacromial shoulder pain, as reported in clinical research studies, are unclear.

We aimed (1) to systematically scope the reported content of advice and education in physical therapy management for patients with subacromial shoulder pain and (2) to define key themes of the advice and education.

## METHODS

### Design

WE USED THE PREFERRED REPORTING Items for Systematic Reviews and Meta-Analyses (PRISMA) extension for Scoping Reviews<sup>89</sup> for the design and reporting of the review. A scoping review explores available evidence, allows a broad search and mapping of the literature, and clarifies working definitions of concepts.<sup>89</sup> Due to their exploratory nature, scoping reviews generally do not include a quality assessment of included studies.<sup>33</sup>

### Search

The systematic search strategy was developed and refined by the research team. Appropriate search terms were

identified and combined using Boolean operators. We searched 4 databases (MEDLINE, Scopus, Web of Science, and CINAHL). Prior to defining the final search strategy, pilot searches were conducted independently by 2 reviewers. We used an iterative process with several amendments until we agreed on the final search strategy (TABLE 1). Publication dates were limited from 2007 to 2019. We hand searched reference lists of appropriate primary articles that did not appear in the original search results. The first and final searches were undertaken on March 14, 2017 and September 19, 2019, respectively.

### Screening

The results from the search strategy were imported into EndNote X8 (Clarivate Analytics, Philadelphia, PA) and duplicates were removed. One reviewer screened all titles of the initial search. A second reviewer independently screened 25% of excluded articles to verify judgment of the first assessor, and verified all included articles. The titles of 32 articles were discussed by the 2 reviewers, who decided by consensus whether to review the article abstracts. The 2 reviewers independently reviewed the abstracts of the included titles, applying selection criteria. Articles that could not be included or excluded based on their abstract and methods were assessed in full text.

**Selection Criteria** Studies that met the following criteria were included:

- Patients of any age diagnosed with subacromial shoulder pain or unspecified shoulder pain
- Treatment delivered by a physical therapist
- Published in the English language from January 2007 to September 2019
- Research designs: quantitative research studies—randomized clinical trials, prospective cohort studies, pre-post study designs (including case series), and surveys—and qualitative studies with focus groups or interviews

We focused on studies published between 2007 and 2019, as the role of patient education in the physical therapy management of persistent pain has advanced during this period.

Studies that met the following criteria were excluded:

- A diagnosis of adhesive capsulitis (frozen shoulder), fracture, dislocation, rheumatoid arthritis, or primary osteoarthritis
- Treatment, surgery, or postsurgery follow-up that was only medical
- Study of the immediate effects of interventions on biomechanical variables (such as advanced kinematic analysis or muscle activity)
- Shoulder pain associated with cerebral vascular accident or other neurological disorders

TABLE 1

SEARCH PARAMETERS<sup>a</sup>

Concept 1	Concept 2	Concept 3	Concept 4
<ul style="list-style-type: none"> <li>• Rotator cuff injuries</li> <li>• Rotator cuff</li> <li>• Shoulder impingement syndrome</li> <li>• Shoulder pain</li> </ul>	<ul style="list-style-type: none"> <li>• Physical therapy modalities</li> </ul>	<ul style="list-style-type: none"> <li>• Advice</li> <li>• Education (health)</li> <li>• Education/patient education</li> <li>• Handout/patient education</li> <li>• Pain education</li> <li>• Exercise</li> <li>• Motivation</li> <li>• Mindfulness</li> <li>• Relax*</li> <li>• Musculoskeletal manipulations</li> </ul>	<ul style="list-style-type: none"> <li>• Adhesive capsulitis</li> <li>• Fracture dislocation</li> <li>• Fracture</li> <li>• Shoulder dislocation</li> <li>• Dislocation</li> <li>• Rheumatoid arthritis</li> <li>• General surgery</li> <li>• Postsurgical</li> <li>• Postoperative pain</li> </ul>
<p><sup>a</sup>OR within each concept; AND concepts 1, 2, and 3; NOT concept 4.</p>			

- Shoulder pain associated with diabetes or nonspecific neck/shoulder pain that could not be differentiated from neck pain
- Review article, expert opinion, clinical commentary, or case report

### Data Extraction

Data were extracted in Microsoft Word (Microsoft Corporation, Redmond, WA), using an iterative process between K.M. and G.S., and exported to Microsoft Excel (Microsoft Corporation) for analysis. The author, title, year of publication and geographical area, inclusion criteria, whether patient advice or education was given, and type of advice or education were extracted from each article. When a pilot study, protocol, or follow-up study was published in addition to a main article, the details of all publications were combined. A qualitative synthesis of the

evidence was undertaken. Items included in patient advice and education were categorized into key themes via consensus.

## RESULTS

OUR SEARCH IDENTIFIED 1193 STUDIES, of which 104 met the inclusion criteria (FIGURE). Fifteen of the 104 included studies were pilot studies, protocols, or follow-up studies<sup>4,5,7,9,20,41-43,46-48,53,54,61,83</sup> of published main studies. Finally, out of 89 independent, original studies (APPENDIX, available at [www.jospt.org](http://www.jospt.org)) identified, 82 were classified as “patient-focused” studies (61 randomized clinical trials; 5 prospective cohort studies; and 16 nonrandomized or retrospective studies, case series, or qualitative interviews). The remaining 7 were classified as “physical therapist-focused” studies

and included surveys, audits, guideline implementation studies, and focus groups with physical therapists. Studies reported using advice and education in combination with exercise, manual therapy, acupuncture, electrotherapies, and taping.

### Key Themes for Advice and Education in the Patient-Focused Studies

Of the 82 intervention/prospective studies, 52 (63%) specified that participants were provided with advice or education, 7 (9%) indicated that advice was provided but did not specify that advice, and 17<sup>1</sup> stated that advice was not provided.

We categorized the items included in education and advice into 7 themes (TABLE 2): exercise intensity and pain response (n = 32, 39%); activity modification advice (n = 17, 21%); posture advice (n = 15, 18%); pain self-management advice; pathoanatomical and diagnosis information; behavioral approaches; and pain biology advice. Of 82 studies, 9 (11%) provided written instructions or booklets. One protocol paper<sup>37</sup> reported the use of multimedia to cater to patient health literacy and preferences.

**Exercise Intensity and Pain Response** In nearly 40% of studies, exercise-related advice supplemented prescribed shoulder exercises (stretching and/or strengthening for the rotator cuff, glenohumeral joint, or scapular thoracic muscle groups). Specific guidelines for progression of exercises were outlined in 3 studies.<sup>1,8,37</sup> A protocol provided a detailed outline for patients regarding acceptable pain levels during and following exercises, without focusing on specific intensity of pain.<sup>37</sup> One study<sup>21</sup> provided information that pain levels should drop to the pre-exercise level after 30 minutes of rest. Two studies specified that pain during exercises should not exceed the numeric pain-rating scale level of 3/10, or should not last longer than 30 seconds after exercise.<sup>1,47</sup>

**Activity Modification Advice** Patients were advised to avoid painful movements,<sup>16,24,27,31,40,85,97,98</sup> overhead sports- or

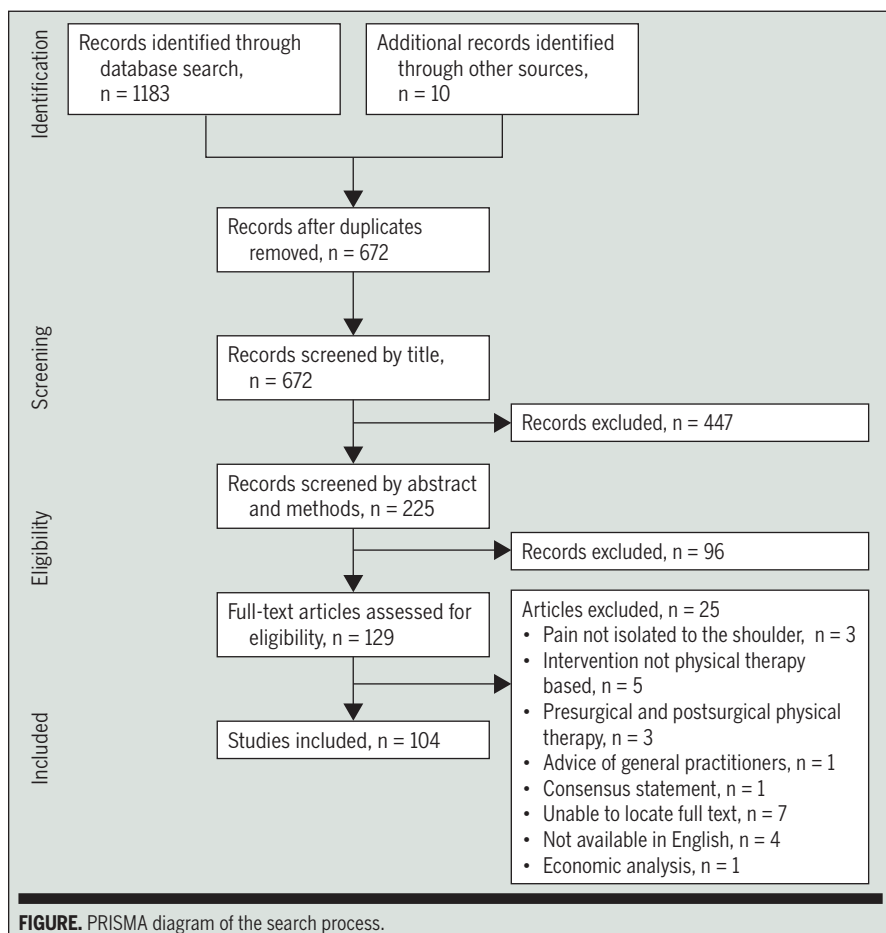


FIGURE. PRISMA diagram of the search process.

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work-related movements,<sup>81</sup> or all sporting activities during the course of treatment or the clinical trial.<sup>82</sup> Yiasemides et al<sup>97</sup> included a focus on scapular movement within the pain-free range of motion, also encouraging preferential use of the unaffected arm. One study specified encouraging return to “normal” activity following cessation of the program.<sup>81</sup>

**Posture Advice** Some studies included detailed instructions regarding movements and postures at work<sup>17</sup> and postures associated with lower loads on the rotator cuff or decreased compression on the shoulder<sup>80</sup> (referred to as “proper” posture<sup>40</sup> or “postural hygiene”<sup>33</sup>), and other studies did not specify the type of advice.<sup>24,35,72,76</sup> Specific advice regarding “centering of the humerus” and scapular position was defined by Vas et al.<sup>91</sup> Four studies provided advice regarding sleeping positions.<sup>1,8,27,37</sup>

**Pain Self-management Advice** Pain management included advice regarding use of analgesia,<sup>55</sup> nonsteroidal anti-inflammatory drugs, taping,<sup>28</sup> heat,<sup>14</sup> or ice<sup>15</sup>; accessing treatment from other health care professionals, if needed<sup>37</sup>; or was not further specified.<sup>8,27</sup> Littlewood et al<sup>53</sup> also included lifestyle changes in addition to self-management of shoulder symptoms.

**Pathoanatomical and Diagnosis Information** Information about the etiology and pathology of the underlying sources of symptoms was based on anatomy and biomechanics of the shoulder complex and on “impingement.”<sup>15,21,27,40,46,76</sup> Kromer et al<sup>46</sup> provided information about possible contributing factors to shoulder pain. Specific information about “contributing factors” was not provided.

**Behavioral Approaches** Behavioral approaches or psychologically informed components were wide ranging and might have overlapped the nonphysical or cognitive treatment approaches specifically explored in the studies. This category included specifying goal setting,<sup>9,46,54</sup> motivation and positive reinforcement,<sup>9</sup> reassurance,<sup>37</sup> and the use of mental imagery while performing exercises as part

of the study methods.<sup>39</sup> Analay Akbaba et al<sup>2</sup> explored whether patients’ expectations of treatment outcomes (of Kinesio Taping) influenced outcomes.

**Pain Biology Advice** Two studies provided information about the neuroscience or biology of pain.<sup>8,27</sup> Detail of such information was not provided.

## Advice and Education Reported by Physical Therapists: Surveys and Focus Groups

Of 5 surveys of physical therapists, 1<sup>84</sup> did not include patient education/advice and 1<sup>42</sup> did not specify the advice provided. Of 271 Swedish physical therapists in primary care, 85% provided advice about posture to patients with subacromial pain, 50% provided advice about staying active, and 10% provided advice regarding bed rest.<sup>11</sup> The most common modalities used by 13 physical therapists when managing shoulder pain in the United Kingdom were education (85/98 patients) and exercise prescription (87/98 patients).<sup>29</sup> Education focused on anatomical structure of the shoulder, describing why pain occurred, and encouragement to return to usual activity.<sup>29</sup> In the SUP-PORT trial,<sup>76</sup> 88% of treatment sessions included advice/education of unspecified content.<sup>83</sup>

In the United Kingdom, 20 physical therapists used education about the etiology of shoulder impingement, the importance of posture to minimize risk of impingement, and strategies to minimize pain to promote self-management.<sup>34</sup> Of 505 physical therapists in Belgium and the Netherlands, three quarters provided advice based on self-management, posture, activity modification, work, and home exercises for rotator cuff disorders.<sup>74</sup> Approximately 70% of the physical therapists advised patients to undertake exercises with levels of pain “acceptable to the patient.” Instructions regarding the behavior of pain during and following exercise varied.<sup>74</sup>

## DISCUSSION

WE REVIEWED THE CONTENT OF PATIENT advice and education included in published physical therapy interventions for subacromial shoulder pain. The physical therapy-focused surveys and focus groups indicate that advice and education comprise a modality that, similar to exercise prescription, is frequently reported in the management of such patients. We identified 7 categories from the patient-focused studies that may provide a clinical structure for

TABLE 2

KEY THEMES FOR ADVICE AND EDUCATION SPECIFIED IN THE PATIENT-FOCUSED STUDIES (N = 82)

Theme	Advice Mentioned by Studies	Studies <sup>a</sup>
Exercise intensity and pain response	Home exercise program prescription: instruction about dosage, progression, and pain response to the exercises	32 (39)
Activity modification advice	Activity modification, rest, activity avoidance, advice to work within pain limits, guidelines for activities of daily living, encouraging physical activity	17 (21)
Posture advice	Posture, biomechanics, ergonomics, shoulder positioning, instruction to decrease load on the shoulder	15 (18)
Pain self-management advice	Use of nonsteroidal anti-inflammatory drugs or analgesics, application of heat/cold, application and use of taping	10 (12)
Pathoanatomical and diagnosis information	Information about etiology of diagnosis; anatomy and biomechanics of the shoulder complex	7 (9)
Behavioral approaches	Empowerment, goal setting, motor imagery, cognitive behavioral techniques, self-efficacy and self-management, reassurance, level of research evidence for the intervention used in the study	6 (7)
Pain biology advice	Information about the neuroscience or physiology of pain	2 (2)

<sup>a</sup>Values are n (percent).

individual-specific and tailored education for patients with subacromial shoulder pain. These categories address potential sources and mechanisms of pain; advice related to exercise, ergonomics, and general physical activity; and psychosocial factors.

### Mechanisms of Pain

Reported advice and education were mostly based on anatomical and biomechanical factors related to the shoulder girdle. A mechanistic approach that focused on shoulder symptoms was thus most commonly included. This approach may apply, in particular, to patients with acute-onset pain, such as those with an acute injury, sudden onset after unaccustomed activity, or repetitive loading activities.

Patients with shoulder pain expect to be provided with a pathoanatomic diagnosis when seeking health care advice,<sup>23</sup> and providing pathoanatomic information may meet this expectation. However, the relationship between anatomical lesions or pathology and the presence of shoulder-related symptoms is unclear, especially in chronic pain states.<sup>12,49</sup> Further, peripheral influences and changes in central pathways, such as central sensitization or central motor reorganization, may also contribute to the experience of shoulder pain.<sup>25,53,64,78</sup> Such information should, therefore, aim to enhance patients' understanding of the multiple factors that can influence their pain.<sup>57</sup> Two intervention studies<sup>8,27</sup> explicitly reported education about the mechanisms of pain (neurophysiology/pain biology), indicating a potential new trend to include such information.

Given the individual and societal burden of shoulder pain,<sup>63,86</sup> management must focus on decreasing risk for chronicity. Patients who understand their condition and related pain often have enhanced clinical outcomes.<sup>67,69</sup> Treatment involving education and advice surrounding pain physiology/neuroscience can improve outcomes, supporting the inclusion of these “nonphysical” interventions in rehabilitation.<sup>57</sup> The impact of the content

of information that is provided to patients with subacromial shoulder pain may also be important.<sup>44,87</sup> For example, the wording used by the clinician to the patient regarding imaging findings and implications for treatment and outcomes should be characterized by reassurance and avoid unnecessary cause for fear and anxiety.<sup>44,87</sup>

### Advice Related to Exercise, Ergonomics, and Physical Activity

Evidence for exercise therapy for subacromial pain syndromes appears to be increasing,<sup>73</sup> and advice as an adjunct to exercise was the most frequent category (39%). Besides describing the exercises, few studies outlined guidelines for progression<sup>1,8,37</sup> or recommended pain response to the exercise.<sup>1,21,47</sup> Future studies should provide such details to allow replication of methods, comparison between exercise programs, and application to clinical practice. Other reported factors included postural or ergonomic advice and avoiding positions of potential impingement and/or pain.

Progressive return to activity and lifestyle factors are important considerations for patients with persistent musculoskeletal pain.<sup>26</sup> Shoulder-specific health-related quality of life measures are influenced by comorbidities.<sup>95</sup> There is increased awareness that chronic metabolic disorders, as well as increased body mass index,<sup>75,96</sup> may be associated with rotator cuff-related conditions. Only 1 protocol included in this review explicitly stated considering lifestyle factors as part of self-management for patients with subacromial shoulder pain.<sup>53</sup> While the factors were not further defined,<sup>53</sup> they may include considerations for sleep patterns, stress management, nutrition, and general physical activity. Lifestyle factors, as well as behavior change, may need to be considered in future studies as part of holistic management for patients with persistent shoulder pain.

### Behavioral and Psychologically Informed Advice

There is growing evidence that psychological responses may be associated

with self-reported shoulder pain and disability.<sup>18,60</sup> Psychologically informed treatment approaches, such as cognitive behavioral therapy, motor imagery, empowerment, and other behavioral techniques, are being explored and applied for the management of persistent musculoskeletal pain,<sup>58</sup> shoulder pain,<sup>56</sup> and lower back pain.<sup>65,66,70</sup> Such approaches include a substantial element of patient education and are reported in our scoping review. Psychologically informed approaches, particularly cognitive behavioral therapy, may be crucial for successful physical therapy management of pain conditions.<sup>30,45,77</sup>

Two surveys of Swedish physical therapists<sup>10,11</sup> found that 5% to 8% of the respondents reported using behavioral therapy. Furthermore, the low number of intervention studies<sup>8,27</sup> that explicitly reported inclusion of behavioral approaches ( $n = 6$ ) to the management of subacromial shoulder pain indicates that this area should be explored more thoroughly. It is currently unknown whether such approaches are more effective than those focused on “local structures” specific to patients with persistent subacromial shoulder pain. The increasing health costs that appear to be associated with subacromial shoulder pain, in addition to personal costs, suggest that further investigations are warranted to determine whether the cost trajectory can be reversed.

### Recommendations for Future Directions

None of the included studies compared different modes of advice/education or the effect of education versus that of other interventions. Physical therapists used a range of modes to deliver education, the content and delivery of which may change with increased clinical experience.<sup>34</sup> Future research is warranted to explore the content of advice and education as part of physical therapy management of persistent subacromial shoulder pain. Such advice may need to expand beyond the local tissue pathology model to include the neurosciences, physical activity, and lifestyle factors. As indicated

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for all patients, the advice needs to be patient centered, considering their level of health literacy, goals, concerns, beliefs, social support, and other factors.<sup>37,38,90</sup>

## Strengths and Limitations

We followed best-practice guidelines, with clearly reported and well-defined methods. Advice and education may be difficult to clearly differentiate from other modalities, as they are often interlinked, such as in the prescription of home-based exercises and self-management of pain.<sup>34</sup> The challenge of defining advice and education as an explicit modality of rehabilitation may help to explain why at least one third of the articles included in our scoping review did not specifically report providing advice. The authors may not have considered providing advice and education as an explicit modality, but rather as part of the conversation with the patient about the treatment intervention. Due to manuscript word count limits, authors may have prioritized information directly aligned with the aims of the individual study. Using reporting guidelines, for example, the Template for Intervention Description and Replication checklist,<sup>36</sup> would assist researchers to clearly define interventions in future trials.

Due to the scoping review design, we do not provide evidence for effectiveness of various items of advice/education for patients with subacromial shoulder pain. We used an iterative process to categorize patient education reported in studies of physical therapy management of subacromial shoulder pain. There may be other topics that physical therapists cover in clinical practice that are not reported in published research. Our results may not apply to surgical, medical, and other management contexts.

## CONCLUSION

**P**HYSICAL THERAPY ADVICE REPORTED for subacromial shoulder pain in published research covered 7 key themes: exercise intensity and pain re-

sponse, activity modification advice, posture advice, pain self-management advice, pathoanatomical and diagnosis information, behavioral approaches, and pain biology advice. While advice focused predominantly on the local tissue pathology model, 10% of studies included information about pain neuroscience education, psychosocial factors, motor imagery, or behavior change. ●

## KEY POINTS

**FINDINGS:** This scoping review provides a structured approach of themes for advice and education provided for patients with subacromial shoulder pain. Advice and education reported in included studies focused mainly on pathoanatomical and biomechanical factors.

**IMPLICATIONS:** Clinicians may need to consider integrating education about pain mechanisms and psychological factors into their management of patients with subacromial shoulder pain, tailoring these to patient-specific health literacy, goals, beliefs, and support systems.

**CAUTION:** A scoping review does not define the most effective patient education that should be provided to patients with subacromial shoulder pain.

## STUDY DETAILS

**AUTHOR CONTRIBUTIONS:** Dr Sole and Karen Meehan conceived of and designed the study and collected the data. All authors analyzed and interpreted the data, drafted and revised the manuscript, and gave final approval of the manuscript.

**DATA SHARING:** Data are available on request.

**PATIENT AND PUBLIC INVOLVEMENT:** Patient and public partners were not involved in the design, conduct, interpretation, and/or translation of the review.

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# [ LITERATURE REVIEW ]

## APPENDIX

### STUDIES INCLUDED IN THE REVIEW

#### Patient-Focused Studies

##### Randomized Clinical Trials

Study	Country	Participant Inclusion Criteria	Advice and Education
Ager et al <sup>1</sup>	Canada	Military personnel with clinical diagnosis of rotator cuff tendinopathy; DASH score >15%; reported shoulder pain; painful arc during flexion or abduction; positive Neer or Hawkins test; pain on resisted external rotation, abduction, or the empty-can test Age, 18-60 y Imaging: to exclude other conditions	Posture, relative rest, sleeping position, physical training; guidance for intensity of exercise and pain levels during exercise (3/10 on NPRS)
Ainsworth et al <sup>2</sup>	United Kingdom	Unilateral shoulder pain exacerbated by active or passive shoulder movement Age, ≥18 y Imaging: none	Advice sheet about shoulder pain and home exercise program
Al Dajah <sup>3</sup>	Saudi Arabia	Clear diagnosis of SIS; VAS, ≥5 Age, 40-60 y Imaging: none	No advice mentioned
Analay Akbaba et al <sup>4</sup>	Turkey	MRI-verified partial rotator cuff tear, shoulder pain for ≥3 mo, insufficient response to nonoperative management (local corticosteroid injection, NSAID, rest, and physical therapy) Imaging: MRI	Patients informed of effectiveness of Kinesio Taping. Group 1: there is no evidence that Kinesio Taping is effective; group 2: there is limited evidence that Kinesio Taping is effective; group 3: there is evidence that Kinesio Taping is effective
Apeldoorn et al, <sup>5</sup> Kalter et al <sup>56</sup>	the Netherlands	Two positive impingement tests indicating subacromial impingement Age, 18-65 y Imaging: X-ray, ultrasound	No advice mentioned
Asensio-García et al <sup>7</sup>	Spain	Patients with nontraumatic shoulder pain referred to physical therapy: nontraumatic rotator cuff tear, supraspinatus or infraspinatus tendinitis, SIS, partial or complete tendon tear, or capsulitis VAS, ≤8/10 Younger than 80 y of age	Group information sessions about “recommendations” and postural “hygiene,” with description of exercises
Barra et al, <sup>8</sup> Barra López et al <sup>9</sup>	Spain	Referred to physical therapy if diagnosed with chronic (>3 mo) painful shoulder of peri-articular origin; some degree of pain and restricted movement in at least 1 of the shoulder movements analyzed in this study Age, ≥18 y Imaging: none	No advice mentioned
Beaudreuil et al <sup>13,14</sup>	France	SIS, pain duration >1 mo Total Constant score, <80 Age, ≥30 y At least 2 positive tests: Neer, Yocum, Hawkins-Kennedy Imaging: none	No advice mentioned
Belley et al <sup>15</sup>	Canada	Unilateral rotator cuff tendinopathy: a positive finding for 1 of the following: (1) painful arc movement, (2) positive Neer test or Hawkins-Kennedy test, and (3) pain on resisted isometric lateral rotation, abduction, or Jobe test Age, 18-65 y Imaging: none	Pain neuroscience, pain management, structures affected, rehabilitation stages, graded exposure to exercise, shoulder and body mechanics and posture, sleeping, activities, work, and sports

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# [ LITERATURE REVIEW ]

## APPENDIX

Study	Country	Participant Inclusion Criteria	Advice and Education
Bennell et al <sup>16,17</sup>	Australia	Shoulder pain for $\geq 3$ mo; pain severity, at least 4/10 on movement; pain on active abduction or external rotation; positive shoulder impingement quick test Age, $\geq 18$ y Imaging: X-ray	Unspecified "education"; cognitive behavioral strategies for the intervention group: education, goal setting, motivation, positive reinforcement; home exercise Placebo group: no advice/education
Bron et al <sup>21</sup>	the Netherlands	Unilateral nontraumatic shoulder pain for $\geq 6$ mo Age, 18-65 y Imaging: none	Advice on the application of heat, advice on pain relief, ergonomic advice and instructions to assume and maintain good posture, relaxation exercises
Calis et al <sup>22</sup>	Turkey	SIS Age, 18-65 y Imaging: MRI	No advice mentioned
Chaconas et al <sup>24</sup>	United States	Shoulder pain for $\geq 3$ mo; positive result on all of the following: Neer test, Hawkins-Kennedy test, empty-can test; pain with resisted external rotation; palpable tenderness at insertion of supraspinatus or infraspinatus; or painful arc from $60^\circ$ to $120^\circ$ of abduction Mean $\pm$ SD age, $46.9 \pm 17.3$ y Imaging: none	Home exercises
Chen et al <sup>25</sup>	Australia	Pain over the glenohumeral joint or in the proximal upper limb and reproduced with shoulder movement; duration, $>1$ mo; shoulder range of motion, $\leq 140^\circ$ of flexion and abduction Imaging: none	Advice to avoid painful activity, advice to use pain-free methods to perform everyday activities, instruction to perform provided exercises in a pain-free manner
Cheng and Hung <sup>26</sup>	China	Work-related rotator cuff tendinitis, clinically diagnosed by a medical doctor Imaging: none	Ergonomic education: keeping the load close to the body, resting arm on support during extended reach, leaning forward or to the side to reduce arm extension, turning the upper body to bring in more shoulder muscles when making lateral movements, holding on to overhead support with one hand to reduce fatigue during overhead work, alternating hands for 1-handed tasks where arm is extended, holding on to vertical supports in front of a load when pushing it forward so the shoulders are stabilized
Cloke et al <sup>31</sup>	United Kingdom	Pain originating from the subacromial region during active arm abduction against gravity without added resistance (painful arc) Age, $\geq 18$ y Imaging: none	No advice mentioned
de Oliveira et al <sup>35</sup>	Canada	Diagnosed with a rotator cuff tear: painful arc on movement during flexion or abduction; positive Neer or Hawkins-Kennedy impingement sign; pain during resisted external rotation, abduction, or empty-can test Age, 18-65 y Imaging: none specified	Guidance to improve patients' understanding of shoulder overload, pain neuroscience, pain management, posture, rehabilitation stages, graded exposure to exercise, shoulder and body mechanics and movements that provoke impingement, and preferred shoulder positioning during sleep, work, and daily sports activities
Dejaco et al <sup>34</sup>	the Netherlands	Unilateral subacromial pain for $>3$ mo; 2 of 3 positive impingement tests: empty-can test, Hawkins-Kennedy test, modified Neer test Age, 18-65 y Imaging: X-ray and ultrasound for exclusion criteria	Home exercises
Devereaux et al <sup>38</sup>	Canada	Primary complaint of anterolateral shoulder pain, subacute pain onset ( $<12$ mo), painful arc ( $60^\circ$ - $120^\circ$ ), positive Hawkins-Kennedy test Age, $\geq 18$ y Imaging: yes, but not specified	Exercise instruction and home exercise program, use of diary, instruction about use of tape and NSAIDs

Table continues on page A3.

## APPENDIX

Study	Country	Participant Inclusion Criteria	Advice and Education
Elsodany et al <sup>42</sup>	Saudi Arabia	Rotator cuff tendinopathy diagnosed clinically with shoulder pain for >3 mo; limited shoulder abduction range and external and internal rotation range; positive diagnostic tests of Neer, Hawkins, Jobe, and external rotation lag sign	Home exercises
Engebretsen et al <sup>43</sup>	Norway	Subacromial shoulder pain (or rotator cuff rupture) lasting >3 mo, dysfunction/pain on abduction, normal passive glenohumeral range of motion, pain on 2 of 3 isometric tests (abduction, internal rotation, and external rotation), positive Hawkins-Kennedy test Age, 18-70 y Imaging: none	Postural awareness, avoid activities that elicit pain
Eslamian et al <sup>44</sup>	Iran	Rotator cuff tendinitis defined by 2 of the following tests: painful arc syndrome, positive impingement test, positive Hawkins-Kennedy test, sensitivity on palpation, positive supraspinatus test Inclusion age range not defined Imaging: none	No advice reported
de Paula Gomes et al <sup>37</sup>	Brazil	Patients on a waiting list for physical therapy with SIS and anterolateral and unilateral shoulder pain for >3 mo Orthopaedic doctor confirmed diagnosis with minimum score of 4/10 on the NPRS at rest and during shoulder movement and 2 of 3 positive tests: Neer, Hawkins, and Jobe Age, 18-60 y Imaging: none	No advice reported
de Paula Gomes et al <sup>36</sup>	Brazil	SIS and anterolateral and unilateral shoulder pain for >3 mo Orthopaedic doctor confirmed diagnosis with minimum score of 4/10 on the NPRS at rest and during shoulder movement and 2 of 3 positive tests: Neer, Hawkins, and Jobe Age, 18-60 y Imaging: none	No advice reported
Gutiérrez-Espinoza et al <sup>46</sup>	Chile	SIS with poor response to initial conservative treatment, under evaluation for surgery Orthopaedic surgeon to conduct assessment: pain located on the anterolateral side of the shoulder for >6 mo; painful arc during elevation; positive Neer or Hawkins-Kennedy test; pain with resisted external rotation, abduction, or empty-can test Age, >18 y Imaging: MRI	No advice reported
Haider et al <sup>47</sup>	Pakistan	SIS with pain for 2-3 mo; NPRS, $\geq 3/10$ Age, 25-60 y	No advice reported
Haik et al <sup>48</sup>	Spain	Shoulder pain in the C5-6 dermatome region and 3 of the following tests positive for SIS: Neer, Hawkins, Jobe, pain during active elevation in the scapular or sagittal plane, and pain or weakness with resisted shoulder external rotation Age, 18-60 y Imaging: none	No advice reported
Hando et al <sup>49</sup>	United States	New episode of shoulder pain with at least 2 of the following positive signs: impingement tests, painful arc, pain with isometric resistance, rotator cuff weakness compared to opposite side Imaging: none	No advice reported

*Table continues on page A4.*

# [ LITERATURE REVIEW ]

## APPENDIX

Study	Country	Participant Inclusion Criteria	Advice and Education
Heredia-Rizo et al <sup>51</sup>	Spain	Impingement defined with positive results in at least 2 of 3 specific tests: Neer test, Jobe test, Yergason test; negative response to cervical compression test Age, ≥18 y Imaging: none	Postural advice
Heron et al <sup>52</sup>	United Kingdom	Shoulder pain for ≥3 mo No passive limitation of range-of-motion testing Pain on Hawkins-Kennedy or empty-can test Imaging: none	Home exercises
Hopewell et al <sup>53</sup>	United Kingdom	A new episode of shoulder pain (within last 6 mo) attributable to rotator cuff disorder using diagnostic criteria of the British Elbow and Shoulder Society guidelines Imaging: none	Assessment and advice: self-management leaflets, tailored education, reassurance and advice on pain management and activity modification Home exercises Behavioral change strategies
Hoyek et al <sup>54</sup>	France	Identified as stage II of SIS Age, 35-65 y Imaging: none	Motor imagery: requested to imagine the exercise/movement performed before performing it
Kachingwe et al <sup>55</sup>	United States	Superolateral shoulder pain with 2 of 4 tests: positive Neer test, positive Hawkins-Kennedy test, painful limitation of active shoulder elevation, pain or limitation with the functional movement patterns of hand behind back or hand behind head Imaging: X-ray to exclude calcific tendinitis	Instruction for home exercises Education on the etiology of SIS and the importance of proper posture Instructed to modify overhead activity
Kamali et al <sup>57</sup>	Iran	Overhead athletes with unilateral SIS: positive Neer and Hawkins tests, active muscle trigger points identified by palpation (taut band, tenderness that reproduced patient's familiar pain, pain intensity of at least 3/10 on a VAS) Age, 18-60 y Imaging: none	No advice reported
Kaya et al <sup>62</sup>	Turkey	Shoulder pain reproduced with empty-can test and Hawkins-Kennedy test, subjective complaint of difficulty performing ADL, pain before 150° of active shoulder elevation in any plane Age, 18-70 y Imaging: none	No advice reported
Kinsella et al <sup>63</sup>	Australia	Pain localized to the proximal anterolateral shoulder Positive for pain on at least 1 of the following: Hawkins-Kennedy, Neer, and Jobe impingement tests Positive for pain on at least 1 of the following: painful arc, drop-arm test, lift-off test, and resisted external rotation Age, 18-80 y	No advice reported, but exercise booklet will be provided
Kromer et al <sup>64-67</sup>	Germany	Main complaints in the glenohumeral joint region or the proximal arm for >4 wk; positive Neer or Hawkins-Kennedy test or painful arc with active abduction or flexion; pain with resisted external rotation, internal rotation, abduction, or flexion Age, 18-75 y Imaging: none	Information booklet: anatomy and biomechanics of the shoulder complex, etiology of SIS, pathology, brief overview about possible contributing factors, goals for treatment, general guidelines for behavior through daily living
Kukkonen et al <sup>69</sup>	Finland	Atraumatic supraspinatus tendon tear comprising <75% of the tendon insertion and documented with MRI, full range of motion in the shoulder Age, ≥55 y Imaging: MRI, X-ray	Written information for home exercises

Table continues on page A5.

## APPENDIX

Study	Country	Participant Inclusion Criteria	Advice and Education
Kvalvaag et al <sup>70</sup>	Norway	Shoulder pain for $\geq 3$ mo Pain on 1 of the following tests: isometric abduction in 45° or external rotation with arm at side, positive Hawkins-Kennedy impingement sign Normal passive glenohumeral range of motion Age, 25-70 y Imaging: none	Home exercises
Lewis et al <sup>72</sup>	United Kingdom	Unilateral shoulder pain in C5-6 dermatome Age, $\geq 18$ y Imaging: none	Shoulder advice and exercise class
Littlewood et al <sup>73-75</sup>	United Kingdom	Primary complaint of shoulder pain with or without referral into the upper limb for $>3$ mo, no or minimal resting shoulder pain, range of motion largely preserved ( $>50\%$ external rotation), shoulder pain provoked consistently with resisted muscle tests (abduction or external rotation) Age, $\geq 18$ y Imaging: none	Pain education, explanation of the cause of the problem, enhancement of self-efficacy, encouragement of self-management
Lombardi et al <sup>76</sup>	Brazil	Shoulder pain, positive Neer and Hawkins-Kennedy tests, pain between 3 and 8 on the NPRS in the arc of movement that produced the greatest pain Imaging: none	Advice regarding analgesic usage
Mintken et al, <sup>78</sup> McDevitt et al <sup>77</sup>	United States	Shoulder pain (between neck and elbow at rest or during arm movements), baseline SPADI $\geq 20\%$ Age, 18-65 y	Advised to maintain usual activities that did not increase symptoms and avoid exacerbating activities
Moosmayer et al <sup>79</sup>	Norway	Lateral shoulder pain at rest or with exercise, painful arc, positive impingement signs, passive range of motion of at least 140° for abduction and flexion Imaging: MRI; ultrasound finding of full-thickness tear, tear of $<3$ cm on the short and long axes; muscle atrophy on MRI not exceeding stage 2	No advice mentioned
Østerås and Torstensen <sup>80</sup>	Norway	Shoulder pain duration of $>3$ mo; positive subacromial impingement test Age, 18-60 y Imaging: none	Education surrounding muscle fatigue resulting from exercise
Pekyavas and Baltaci <sup>81</sup>	Turkey	Diagnosis of SIS by a physical medicine and rehabilitation doctor, symptoms for $>3$ mo Imaging: none	Written instruction for exercises provided
Pérez-Merino et al <sup>82</sup>	Spain	SIS diagnosed by ultrasound, with rotator cuff tendinitis or tendinosis, or partial tear of the cuff and/or brachial biceps Age, 36-70 y Imaging: ultrasound	No advice given
Perez-Palomares et al <sup>83</sup>	Spain	Diagnosis of rotator cuff tendinitis and/or SIS by general practitioner Functional limitation and pain above 50% of flexion, abduction, and elevation in the scapular plane Imaging: MRI, ultrasound	Postural re-education
Rhon et al <sup>85</sup>	United States	Primary symptom of unilateral shoulder pain Age, 18-65 y Imaging: none	No advice mentioned
Roddy et al <sup>86</sup>	United Kingdom	Clinical diagnosis of SIS, pain in deltoid insertion, positive Neer and Hawkins-Kennedy tests, pain on shoulder abduction Age, $\geq 18$ y Imaging: none	Information leaflet: shoulder anatomy and SIS, simple messages about pain relief and activities

*Table continues on page A6.*

# [ LITERATURE REVIEW ]

## APPENDIX

Study	Country	Participant Inclusion Criteria	Advice and Education
Stevenson et al <sup>92</sup>	United Kingdom	Audit of treatment report form of physical therapists for patients with shoulder pain (661 treatments)	88% of sessions included education and advice, but not further specified
Salom-Moreno et al <sup>97</sup>	Spain	Unilateral shoulder pain for $\geq 6$ mo, pain intensity $> 3$ points on 11-point NPRS, positive painful arc test during abduction, at least 2 positive tests: Hawkins-Kennedy test, Neer sign, empty-can test, drop-arm test, or lift-off test Imaging: none	No advice mentioned
Santamato et al <sup>98</sup>	Italy	Subacromial impingement confirmed using ultrasound or MRI Shoulder pain for $\geq 4$ wk, painful abduction of the shoulder with a painful arc, positive Hawkins-Kennedy test, pain relief within 15 min of injection of local anesthetic into the subacromial space Imaging: MRI, ultrasound	No advice mentioned
Senbursa et al <sup>90</sup>	Turkey	Shoulder pain, painful range of motion, no marked loss of active or passive range of motion Imaging: MRI	Advice to avoid overhead work and overhead sports, encouraged to use shoulder "normally without any limitation" after completion of the treatment Shoulder exercise brochures were provided
Senbursa et al <sup>91</sup>	Turkey	Presence of SIS or stage 1 rotator cuff tear diagnosed by clinical examination and MRI Imaging: MRI	Leaflet with instructions for exercises, avoidance of sports activities for 12 wk
Ucurum et al <sup>97</sup>	Turkey	SIS, unilateral shoulder pain for $\geq 4$ wk, passive range of motion of the shoulder: restriction of $< 30\%$ compared to opposite side	No advice reported
Vas et al <sup>99</sup>	Spain	Chronic symptoms of unilateral subacromial syndrome; duration, $\geq 3$ mo Imaging: X-ray to exclude other conditions	A series of postural and ergonomic instructions (eg, centering the humeral head and scapula during movement)
Vallés-Carrascosa et al <sup>98</sup>	Spain	Diagnosis of subacromial syndrome by physician Painful arc between $60^\circ$ and $120^\circ$ of abduction Age, 25-70 y Imaging: none	No advice reported
Vinuesa-Montoya et al <sup>100</sup>	Spain	Unilateral shoulder pain compatible with medical diagnosis of SIS; duration, $\leq 12$ mo; baseline pain, $\geq 2/10$ on the VAS; pain or dysfunction with overhead activities; pain during active shoulder movements; positive Neer or Hawkins-Kennedy test Included age range not reported Imaging: none	Home exercises
Wright et al <sup>101</sup>	United States	Shoulder pain with 3 positive tests for the diagnosis of SIS: Hawkins-Kennedy test, painful arc sign, weakness in external rotation with arm at the side Age, $\leq 18$ y Imaging: none	Home exercise
Yiasemides et al <sup>102</sup>	Australia	Painful active flexion or abduction for $> 1$ mo; minimal shoulder movement restrictions; pain/tenderness or restriction during passive accessory movements at the glenohumeral joint, acromioclavicular joint, or sternoclavicular joint, or during passive scapular movements Included age range not reported Imaging: none	Advice on how to avoid/minimize painful movement during ADL: limiting movement to pain-free range of motion, maintaining normal scapulohumeral rhythm within pain-free range of motion, using the affected upper limb in a slow/careful manner, using techniques to minimize pain during activity, preferential use of nonaffected upper limb
Yildirim et al <sup>103</sup>	Turkey	Shoulder symptoms with findings compatible with shoulder impingement for $> 6$ mo, passive range of motion less than $30\%$ compared to the unaffected side Age, $> 40$ y Imaging: MRI, X-ray	Advice not to use affected arm for ADL or overhead activity

## APPENDIX

### *Prospective Cohort Studies*

<b>Study</b>	<b>Country</b>	<b>Participant Inclusion Criteria</b>	<b>Advice and Education</b>
Braun et al <sup>20</sup>	Germany	Shoulder pain associated with nontraumatic partial-thickness rotator cuff tear Clinical signs of shoulder impingement Age, ≥18 y Imaging: ultrasound	No advice mentioned
Chester et al <sup>27,28</sup>	United Kingdom	Musculoskeletal shoulder pain of any duration, score of ≤8 on the SPADI or QuickDASH, reproduction of pain and/or restriction on active or passive movement in at least 1 direction Age, ≥18 y Imaging: none	Advice and exercise
Christiansen et al <sup>30</sup>	Denmark	Diagnosis of rotator cuff syndrome, bicipital tendinitis, calcific tendinitis, impingement syndrome, bursitis, other shoulder lesions, or unspecified shoulder lesions Age, 18-65 y Imaging: none	Advice on self-training
Cummins et al <sup>33</sup>	United States	Diagnosis of impingement syndrome using diagnostic subacromial injection Age, 35-65 y Imaging: none	Work within pain, only progress exercise as tolerated, posture
Karel et al <sup>58</sup>	the Netherlands	Shoulder pain (not further defined) Imaging: ultrasound imaging in 31% of 389 included patients	Informing, advising, counseling, and coaching were documented for 86% of patients

### *Nonrandomized or Retrospective Studies, Case Series, or Qualitative Interviews*

<b>Study</b>	<b>Country</b>	<b>Participant Inclusion Criteria</b>	<b>Advice and Education</b>
Andrews et al <sup>5</sup>	United States	Overhead athletes (water polo, baseball, basketball, volleyball) with complaints of SIS Imaging: none	No advice mentioned
Barrett et al <sup>10,11</sup>	Ireland	Minimum 6-wk history of shoulder pain; aggravated by resisted shoulder flexion, abduction, or external rotation Age, ≥18 y	Encouraged to perform home exercises
Baydar et al <sup>12</sup>	Turkey	MRI-confirmed full-thickness rotator cuff tears	Activity modification
Camargo et al <sup>23</sup>	Brazil	Clinical diagnosis of SIS No evidence of rotator cuff or long head biceps tendon tear Imaging: ultrasound	Basic instruction about the anatomy and biomechanical factors related to SIS; advice surrounding arm and trunk positions that may lead to impingement; strategies to reduce load on the shoulder; instructions to use cryotherapy at home, as in sessions, if pain is present
Christensen et al <sup>29</sup>	Denmark	Experienced symptoms of rotator cuff rupture for ≥3 mo; rupture of at least the supraspinatus and infraspinatus, visualized by ultrasound or arthroscopy Imaging: ultrasound, MRI, or arthroscopy	Information on the diagnosis and rationale for exercise protocol, advice on how to manage pain related to exercise
Collin et al <sup>32</sup>	France	Full-thickness tears of at least 2 rotator cuff tendons, stage 3 or 4 fatty muscle degeneration in the affected muscles, pain score of ≤4 on the VAS, shoulder pseudo-paralysis: less than 90° of active elevation with full passive range of motion Imaging: none defined	No advice mentioned
Dickinson et al <sup>39</sup>	United States	Symptomatic rotator cuff tears, pain and decreased function for ≤4 wk Age, ≤45 y Imaging: MRI	No advice reported

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# [ LITERATURE REVIEW ]

## APPENDIX

Study	Country	Participant Inclusion Criteria	Advice and Education
Elkhadir et al <sup>41</sup>	Saudi Arabia	Rotator cuff tear, subacromial bursitis, subdeltoid bursitis, labral tears Imaging: MRI	Advice not specified
Garrison et al <sup>45</sup>	United States	Medically diagnosed with impingement syndrome with 1 or more of the following: dull ache at the anterolateral aspect of the shoulder, pain with overhead activity, pain with resisted abduction/external rotation, and pain with overhead positioning or direct pressure against the shoulder Imaging: none	No advice mentioned
Kuhn et al <sup>68</sup>	United States	MRI-documented atraumatic full-thickness rotator cuff tears Age, 18-100 y Imaging: MRI	Instructive rehabilitative booklets
Leffa et al <sup>71</sup>	Brazil	Clinical diagnosis of rotator cuff injury, pain for $\geq 3$ mo Age, 18-70 y	No advice reported
Savoie et al <sup>89</sup>	Canada	Shoulder pain with painful arc of movement during flexion or abduction; positive Neer or Hawkins-Kennedy test; pain on resisted lateral rotation, abduction, or the empty-can test Age, 18-65 y Imaging: none	Education regarding posture and body mechanics; instructions around preferred shoulder positioning during sleep, activities, work, and sports
Su et al <sup>94</sup>	China	Pain or dysfunction for the shoulder for $>3$ mo Age, $\geq 18$ y Imaging: MRI indicating rotator cuff tendinopathy	No advice reported
Tate et al <sup>95</sup>	United States	Shoulder pain: VAS, $\leq 7/10$ at rest, positive Hawkins-Kennedy or Neer test, positive painful arc, pain or weakness with either the Jobe empty-can test or resisted shoulder external rotation Age, 14-80 y Imaging: none	Patient education: posture and body mechanics, avoidance of positions likely to provoke impingement
Tyler et al <sup>96</sup>	United States	Shoulder pain with posterior glenohumeral joint line tenderness, posterosuperior glenoid labral lesion on MRI, positive relocation test, positive posterior impingement sign Imaging: MRI	No advice mentioned
Yilmaz and Tuncer <sup>104</sup>	Turkey	Subacromial bursa and supraspinatus tendon pathology with or without restricted shoulder movement Imaging: X-ray	Home exercise program

### Physical Therapist-Focused Studies

#### Surveys/Audits, Guidelines Implementation Studies, and Focus Groups With Physical Therapists

Study	Country	Participant Inclusion Criteria	Advice and Education
Bernhardsson et al <sup>19</sup>	Sweden	271 physical therapists in primary care (survey)	Advice on posture, 85%; advice to stay active, 50%; advice on bed rest, 10%; behavioral therapy, 5%
Bernhardsson and Larsson <sup>38</sup>	Sweden	Total of 256 physical therapists surveyed in primary care as part of an implementation study Intervention group: 168 physical therapists included in a program to implement clinical guidelines for subacromial pain Control group: 88 physical therapists	Advice on posture: intervention group, 95%; control group, 92% Advice to stay active: intervention group, 89%; control group, 87% Advice on bed rest: intervention group, 10%; control group, 10% Behavioral therapy: intervention group, 8%; control group, 5%
Dziedzic et al <sup>40</sup>	United Kingdom	Audit of physical therapy patient notes	Basic description of shoulder complex, what makes the shoulder painful, why movements may be stiff, how to ease discomfort, advice on when to move, encouragement to get back to daily routine
Hanratty et al <sup>50</sup>	United Kingdom	Physical therapists with $\geq 5$ y of postgraduate experience working with musculoskeletal conditions, working on a daily basis in a musculoskeletal role (survey)	Patient education to improve "buy-in": SIS etiology, self-management through exercise, postural advice, pain management

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## APPENDIX

Study	Country	Participant Inclusion Criteria	Advice and Education
Karel et al <sup>59-61</sup>	the Netherlands	125 physical therapists participating in a prospective study, reporting their treatment interventions for patients with shoulder pain; 112 (48%) of the patients were diagnosed as having a subacromial impingement (survey)	Information/advice: 92% of patients with SIS, but not defined
Pieters et al <sup>64</sup>	Belgium and the Netherlands	505 physical therapists, comparing those who were members of a professional shoulder network group to those who were not members	Self-management of pain, posture, activity modification, work-related advice, options for exercise
Struyf et al <sup>63</sup>	Belgium	Dutch-speaking members of the Belgian physical therapist society who had the possibility of treating patients with shoulder pain (183 respondents) (survey)	Patient education/advice was not included

*Abbreviations: ADL, activities of daily living; DASH, Disabilities of the Arm, Shoulder and Hand questionnaire; MRI, magnetic resonance imaging; NPRS, numeric pain-rating scale; NSAID, nonsteroidal anti-inflammatory drug; QuickDASH, shortened version of the Disabilities of the Arm, Shoulder and Hand questionnaire; SIS, subacromial impingement syndrome/shoulder impingement syndrome; SPADI, Shoulder Pain and Disability Index; VAS, visual analog scale.*

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