An Evaluation of the Rotator Cuff Repair Research Pipeline

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Background: We conducted a study of recommendations from the American Academy of Orthopaedic Surgeons (AAOS) guideline, “Optimizing the Management of Rotator Cuff Problems.” Using these recommendations, we conducted searches of clinical trial registries and bibliographic databases to note the extent to which new research has been undertaken to address areas of deficiency.

Hypothesis: Newly conducted research regarding rotator cuff repair and injury is available that will fill knowledge gaps identified by the AAOS guideline.

Study Design: Cross-sectional study.

Methods: For each recommendation in the AAOS guideline, we created PICO (participants, intervention, comparator, outcome) questions and search strings. Searches were conducted of ClinicalTrials.gov, the World Health Organization’s International Clinical Trials Registry Platform, MEDLINE via PubMed, and EMBASE to locate studies undertaken after the final literature search performed by the AAOS work group.

Results: We located 210 newly registered trials and 448 published studies that are relevant to the recommendations made in the rotator cuff guideline. The majority of the recommendations have been addressed by relevant registered trials or published studies. Of the 448 published studies, 185 directly addressed the guideline recommendations. Additionally, 71% of the 185 published studies directly addressing the recommendations were randomized trials or systematic reviews/meta-analyses. The most important finding of our study was that the recommendations in the AAOS rotator cuff guideline have been adequately addressed.

Conclusion: Orthopaedic researchers have adequately addressed knowledge gaps regarding rotator cuff repair treatment and management options. As such, the AAOS may consider a guideline update to ensure that recommendations reflect current findings in orthopaedic literature.

Keywords: rotator cuff; shoulder; clinical practice guidelines; research gaps; research waste

Rotator cuff tears are the most common musculoskeletal shoulder injury. These tears affect at least 10% of people over the age of 60 in the United States, and it is estimated that 250,000 rotator cuff repairs are performed in the United States per year. Furthermore, the volume of rotator cuff repairs is increasing. Colvin et al reported an increase of 141% between 1996 and 2006, with arthroscopic procedures increasing by 600% and open repairs increasing by 34%. Treatment options for rotator cuff tears include nonoperative management, arthroscopic debridement with a biceps tenotomy or tenodesis, partial repair, complete repair, patch augmentation, superior capsular reconstruction, muscle-tendon transfer, and reverse total shoulder arthroplasty. Given the high incidence of rotator cuff repairs and the diversity of treatment options, the American Academy of Orthopaedic Surgeons (AAOS) developed a clinical practice guideline that addressed the management of rotator cuff problems. This evidence-based guideline...
categorized evidence and assigned confidence to recommendations based on the quality of evidence that underpinned them; however, the majority of recommendations (55%) in the guideline were inconclusive. Even the most robust recommendations were classified as moderate. Criticisms surrounding potential bias and the large number of inconclusive recommendations ensued.\textsuperscript{18,27} The American Orthopaedic Society of Sports Medicine, the Arthroscopy Association of North America, as well as specialty societies of the AAOS, such as the American Shoulder and Elbow Surgeons, expressed concerns culminating in a request by the Council of Specialty Societies that the AAOS not publish the guideline due to lack of evidence, risk of misinterpretation, and potential for misuse.\textsuperscript{19} A continuous theme of these exchanges was the need for further research on rotator cuff disease. As Lubowitz et al\textsuperscript{19} concluded, “The real conclusion of the Guideline is that future and better research is required.”

Recommendations based on insufficient or inconclusive evidence (“moderate,” “limited,” “inconclusive,” or “consensus statement ratings”) serve as the basis for identifying research gaps in rotator cuff research. Chalmers and Glasziou\textsuperscript{6} estimated that up to 85% of research is wasted or of little value because of factors such as poor method, studies being underpowered, bias, and, pertinent to this study, addressing of the wrong research questions. In 2015, the Orthopaedic Research and Education Foundation (OREF) awarded US$2.5 million to 63 grant and award recipients.\textsuperscript{24} A more well-established connection between the research gaps identified during guideline development and the research enterprise is a viable solution for reducing research waste in rotator cuff studies and could allow funders such as OREF to better allocate funding to areas where research and treatment guidelines are least conclusive. Recent editorials regarding rotator cuff repair methods covered in the AAOS guideline also suggest that addressing knowledge gaps in rotator cuff repair with high-quality, methodologically sound studies should be a priority.\textsuperscript{9,11,23,25}

The primary purpose of the current study was to explore whether orthopaedic surgery researchers are addressing the research gaps identified by low-level recommendations in the AAOS clinical practice guideline, “Optimizing the Management of Rotator Cuff Problems.”\textsuperscript{3} Using recommendations from this guideline, we conducted searches of clinical trial registries, PubMed, and EMBASE to note the extent to which new, ongoing, and published research is being undertaken to address areas of deficiency. We hypothesized that the areas of deficiency in the rotator cuff guideline will have been addressed by new, ongoing, or published research.

**METHODS**

**Oversight and Reporting**

We applied relevant Statistical Analyses and Methods in the Published Literature (SAMPL) reporting guidelines for reporting descriptive statistics.\textsuperscript{18} These guidelines instruct authors on reporting basic statistical methods and results and were created to prevent most reporting deficiencies routinely found in published scientific reports.

We located the latest clinical practice guideline for rotator cuffs from the AAOS website.\textsuperscript{3} The strength of recommendations ratings are located in Table 1. For each recommendation, we constructed 1 or more research

**TABLE 1**

| Evidence of recommendation | Description |
|----------------------------|-------------|
| Strength of recommendation | Description |
| Strong                     | The benefits of the recommended approach clearly exceed the potential harm (or the potential harm clearly exceeds the benefits in the case of a strong negative recommendation), and the strength of the supporting evidence is high. |
| Moderate                   | The benefits exceed the potential harm (or the potential harm clearly exceeds the benefits in the case of a negative recommendation), but the strength of the supporting evidence is not as strong. |
| Limited                    | The quality of the supporting evidence that exists is unconvincing, or well-conducted studies show little clear advantage for one approach versus another. |
| Inconclusive               | A lack of compelling evidence exists, resulting in an unclear balance between benefits and potential harm. |
| Consensus                  | Expert opinion supports the guideline recommendation, but there is no available empirical evidence meeting the inclusion criteria. |
| Evidence of recommendation | Description |
| Level 1                    | High-quality randomized trial with statistically significant difference or no statistically significant difference but narrow CIs; systematic reviews of level 1 RCTs (and study results) were homogenous. |
| Level 2                    | Lesser quality RCT (eg, <80% follow-up, no blinding, improper randomization); prospective comparative study; systematic review of level 2 studies or level 1 studies with inconsistent results. |
| Level 3                    | Case-control study, retrospective comparative study, or systematic review of level 3 studies. |
| Level 4                    | Case series. |
| Level 5                    | Expert opinion. |

Source: American Academy of Orthopaedic Surgeons.\textsuperscript{3} “RCT, randomized controlled trial.”
questions using the PICO (participants, intervention, comparator, outcome) format. This method is used to identify clinical components for systematic reviews and is endorsed by the Cochrane Collaboration. It was chosen over other methods, as evidence suggests that the PICO method produces searches with greater sensitivity. One investigator (M.F.) constructed all initial PICO questions, and 2 investigators (J.J., J.W.) reviewed them for accuracy and drafted the final questions.

Development of the Search Strings

For our study, we used the search strategies found in Table A3 of the AAOS guideline, which included search strings for PubMed and EMBASE. The guideline work group did not perform searches of ClinicalTrials.gov or the World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP); therefore, keywords from the PubMed and EMBASE search strings were used to construct search strings for these trial registries. Search strings were formulated leveraging Boolean operators (eg, OR, AND) and parenthetical groupings to optimize the use of key terms. Although both ClinicalTrials.gov and the WHO ICTRP databases use the Unified Medical Language System to enhance interoperability of vocabularies, their search engines work differently. For example, on ClinicalTrials.gov, a search using the term “prehospital” (space between) returns records that include the word “prehospital” or “prehospital,” whereas on the ICTRP site, the word “prehospital” (hyphenated) also returns the forms “pre-hospital” and “prehospital.” For this reason, we developed 2 separate search strings for each clinical trial registry used in this study. We consulted Glavanl et al to accurately translate these search strings between the trial registries. We also consulted an expert on searching these trial registries to verify the accurate translation of our search strategy between the sites (M. Arber, personal communication, May 2017). The search strings used in this study are located in Appendix Table A1.

Screening the Trial Registries

Using the search strings for ClinicalTrials.gov, we retrieved studies using the “expert search” feature. Registry-listed information included study identification number, title, recruitment status, condition, intervention, phase, enrollment status, and study type.

Using the search strings for ICTRP, we retrieved studies using the basic search function. By performing a basic rather than advanced search, we were able to achieve a more sensitive search. These studies were then added to those identified through ClinicalTrials.gov. After the 2 files were merged, duplicate studies were deleted, and the remaining studies were subject to screening.

Searching PubMed and EMBASE

Using the search strings for PubMed, we retrieved studies using the advanced search function, limiting the date range for included studies from October 2008 to July 24, 2017, when this study concluded. This date was chosen because October 1, 2008, was the final date included in the literature search for the guideline. Additionally, we limited the search to clinical trials, systematic reviews and meta-analyses, and observational studies. For EMBASE we used the same method; however, this database allows for limiting date only by year, so January 2008 was used as the start date for the search. Studies published between January 1 and October 1, 2008, were then omitted. We also applied an EMBASE limiter to search only for included studies not published in PubMed/MEDLINE to limit duplication.

Identification of Studies Directly Addressing the AAOS Recommendations

Next, all published studies determined as relevant to the guideline recommendations from our search of PubMed and EMBASE were separated, and the full-text versions of the manuscripts were screened. In this analysis, 3 authors (J.X.C., J.S., J.H.) determined whether studies directly addressed the recommendations in the guideline through at least 1 arm and therefore would aid in increasing the evidence base of the corresponding recommendation. For example, recommendation 10B states, “We cannot recommend for or against the preferential use of suture anchors versus bone tunnels for repair of full-thickness rotator cuff tears.” For a study to be designated as relevant to this recommendation, the study would have to include 1 arm or objective evaluating the outcomes of bone tunnels or suture anchors for full-thickness rotator cuff repair.

Second, we screened relevant studies by completion date. Only studies completed or published after the end of the literature search stated in the guideline (October 2008) and ongoing studies were included. After screening, studies were mapped to their corresponding recommendation (Appendix Tables A2 and A3).
Independently screened the studies, each blinded to the other’s determinations. Once screening was complete, consensus was reached among the authors, and a third author (J.H.) provided a third review of the studies to confirm accuracy. Next, the study type (eg, randomized trial, systematic review, meta-analysis) was evaluated to establish the quality of evidence among the studies directly addressing the recommendations.

Identification of Studies Funded by OREF

We evaluated studies funded by OREF to determine whether recently funded studies addressed the research gaps we identified from the clinical practice guideline. We used the 2013-2015 OREF Annual Reports to gather the titles of all funded research projects. We included studies that indirectly addressed the recommendations and those that directly addressed recommendations. Only studies funded after the publication of the rotator cuff clinical practice guideline (2010) were included.

RESULTS

Results From Trial Registries

Our search of ClinicalTrials.gov and ICTRP yielded 868 studies; 409 studies were retrieved from ClinicalTrials.gov, and 459 studies were retrieved from the ICTRP database. After removing duplicate studies and those with completion dates prior to October 1, 2008, we were left with 532 studies (Figure 1).

Of the 532 studies included in our sample, 210 (39%) were relevant to the 25 recommendations made in the AAOS rotator cuff clinical practice guideline. Additionally, of the 25 recommendations made in the guideline, 24 (96%) were being addressed by new or ongoing research. The recommendation with the greatest number of new and/or ongoing trials was recommendation 4A, regarding patients with rotator cuff symptoms in the absence of a full tear being treated nonoperatively with exercise or nonsteroidal anti-inflammatory drugs. This recommendation was being addressed by 65 (31%) new or ongoing studies (Table 2). The recommendation with the next highest number of new and/or ongoing studies was recommendation 2, regarding the use of surgical rotator cuff repair in patients with symptomatic full-thickness tears, which was being addressed by 37 (18%) new and/or ongoing studies (Table 2). We found no new or ongoing studies evaluating recommendation 7B (the effects of diabetes, comorbidities, smoking, infection, and cervical disease on outcomes of rotator cuff surgery). The most common recruitment status for the 210 studies was “completed” (51; 24%), and the next most common recruitment status for the studies was “recruiting” (34; 16%) (Table 2).

Of the 210 registered trials determined as relevant to the recommendations in the guideline, only 99 (47%) have been updated as “completed” within their respective clinical trial registry database. Furthermore, of the 99 completed trials, only 17 (17%) were updated with the results of their study.

Figure 1. Flow diagram detailing the search results of ClinicalTrials.gov (CT.gov) and the World Health Organization International Clinical Trials Registry Platform (ICTRP). AAOS, American Academy of Orthopaedic Surgeons.

Results From PubMed and EMBASE

Our PubMed search yielded 1703 studies that were published between October 2008 and July 24, 2017. Our EMBASE search yielded 422 studies published between January 2008 and July 24, 2017. When combined, 2125 studies were screened for relevance. Of these, 448 (21%) were relevant to the 25 recommendations made in the guideline. Additionally, of the 25 recommendations made, all 25 (100%) were addressed by at least 1 published study (Figure 2). Recommendation 2, regarding the use of surgical rotator cuff repair in patients with symptomatic full-thickness tears, had the highest number of published studies (n = 158). The recommendation with the next highest number of published studies was recommendation 10C, regarding specific technique (arthroscopic, mini-open, or open repair) when surgical repair is indicated (n = 81) (Table 2).

Results of Full-Text Screening to Determine Studies Directly Addressing the AAOS Recommendations

Of the 448 published studies deemed relevant to the 25 recommendations made in the guideline, 185 (41%) were determined to directly address the recommendations in the
| Recommendation                                                                 | Level of Evidence | No. of Potential Trials in CT.gov/ICTRP | No. of Completed Trials in CT.gov/ICTRP (No. with results) | No. of Relevant Studies From PubMed and EMBASE | No. of Studies From PubMed and EMBASE Directly Addressing Recommendation |
|---------------------------------------------------------------------------------|-------------------|----------------------------------------|------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------|
| 1. In the absence of reliable evidence, it is the opinion of the work group that surgery not be performed for asymptomatic, full-thickness rotator cuff tears. | Level 5, consensus | 7                                      | 2 (0)                                                      | 3                                              | 2                                                                      |
| 2. Rotator cuff repair is an option for patients with chronic, symptomatic full-thickness tears. | Level 4, limited   | 37                                     | 9 (2)                                                      | 158                                            | 33                                                                     |
| 3A. We cannot recommend for or against exercise programs (supervised or unsupervised) for patients with rotator cuff tears. | Level 4, inconclusive | 12                                     | 2 (0)                                                      | 24                                             | 6                                                                      |
| 3B. We cannot recommend for or against subacromial injections for patients with rotator cuff tears. | Level 4, inconclusive | 3                                      | 1 (1)                                                      | 10                                             | 2                                                                      |
| 3C. We cannot recommend for or against the use of NSAIDs, activity modification, ice, heat, iontophoresis, massage, TENS, PEMF, or phonophoresis (ultrasound) for nonoperative management of rotator cuff tears. | None, inconclusive | 2                                      | 1 (0)                                                      | 12                                             | 0                                                                      |
| 4A. We suggest that patients who have rotator cuff–related symptoms in the absence of a full-thickness tear be initially treated nonoperatively using exercise and/or NSAIDs. | Level 2, moderate  | 65                                     | 23 (2)                                                     | 73                                             | 10                                                                     |
| 4B. We cannot recommend for or against subacromial corticosteroid injection or PEMF in the treatment of rotator cuff-related symptoms in the absence of a full-thickness tear. | Level 2, inconclusive | 21                                     | 7 (3)                                                      | 47                                             | 20                                                                     |
| 4C. We cannot recommend for or against the use of iontophoresis, phonophoresis, TENS, ice, heat, massage, or activity modification for patients who have rotator cuff–related symptoms in the absence of a full-thickness tear. | None, inconclusive | 19                                     | 9 (0)                                                      | 47                                             | 24                                                                     |
| 5. Early surgical repair after acute injury is an option for patients with a rotator cuff tear. | Level 4, limited   | 4                                      | 2 (0)                                                      | 1                                              | 0                                                                      |
| 6. We cannot recommend for or against the use of perioperative subacromial corticosteroid injections or NSAIDs in patients undergoing rotator cuff surgery. | Insufficient, inconclusive | 3                                      | 0 (0)                                                      | 1                                              | 1                                                                      |
| 7A. It is an option for physicians to advise patients that the following factors correlate with less favorable outcomes after rotator cuff surgery: age, atrophy/fatty degeneration, and workers’ compensation status. | Level 4, limited-moderate | 4                                      | 1 (0)                                                      | 22                                             | 15                                                                     |
| 7B. We cannot recommend for or against advising patients in regard to the following factors related to rotator cuff surgery: diabetes, comorbidities, smoking, infection, and cervical disease. | Inconclusive       | 0                                      | 0 (0)                                                      | 16                                             | 8                                                                      |

(continued)
| Recommendation | Level of Evidence | No. of Potential Trials in CT.gov/ICTRP | No. of Completed Trials in CT.gov/ICTRP (No. with results) | No. of Relevant Studies From PubMed and EMBASE | No. of Studies From PubMed and EMBASE Directly Addressing Recommendation |
|----------------|-------------------|----------------------------------------|-----------------------------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------|
| 8. We suggest that routine acromioplasty is not required at the time of rotator cuff repair. | Level 2, moderate | 9 | 4 (1) | 17 | 6 |
| 9. It is an option to perform partial rotator cuff repair, debridement, or muscle transfers for patients with irreparable rotator cuff tears when surgery is indicated. | Level 4, limited | 2 | 0 (0) | 26 | 13 |
| 10A. It is an option for surgeons to attempt to achieve tendon to bone healing of the cuff in all patients undergoing rotator cuff repair. | Level 4, limited | 5 | 0 (0) | 1 | 0 |
| 10B. We cannot recommend for or against the preferential use of suture anchors vs bone tunnels for repair of full-thickness rotator cuff tears. | Level 4, inconclusive | 8 | 5 (1) | 50 | 0 |
| 10C. We cannot recommend for or against a specific technique (arthroscopic, mini-open, or open repair) when surgery is indicated for full-thickness rotator cuff tears. | Level 3, inconclusive | 12 | 5 (3) | 81 | 16 |
| 11A. We suggest surgeons not use a non-cross-linked, porcine small intestine submucosal xenograft patch to treat patients with rotator cuff tears. | Level 3, moderate | 1 | 1 (0) | 14 | 9 |
| 11B. We cannot recommend for or against the use of soft tissue allografts or other xenografts to treat patients with rotator cuff tears. | Level 4, inconclusive | 4 | 3 (1) | 15 | 6 |
| 12. In the absence of reliable evidence, it is the opinion of the work group that local cold therapy is beneficial to relieve pain after rotator cuff surgery. | None, consensus | 2 | 1 (1) | 2 | 1 |
| 13A. We cannot recommend for or against the preferential use of an abduction pillow vs a standard sling after rotator cuff repair. | Insufficient, inconclusive | 6 | 2 (1) | 7 | 1 |
| 13B. We cannot recommend for or against a specific time frame of shoulder immobilization without range of motion exercises after rotator cuff repair. | Insufficient, inconclusive | 18 | 7 (0) | 38 | 6 |
| 13C. We cannot recommend for or against a specific time interval prior to initiation of active resistance exercises after rotator cuff repair. | Insufficient, inconclusive | 10 | 6 (0) | 24 | 4 |
| 13D. We cannot recommend for or against home-based exercise programs vs facility-based rehabilitation after rotator cuff surgery. | Level 2, inconclusive | 9 | 5 (0) | 15 | 3 |
| 14. We cannot recommend for or against the use of an indwelling subacromial infusion catheter for pain management after rotator cuff repair. | Insufficient, inconclusive | 4 | 3 (1) | 5 | 3 |

*AAOS, American Academy of Orthopaedic Surgeons; CT.gov, ClinicalTrials.gov; ICTR, International Clinical Trials Registry Platform; NSAIDs, nonsteroidal anti-inflammatory drugs; PEMF, pulsed electromagnetic field; TENS, transcutaneous electrical nerve stimulation.*
Collectively, the 185 studies directly addressed 21 (84%) of the 25 guideline recommendations. Of the 25 recommendations, recommendation 2 regarding the use of surgical rotator cuff repair in patients with symptomatic full-thickness tears was found to have the highest number of published studies directly addressing it (n = 33). The recommendations with the next highest number of published studies directly addressing them were 4C (regarding the use of iontophoresis, transcutaneous electrical nerve stimulation, ice, heat, massage, or activity modification for symptomatic non–full-thickness tears), and 4B (regarding subacromial corticosteroid injection or pulsed electromagnetic field in treating symptomatic non–full-thickness tears), which were directly addressed by 24 and 20 published studies, respectively. Recommendations 3C (mechanisms of nonoperative management of rotator cuff tears), 5 (early surgical repair after acute rotator cuff tears), 10A (tendon to bone healing), and 10B (suture anchors vs bone tunnels) were not directly addressed by any published studies.

Of the 185 studies directly addressing the recommendations, the most prevalent study type was randomized trial, accounting for 68 (37%) published studies directly addressing the recommendations; the next most prevalent study type was systematic review/meta-analysis, accounting for 64 (35%) published studies directly addressing the recommendations (Table 3). Of the 25 recommendations, 20 (80%) were directly addressed by at least 1 randomized trial or systematic review/meta-analysis.

Results From OREF

We identified 150 studies funded by OREF from 2012 to 2015. Of these, 20 concerned rotator cuff repair, and 6 addressed research gaps identified from the rotator cuff clinical practice guideline (Table 4). Two funded studies contributed to recommendation 7B (concerning the effects of diabetes, comorbidities, smoking, infection, and cervical disease on rotator cuff repair), and no studies registered in the 2 databases contributed to recommendation 7B. The 4 other grant-funded studies evaluated recommendations 6, 9, 3B, and 7A (Table 4).

DISCUSSION

Rotator cuff injury is the most common injury of the shoulder for which patients seek treatment, and research to improve methods for diagnosis and management should be a high priority. Our results suggest that all recommendations that lacked sufficient evidence at the time of guideline publication are receiving attention from orthopaedic researchers. These efforts suggest that the orthopaedic community is working to address the skepticism regarding “evidence not opinion” after the publication of this controversial “evidence-based” guideline. The AAOS standards affirm that clinical practice guidelines should be updated, reviewed, or retired every 5 years. Evidence indicates that waiting more than 3 years to review a guideline may be problematic, as up to 22.2% of recommendations may no longer be valid. No data exist to describe the validity of recommendations, especially those called into question for suspect levels of evidence, despite availability of 9 years of new research data.

Rotator cuff disease is a common and complicated condition. With both surgical and nonsurgical treatments being viable options, a paucity of data are available to support a definitive treatment algorithm for practitioners. In fact, algorithms for diagnosis and management of rotator cuff injuries exist as a matter of expert opinion, animal studies, and observational studies. For most patients, conservative physical therapy and pain management are used; however, if such options fail, surgery is the inevitable option. Although the specific indications for surgery remain unclear, our results show that nearly 220 studies have been performed, or are under way, to investigate techniques for surgical repair of rotator cuff injuries since the 2010 release of the guideline (Appendix Table A4).
TABLE 3
Classification of Published Studies Directly Addressing the Recommendations in the AAOS Guideline

| Recommendation                                                                 | No. of Randomized Controlled Trials | No. of Systematic Reviews/Meta-Analyses | No. of Review Articles | No. of Case Series | No. of Other Studies |
|--------------------------------------------------------------------------------|-------------------------------------|----------------------------------------|------------------------|--------------------|---------------------|
| 1. In the absence of reliable evidence, it is the opinion of the work group that surgery not be performed for asymptomatic, full-thickness rotator cuff tears. | 2                                   | 0                                      | 0                      | 0                  | 0                   |
| 2. Rotator cuff repair is an option for patients with chronic, symptomatic full-thickness tears. | 3                                   | 11                                     | 5                      | 6                  | 8                   |
| 3A. We cannot recommend for or against exercise programs (supervised or unsupervised) for patients with rotator cuff tears. | 1                                   | 1                                      | 0                      | 1                  | 3                   |
| 3B. We cannot recommend for or against subacromial injections for patients with rotator cuff tears. | 2                                   | 0                                      | 0                      | 0                  | 0                   |
| 3C. We cannot recommend for or against the use of NSAIDs, activity modification, ice, heat, iontophoresis, massage, TENS, PEMF, or phonophoresis (ultrasound) for nonoperative management of rotator cuff tears. | 0                                   | 0                                      | 0                      | 0                  | 0                   |
| 4A. We suggest that patients who have rotator cuff–related symptoms in the absence of a full-thickness tear be initially treated nonoperatively using exercise and/or NSAIDs. | 6                                   | 4                                      | 0                      | 0                  | 0                   |
| 4B. We cannot recommend for or against subacromial corticosteroid injection or PEMF in the treatment of rotator cuff–related symptoms in the absence of a full-thickness tear. | 13                                  | 7                                      | 0                      | 0                  | 0                   |
| 4C. We cannot recommend for or against the use of iontophoresis, phonophoresis, TENS, ice, heat, massage, or activity modification for patients who have rotator cuff–related symptoms in the absence of a full-thickness tear. | 14                                  | 8                                      | 0                      | 0                  | 2                   |
| 5. Early surgical repair after acute injury is an option for patients with a rotator cuff tear. | 0                                   | 0                                      | 0                      | 0                  | 0                   |
| 6. We cannot recommend for or against the use of perioperative subacromial corticosteroid injections or NSAIDs in patients undergoing rotator cuff surgery. | 1                                   | 0                                      | 0                      | 0                  | 0                   |
| 7A. It is an option for physicians to advise patients that the following factors correlate with less favorable outcomes after rotator cuff surgery: age, atrophy/fatty degeneration, and workers’ compensation status. | 1                                   | 5                                      | 3                      | 2                  | 4                   |
| 7B. We cannot recommend for or against advising patients in regard to the following factors related to rotator cuff surgery: diabetes, comorbidities, smoking, infection, and cervical disease. | 0                                   | 4                                      | 2                      | 0                  | 2                   |
| 8. We suggest that routine acromioplasty is not required at the time of rotator cuff repair. | 3                                   | 2                                      | 0                      | 0                  | 1                   |
| 9. It is an option to perform partial rotator cuff repair, debridement, or muscle transfers for patients with irreparable rotator cuff tears when surgery is indicated. | 0                                   | 5                                      | 4                      | 2                  | 2                   |
| 10A. It is an option for surgeons to attempt to achieve tendon to bone healing of the cuff in all patients undergoing rotator cuff repair. | 0                                   | 0                                      | 0                      | 0                  | 0                   |
| 10B. We cannot recommend for or against the preferential use of suture anchors vs bone tunnels for repair of full-thickness rotator cuff tears. | 0                                   | 0                                      | 0                      | 0                  | 0                   |
| 10C. We cannot recommend for or against a specific technique (arthroscopic, mini-open, or open repair) when surgery is indicated for full-thickness rotator cuff tears. | 8                                   | 5                                      | 2                      | 0                  | 1                   |
| 11A. We suggest surgeons not use a non–cross-linked, porcine small intestine submucosal xenograft patch to treat patients with rotator cuff tears. | 1                                   | 8                                      | 0                      | 0                  | 0                   |
| 11B. We cannot recommend for or against the use of soft tissue allografts or other xenografts to treat patients with rotator cuff tears. | 0                                   | 4                                      | 0                      | 1                  | 1                   |

(continued)
the AAOS guideline. Our findings also indicate that 185 of these studies directly address the recommendations in the guideline, and of these 185 studies, 132 (71%) are randomized trials or systematic reviews/meta-analyses, which are generally regarded as having a high level of evidence assuming they have robust methods. With 185 new studies directly addressing the recommendations in the guideline and with 80% of the recommendations being directly addressed by at least 1 randomized trial or systematic review, our findings suggest there may be sufficient research to warrant an evaluation of the recommendations and to determine whether the stances made by the AAOS in the guideline still reflect the evidence base.

Doing so may give the AAOS the opportunity to establish a truly evidence-based guideline regarding rotator cuff repair. Our study suggests that areas not addressed in the AAOS guideline are also receiving much attention by the orthopaedic research community. Interestingly, nearly 70 ongoing or recently published studies have focused on the use of platelet-rich plasma (PRP) injections. While some believe that no definitive evidence supports improved patient outcomes with PRP or stem cell injections, our search results point to an increasing interest in the topic from the orthopaedic community.1,30 Despite the increased interest, the AAOS guideline contains no definitive statement regarding its stance on this type of therapy. We believe the abundance of new evidence for this less invasive treatment is one of the clearer indications that a guideline update is necessary.

With this in mind, we must still consider the potentially prohibitive factors of such a treatment option for our patients. A recent meta-analysis of PRP showed an incremental cost-effectiveness ratio of US$127,893 per quality-adjusted life-year gained.30 This study suggested not only that this value is prohibitive and noneffective in small and medium-sized tears but that using PRP after large tears is economically and clinically ineffective due to the extent of tissue damage.30 Safety was not addressed in that meta-analysis, but other studies have made conclusions regarding

### TABLE 3 (continued)

| Recommendation                                                                 | No. of Randomized Controlled Trials | No. of Systematic Reviews/Meta-Analyses | No. of Review Articles | No. of Case Series | No. of Other Studies |
|--------------------------------------------------------------------------------|------------------------------------|----------------------------------------|------------------------|--------------------|---------------------|
| 12. In the absence of reliable evidence, it is the opinion of the work group that local cold therapy is beneficial to relieve pain after rotator cuff surgery. | 1                                  | 0                                      | 0                      | 0                  | 0                   |
| 13A. We cannot recommend for or against the preferential use of an abduction pillow vs a standard sling after rotator cuff repair. | 0                                  | 0                                      | 0                      | 0                  | 1                   |
| 13B. We cannot recommend for or against a specific time frame of shoulder immobilization without range of motion exercises after rotator cuff repair. | 3                                  | 2                                      | 1                      | 0                  | 0                   |
| 13C. We cannot recommend for or against a specific time interval prior to initiation of active resistance exercises after rotator cuff repair. | 0                                  | 2                                      | 2                      | 0                  | 0                   |
| 13D. We cannot recommend for or against home-based exercise programs vs facility-based rehabilitation after rotator cuff surgery. | 2                                  | 0                                      | 0                      | 0                  | 1                   |
| 14. We cannot recommend for or against the use of an indwelling subacromial infusion catheter for pain management after rotator cuff repair. | 3                                  | 0                                      | 0                      | 0                  | 0                   |

*AAOS, American Academy of Orthopaedic Surgeons; NSAIDs, nonsteroidal anti-inflammatory drugs; PEMF, pulsed electromagnetic field; TENS, transcutaneous electrical nerve stimulation.

**TABLE 4**
Studies Funded by OREF Addressing Recommendations in the Rotator Cuff Clinical Practice Guideline

| Study Funded                                                                 | Year Funded | Recommendation Addressed |
|------------------------------------------------------------------------------|-------------|--------------------------|
| Effect of ibuprofen on postoperative narcotic consumption and shoulder functional outcomes after arthroscopic rotator cuff repair | 2015        | 6                        |
| Mechanical and structural properties and gene expression patterns in full thickness rotator cuff tears: a study of diabetic versus nondiabetic patients | 2014        | 7B                       |
| Effect of nicotine on rotator cuff structure and healing                      | 2013        | 7B                       |
| Biomechanical comparison of the lower trapezius transfer vs latissimus dorsi tendon transfer for irreparable massive posterior-superior rotator cuff tears | 2013        | 9                        |
| Platelet-rich plasma vs corticosteroid injection in the treatment of partial thickness rotator cuff tears: a randomized, prospective, double-blinded trial | 2013        | 3B                       |
| Satisfaction and shoulder function in patients with re-tear following rotator cuff repair: analysis of the effects of age and activity level | 2012        | 7A                       |

*OREF, Orthopaedic Research and Education Foundation.
the safety of the therapy; however, as stated, cost is a prohibitive factor for the use of PRP.

These conclusions, while interesting, are supported by only 13 studies from 2010 to 2014, and a definitive position on PRP injections by the AAOS may provide guidance and clarity for future research into similar, less invasive treatment options. Furthermore, treatment options for rotator cuff tear such as patch augmentation, superior capsular reconstruction, and reverse total shoulder arthroplasty are not thoroughly addressed by the guideline. An evaluation of the literature and updated recommendations from the AAOS regarding these options may be of value to orthopaedic surgeons and patients alike.

With recognition that repairs leading to retear can negatively affect patient outcome measures, further research into conditions that most commonly lead to retear are of great importance. While some studies indicate that many common comorbid conditions such as osteoporosis (200 million patients worldwide) and diabetes (29.1 million Americans in 2012) have been shown to negatively influence tendon healing, our study found that there are currently no ongoing trials to address how these factors affect rotator cuff repair or management. Although the number of diseases associated with poor outcomes of rotator cuff repair is high, the research community’s commitment to discovering new and improved methods to incorporate this information into treatment and management options is miniscule in comparison with the efforts to improve surgical technique or evaluate the use of PRP or other such injections in nonoperative patients. Although Tashjian et al suggested that patients with an increasing number of medical comorbidities had a greater improvement in postoperative functional outcomes from baseline compared with those without medical comorbidities, the patients with comorbidities began the study with lower preoperative functional status and failed to reach the functional outcomes of those without comorbidities. While this finding is statistically significant for researchers, further studies are needed to illuminate its basis in patient satisfaction and perception of treatment success. The finding also fails to provide a conclusion or resolution to any concerns about treatment selection for those with comorbidities, as all patients were standardized to the same treatment. This confusion provides another opportunity for expert work groups to synthesize the literature and provide evidence-based suggestions for treatment.

Limitations

Our study had limitations. Although we used both Clinical-Trials.gov and the WHO ICTRP, a known comprehensive strategy for searching trial registries, it is possible that our searches did not locate studies that may have been relevant to this investigation. Furthermore, only a small percentage of the registered trials were updated as “complete,” and a smaller percentage had uploaded results. This finding could indicate that these studies are not surviving to publication and will not benefit rotator cuff repair evidence or orthopaedic surgery as a whole. While other databases exist, we believe that using PubMed and EMBASE provided an adequate evaluation of the published literature regarding rotator cuff injury; however, using only these databases could have inadvertently excluded relevant studies found in other databases. Although all studies were screened by multiple investigators, there is a chance that studies were incorrectly classified as to whether they addressed the recommendations. Furthermore, while we discovered many studies that directly addressed the recommendations, these studies may have methodological shortcomings that would preclude their inclusion in an AAOS clinical practice guideline, and thus our findings may have overestimated the number of studies that would actually be used as the evidence base for rotator cuff repair recommendations. In addition, because those evaluating grant proposals for the OREF likely distribute funding based on the strength of the proposal, it is possible that the reason rotator cuff recommendations are not being addressed by OREF funding is because proposals that would address these recommendations are not as strong as research focused on other areas of orthopaedics. As such, our findings may have underestimated the interest in addressing rotator cuff repair by those submitting proposals for OREF funding.

CONCLUSION

Our study located 210 newly registered trials and 448 published studies that are relevant to the recommendations made in the AAOS rotator cuff guideline. The majority of the recommendations have been addressed by relevant registered trials or published studies. Of the 448 published studies, 185 directly addressed the guideline recommendations. Additionally, 71% of the 185 published studies directly addressing the recommendations were randomized trials or systematic reviews/meta-analyses.

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APPENDIX

TABLE A1
List of Search String by Database

| Database       | Search String                                                                                                                                 |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------|
| ClinicalTrials.gov | rotator cuff OR shoulder impingement OR supraspinatus tendinitis OR subacromial bursitis OR glenohumeral instability OR cuff tear OR cuff tears OR supraspinatus atrophy OR subacromial atrophy OR ((infraspinatus OR supraspinatus OR subscapularis OR teres minor) AND (tear OR impingement OR augmentation)) |
| ITRP            | rotator cuff OR shoulder impingement OR supraspinatus tendinitis OR subacromial bursitis OR glenohumeral instability OR cuff tear OR cuff tears OR supraspinatus atrophy OR subacromial atrophy OR infraspinatus tear OR infraspinatus impingement OR infraspinatus augmentation OR supraspinatus impingement OR supraspinatus augmentation OR subscapularis tear OR subscapularis impingement OR subscapularis augmentation OR teres minor tear OR teres minor impingement OR teres minor augmentation |
| PubMed          | rotator cuff OR shoulder impingement OR supraspinatus tendinitis OR subacromial bursitis OR glenohumeral instability OR cuff tear OR cuff tears OR supraspinatus atrophy OR subacromial atrophy OR ((infraspinatus OR supraspinatus OR subscapularis OR teres minor) AND (tear OR impingement OR augmentation)) AND (Observational Study[ptyp] OR Clinical Trial[ptyp] OR Review[ptyp] OR systematic[sb] OR Meta-analysis[ptyp] OR Multicenter Study[ptyp]) AND (“2008/10/01”[PDat]:”2017/07/24”[PDat]) |
| EMBASE          | ‘rotator cuff’ OR ‘shoulder impingement’ OR ‘supraspinatus tendinitis’ OR ‘subacromial bursitis’ OR ‘glenohumeral instability’ OR ‘cuff tear’ OR ‘cuff tears’ OR ‘supraspinatus atrophy’ OR ‘subacromial atrophy’ OR ((infraspinatus OR supraspinatus OR subscapularis OR teres minor) AND (tear OR impingement OR augmentation)) AND (article) AND (conference paper) AND (review) AND (english) AND (humans) AND (embase) }
| Title                                                                 | Registry No.       | Recruitment Status         | Recommendation Addressed |
|----------------------------------------------------------------------|--------------------|---------------------------|---------------------------|
| Longitudinal study of asymptomatic rotator cuff tears                | NCT01085942        | Completed                  | 1                         |
| Features to predict success with nonoperative treatment of patients   | NCT00762580        | Active, not recruiting     | 1                         |
| The natural history of asymptomatic rotator cuff tears                | NCT00923858        | Enrolling by invitation    | 1                         |
| Outcome of arthroscopic repair of chronic rotator cuff tears between  | NCT00828256        | Unknown status             | 2                         |
| Rotator cuff repair (RCR) with and without OrthoADAPT augmentation    | NCT00957255        | Withdrawn                  | 2                         |
| Arthroscopic surgical outcome study in subjects with rotator cuff     | NCT00739947        | Completed                  | 2                         |
| Outcome following surgery to repair rotator cuff tears                | NCT00260949        | Completed                  | 2                         |
| Pilot study of augment rotator cuff for surgical treatment of full    | NCT01256242        | Unknown status             | 2                         |
|thickness rotator cuff tears                                         |                    |                           |                           |
| Study comparing patient function and satisfaction with arthroscopic    | NCT01430598        | Unknown status             | 2                         |
| subacromial decompression before and after repair of complete rotator |                    |                           |                           |
| cuff tears                                                            |                    |                           |                           |
| Results of shoulder arthroscopic surgery for rotator cuff, biceps    | NCT01401738        | Unknown status             | 2                         |
| tendon, labrum and capsule                                           |                    |                           |                           |
| Postoperative multiparameter outcomes during the six months after    | NCT01608997        | Unknown status             | 2                         |
| rotator cuff repair                                                  |                    |                           |                           |
| A pilot cohort study of surgical and non-surgical management of       | NCT03021733        | Completed                  | 2                         |
| rotator cuff tears                                                   |                    |                           |                           |
| Can shoulder arthroscopy work                                         | NCT01623011        | Active, not recruiting     | 2                         |
| Rotator cuff injury to surgery                                       | NCT01744080        | Withdrawn                  | 2                         |
| Functional and radiographic outcomes after shoulder surgery           | NCT01405781        | Enrolling by invitation    | 2                         |
| Arthroscopic rotator cuff repair with synovectomy                     | NCT03061942        | Recruiting                 | 2                         |
| Comparing the outcomes between rotator cuff repair with and without  | NCT02107573        | Recruiting                 | 2                         |
| suprascapular nerve decompression                                    |                    |                           |                           |
| InSpace™ system over rotator cuff repair in comparison to repair      | NCT02210910        | Active, not recruiting     | 2                         |
| alone                                                                |                    |                           |                           |
| Tenotomy or tenodesis of long head biceps in arthroscopic rotator     | NCT02655848        | Recruiting                 | 2                         |
| cuff repair                                                          |                    |                           |                           |
| InSpace™ system in comparison to best repair of massive rotator cuff  | NCT02208440        | Recruiting                 | 2                         |
| tear                                                                 | NCT03111147        | Recruiting                 | 2                         |
| Impact of humeral component version on outcomes following RTSA       | NCT02725320        | Recruiting                 | 2                         |
| Rotator cuff surgical outcomes in women                              | NCT02811757        | Recruiting                 | 2                         |
| Clinical outcomes after arthroscopic tenotomy or tenodesis of the    | NCT02811757        | Recruiting                 | 2                         |
| long head of the biceps                                              |                    |                           |                           |
| Assessing the post-operative quality of recovery and chronic pain     | ACTRN12616000878471| Not recruiting             | 2                         |
| rates after elective shoulder surgery                                 |                    |                           |                           |
| Functional reconstruction for irreparable rotator cuff tissue         | ChiCTR-INR-16008114| Not recruiting             | 2                         |
| Patients with impingement syndrome with and without rotator cuff     | DRKS00006776       | Not recruiting             | 2                         |
| tears do well 20 years after arthroscopic subacromial decompression   |                    |                           |                           |
| Treatment of long head of biceps tendon lesions together with rotator | IRCT201406117274N10| Not recruiting             | 2                         |
| cuff tears: which method is preferred? Tenotomy or tenodesis          |                    |                           |                           |
| Comparison between two tenodesis methods in the treatment of biceps   | IRCT201309247274N9 | Not recruiting             | 2                         |
| tendon and shoulder pathology                                         |                    |                           |                           |
| Tenotomy or tenodesis for long head biceps lesions associated with    | ChiCTR-TRC-12002649| Recruiting                 | 2                         |
| reparable rotator cuff tears                                         |                    |                           |                           |
| United Kingdom rotator cuff trial                                   | ISRCTN97804283     | Not recruiting             | 2                         |
| Outcomes after repair of acute rotator cuff tears                    | NCT01140230        | Completed                  | 5                         |
| Clinical and structural outcome after early repair of the traumatic   | NCT01557309        | Completed                  | 5                         |
| rotator cuff tear                                                    |                    |                           |                           |
| ACCURATE trial—operative treatment of acute rotator cuff tear related | NCT02885714        | Recruiting                 | 5                         |
| to trauma                                                            |                    |                           |                           |
| Effect of ibuprofen on postoperative opiate medication use and        | NCT02588027        | Recruiting                 | 6                         |
| shoulder                                                             | NCT02153177        | Suspended                  | 6                         |

(continued)
| Title                                                                 | Registry No.                  | Recruitment Status                      | Recommendation Addressed |
|----------------------------------------------------------------------|------------------------------|-----------------------------------------|--------------------------|
| Dexamethasone effect on the duration of interscalenic brachial plexus block guided by ultrasound for videoarthroscopic shoulder surgery | RBR-86mhm2                   | Not recruiting                          | 6                        |
| Radiofrequency microtenotomy for treatment of rotator cuff tendinopathy | NCT02275689                  | Completed                               | 8                        |
| ArthroPlanner: a surgical planning solution for acromioplasty         | NCT02725346                  | Active, not recruiting                   | 8                        |
| Latissimus dorsi tendon transfer or partial arthroscopic repair of massive rotator cuff tears | NCT01481480                  | Recruiting                              | 9                        |
| Compression and cold therapy on the post-operative shoulder            | NCT00703729, JPRN-UMIN000026796 | Completed                              | 12                       |
| Post-operative pain relief for patients undergoing arthroscopic shoulder surgery—an investigation of the efficacy of cryotherapy | NCT02275346                  | Completed                               | 12                       |
| Continuous subacromial bupivacaine                                    | NCT01126593                  | Completed                               | 14                       |
| Post-operative quality of life evaluation for different anesthesia techniques for arthroscopic shoulder surgery | NCT01355757                  | Completed                               | 14                       |
| Use of catheter for patient controlled interscalene analgesia          | NCT00695981                  | Not recruiting                          | 14                       |
| Operative versus non-operative management of rotator cuff tear         | NCT01877772                  | Recruiting                              | 10A                      |
| Comparative effectiveness of operative versus non-operative treatments for rotator cuff tears | NCT02287090                  | Not recruiting                          | 1, 2                     |
| Functional and radiological outcome of non-surgical vs surgical treatment for the atraumatic cuff rupture after 1 year (COPACABANA trial) | NTR2343                      | Recruiting                              | 1, 2                     |
| Treatment of atraumatic rotator cuff rupture                          | NCT01116518                  | Completed                               | 1, 8, 3A                 |
| A comparison of two adjunctive treatments in arthroscopic cuff repair  | NCT01706978                  | Active, not recruiting                   | 10A                      |
| Trephination in arthroscopic cuff repair: a prospective randomized controlled trial | NCT01877772                  | Recruiting                              | 10A                      |
| Evaluation of tendon-to-bone healing potential in arthroscopic rotator cuff repair through biological stimulation | NCT03060928                  | Not yet recruiting                       | 10A                      |
| The effect of synovium for tendon-to-bone insertion healing—microvascularity analysis | JPRN-UMIN000017349           | Not recruiting                          | 10A                      |
| A study in healing process of tendon-to-bone insertion—microvascularity analysis | JPRN-UMIN000017312           | Not recruiting                          | 10A                      |
| Types of fixation in arthroscopic rotator cuff repair                 | NCT00508183, NCT01815177    | Completed                               | 10B                      |
| Arthroscopic rotator cuff repair: suture anchors versus arthroscopic transosseous fixation | NCT02256891                  | Completed                               | 10B                      |
| Rotator cuff repair using standard double row technique with platelet rich fibrin membrane vs. standard double row technique | NCT02759458                  | Enrolling by invitation                 | 10B                      |
| Evaluation of the Healicoil suture anchor for rotator cuff repair      | NCT02350647                  | Recruiting                              | 10B                      |
| Suture anchor comparison in rotator cuff repairs                       | NCT01481480                  | Recruiting                              | 10B                      |
| Optimal insertion angle for suture anchors—an assessment using three dimensional finite element method | NCT03084068                  | Not recruiting                          | 10B                      |
| Comparison of clinical outcomes in all-arthroscopic versus mini-open repair of rotator cuff tears | ChiCTR-IOR-17011244          | Not recruiting                          | 10B                      |
| Early mobilization following mini-open rotator cuff repair             | NCT01741272                  | Completed                               | 10C, 13A                 |
| Outcomes in rotator cuff repair using graft reinforcement             | NCT01025037                  | Completed                               | 11B                      |
| Rotator cuff reconstruction with xenologous dermis-patch augmentation and ACPO - injection | NCT01586351                  | Completed                               | 11B                      |
| Use of human dehydrated umbilical cord allograft in supraspinatus tendon repair | NCT03084068                  | Enrolling by invitation                 | 11B                      |
| Outcome evaluation of allograft scaffold augmentation for arthroscopic repair of full thickness of rotator cuff tear | KCT0002134                   | Not recruiting                          | 11B                      |
| Duration of immobilization after rotator cuff repair: its clinical impact | NCT00891566                  | Completed                               | 13A                      |
| The role of postoperative immobilization after arthroscopic rotator cuff repair | NCT02050087                  | Unknown status                          | 13A                      |
| Prospective sensor controlled compliance analysis of shoulder abduction splint after rotator cuff repair | NCT03054753                  | Enrolling by invitation                 | 13A                      |
| Early mobilization following arthroscopic rotator cuff repair          | NCT01333527                  | Active, not recruiting                   | 13A                      |
| Title                                                                 | Registry No.          | Recruitment Status               | Recommendation Addressed |
|---------------------------------------------------------------------|-----------------------|----------------------------------|---------------------------|
| Effect of postoperative immobilization on healing after rotator cuff arthroscopic repair | NCT01502098           | Unknown status                   | 13A, 13B                 |
| Early range of motion following arthroscopic rotator cuff repair    | NCT00845715           | Completed                        | 13B                      |
| Rehabilitation after rotator cuff repair                            | NCT02261701           | Recruiting                       | 13B                      |
| Allograft reconstruction of massive rotator cuff tears vs partial repair alone | NCT01987973           | Recruiting                       | 13B                      |
| Post-operative mobilisation after rotator cuff repair               | NCT02943005           | Recruiting                       | 13B                      |
| Shoulder proprioception following open and arthroscopic instability repair | NCT00889109           | Unknown status                   | 13B                      |
| Immediate or delayed passive motion for rotator cuff repair         | ChiCTR-TRC-12002869   | Not recruiting                   | 13B                      |
| Is early passive motion exercise necessary after arthroscopic rotator cuff repair? | KCT0000123             | Not recruiting                   | 13B                      |
| Progressive exercise after operation of rotator cuff rupture and anterior labrum rupture | NCT00624117           | Completed                        | 13B, 13C                 |
| Post-op rehabilitation’s influence on tendon healing & clinical outcomes following arthroscopic rotator cuff repair | NCT00756015           | Completed                        | 13B, 13C, 13D            |
| Rehabilitation of reconstructed shoulder rotator cuff               | NCT014909992          | Completed                        | 13B, 13C, 13D            |
| Effectiveness study of postoperative rotator cuff repair rehabilitation | NCT01819909           | Unknown status                   | 13B, 13C, 13D            |
| Early active rehabilitation after arthroscopic rotator cuff repair  | NCT02915588           | Completed                        | 13B, 13C, 13D            |
| Supra-spinatus rehabilitation program comparison                    | NCT01467336           | Unknown status                   | 13B, 13C, 13D            |
| Enhanced function and quality of life following 5 months of exercise therapy for patients with rotator cuff tears | NCT02740946           | Completed                        | 13B, 13C, 13D            |
| Impact of postoperative management on outcomes and healing of rotator cuff repairs | NCT01383239           | Completed                        | 13B, 13C, 13D            |
| Progressive active exercise after surgical rotator cuff repair      | NCT02969313           | Recruiting                       | 13B, 13C, 13D            |
| Accelerated versus conservative rehabilitation following rotator cuff surgery to repair full-thickness tears: clinical outcomes and recovery of muscle function | ACTRN12615000644561 | Not recruiting                   | 13B, 13D, 13C            |
| Single versus double row suture anchor repair in medium to large rotator cuff tears | NCT01039571           | Completed                        | 2, 10B                   |
| Prospective randomized comparative study of outcome of subscapularis tear | NCT01996904           | Completed                        | 2, 10B                   |
| All-arthroscopic versus mini-open repair of small or moderate rotator cuff tears | NCT00128076           | Completed                        | 2, 10C                   |
| Arthroscopic rotator cuff repair of full thickness tears with and without arthroscopic acromioplasty | NCT00290888           | Completed                        | 2, 8                     |
| Rotator cuff repair with arthroscopic acromioplasty (shaving the acromion bone) versus repair without acromioplasty | NCT00664794           | Completed                        | 2, 8                     |
| The effect of a pre-operative exercise program for patients with full thickness rotator cuff tear waiting for surgical repair | NCT02208752           | Unknown status                   | 3A                       |
| Anatomic and clinical long-term follow-up of conservatively treated rotator cuff tears | NCT01829633           | Enrolling by invitation          | 3A                       |
| Regenex™ SD versus exercise therapy for rotator cuff tears          | NCT01788683           | Recruiting                       | 3A                       |
| Rehabilitation: closed-chain exercises for rotator cuff tears       | NCT02750176           | Recruiting                       | 3A                       |
| Efficacy of balance training in patients with rotator cuff disease  | NCT03054129           | Not yet recruiting               | 3A                       |
| Exploring shoulder muscle activity levels during low-intensity exercise in asymptomatic individuals | ACTRN12616000253404  | Not recruiting                   | 3A                       |
| Preoperative group shoulder program for patients awaiting shoulder surgery | ACTRN12615000764538 | Not recruiting                   | 3A                       |
| Predicting the outcome of conservative treatment with physiotherapy for shoulder pain in the presence of atraumatic partial-thickness tears of the rotator cuff | DRKS00004462          | Not recruiting                   | 3A                       |
| A self-managed exercise programme versus usual physiotherapy for chronic rotator cuff disorders | ISRCTN84709751        | Not recruiting                   | 3A, 4A                   |
| Platelet rich plasma vs. corticosteroid injection in the treatment of partial rotator cuff tears | NCT01668362           | Terminated                       | 3B                       |
| Ropivacaine block alone or with perineural or systemic dexamethasone for pain in shoulder surgery | NCT01450007           | Completed                        | 3B                       |

(continued)
| Title                                                                 | Registry No.                                      | Recruitment Status | Recommendation Addressed |
|----------------------------------------------------------------------|--------------------------------------------------|--------------------|--------------------------|
| Evaluation of the efficacy and suppression of the hypothalamic-pituitary-adrenal axis resulting in intrabursal single administration of cortisone in patients with calcific tendonitis of the rotator cuff: randomized controlled clinical trial | EUCTR2012-000866-40-IT                           | Authorized          | 3B                       |
| Ultrasound as a diagnostic tool for rotator cuff tears               | NCT01242761                                      | Unknown status     | 3C                       |
| Effectiveness of fascial manipulation in rotator’s cuff surgery patients | NCT01888016                                      | Completed          | 3C                       |
| Supervised exercises compared with radial extracorporeal shock wave therapy (rESWT) in patients with SIS | NCT00653081                                      | Unknown status     | 4A                       |
| Progressive resistance training of the biceps in subacromial impingement syndrome | NCT01314196                                      | Completed          | 4A                       |
| Shoulder training: muscle recruitment patterns and the effect of an exercise program | NCT00774956                                      | Completed          | 4A                       |
| Subacromial impingement—the need of arthroscopic subacromial decompression after eccentric physical therapy exercises | NCT01037673                                      | Completed          | 4A                       |
| Effectiveness of physical therapy program to treat rotator cuff disorders among nursing professionals | NCT01465932                                      | Completed          | 4A                       |
| Effect study of an eccentric training program and stretching for patients with chronic rotator cuff tendinopathy | NCT00782522                                      | Completed          | 4A                       |
| Randomized clinical trial of rehabilitation for subacromial impingement syndrome | NCT00633451                                      | Completed          | 4A                       |
| Study of neurocognitive therapeutic exercise in the shoulder impingement syndrome in comparison with traditional therapeutic exercise | NCT01785745                                      | Completed          | 4A                       |
| Supervised exercise therapy vs home exercises for patients with subacromial impingement | NCT01257113                                      | Completed          | 4A                       |
| Exercise in the physiotherapy management of shoulder impingement      | NCT01691157                                      | Unknown status     | 4A                       |
| Exercise and manual therapy for shoulder subacromial impingement syndrome | NCT00632996                                      | Completed          | 4A                       |
| Comparison of exercise interventions in adults with subacromial impingement syndrome | NCT01508715                                      | Completed          | 4A                       |
| Effects of a movement training for subacromial pain syndrome         | NCT02935770                                      | Completed          | 4A                       |
| Exercise training sequence for subacromial impingement syndrome      | NCT02478567                                      | Completed          | 4A                       |
| Eccentric exercises for shoulder pain                                | NCT02092272                                      | Terminated         | 4A                       |
| The influence of eccentric training on the volume and vascularisation of the rotator cuff in patients with rotator cuff tendinopathy and healthy subjects | NCT01423682                                      | Unknown status     | 4A                       |
| Rotator cuff tendinopathy exercise trial                             | NCT01984203                                      | Completed          | 4A                       |
| SWESS: the Swedish exercise shoulder study in primary care for patients with subacromial pain | NCT01885377                                      | Completed          | 4A                       |
| Shoulder eccentric external rotator training for subacromial pain syndrome | NCT02153827                                      | Completed          | 4A                       |
| Effect of exercise programs on 3-dimensional scapular kinematics, disability and pain | NCT02286310                                      | Unknown status     | 4A                       |
| The effects of exercise training on shoulder neuromuscular control   | NCT02164305                                      | Active, not recruiting | 4A                       |
| Effectiveness of telerehabilitation program in subacromial syndrome (Telerehab Sis) | NCT02909920                                      | Recruiting         | 4A                       |
| Effects of overload progressive in the treatment of shoulder         | NCT02870257                                      | Active, not recruiting | 4A                       |
| Effectiveness of supervised motor control exercises on rotator cuff tendinopathies | NCT02926443                                      | Recruiting         | 4A                       |
| Effect of muscle coactivation strengthening for rotator cuff tendinopathy | NCT02837848                                      | Recruiting         | 4A                       |
| Effects of iso inertial training on rotator cuff tendinopathy        | NCT028982460                                     | Not yet recruiting | 4A                       |
| Effects of kinesiotaping on symptoms, functional limitations, and underlying deficits of patients with rotator cuff tendinopathy | NCT02881021                                      | Recruiting         | 4A                       |
| The effect of an evidence-based physiotherapy regimen for patients with rotator cuff tendinopathy | NCT02304003                                      | Recruiting         | 4A                       |
| Neurophysiology of weakness and exercise in rotator cuff tendinopathy | NCT02971072                                      | Recruiting         | 4A                       |
| Does early mobilisation improve outcomes after rotator cuff repair?   | NCT02631486                                      | Recruiting         | 4A                       |
| Influence of kinetic chain training on the treatment outcome of overhead athletes with impingement | NCT02670174                                      | Active, not recruiting | 4A                       |

(continued)
| Title                                                                 | Registry No. | Recruitment Status | Recommendation Addressed |
|----------------------------------------------------------------------|--------------|--------------------|--------------------------|
| Glenohumeral re-centering during closed kinetic chain for shoulder physiotherapy: a prospective and randomized study | NCT02874105  | Not yet recruiting | 4A                       |
| Strengthening exercises in shoulder impingement (SExSI) trial         | NCT02747251  | Recruiting         | 4A                       |
| Exercise application in the treatment of patients with shoulder impingement | NCT02695524  | Not yet recruiting | 4A                       |
| Type of exercise and education in patients with subacromial pain syndrome | NCT03127839  | Recruiting         | 4A                       |
| Platelet-rich plasma injections and physiotherapy in the treatment of chronic rotator cuff tendinopathy | NCT03133416  | Recruiting         | 4A                       |
| Exercises associated or not with manual therapy shoulder impingement | NCT02035618  | Completed          | 4A                       |
| Trial to compare the effectiveness of group versus individual therapy on alternate days in patients with subacromial impingement syndrome | NCT02833779  | Completed          | 4A                       |
| A pilot randomised controlled trial comparing three different physiotherapy interventions to treat rotator cuff tendinopathy/subacromial pain syndrome | ACTRN12616001676404 | Not recruiting | 4A                       |
| Efficacy of a motor control program on pain and functionality in patients diagnosed with shoulder impingement syndrome: randomized clinical trial | ACTRN12616001480471 | Not recruiting | 4A                       |
| Comparison of two exercise protocols for the rotator cuff and scapular stabilizers in patients with subacromial syndrome: a randomized controlled pilot study | ACTRN1261600196448 | Not recruiting | 4A                       |
| Specific physiotherapy management for subacromial impingement         | ACTRN12615001303538 | Not recruiting | 4A                       |
| Exercise intervention for subacromial impingement syndrome: a randomized controlled trial of two rehabilitation protocols | ACTRN12615000704594 | Not recruiting | 4A                       |
| Pain modulation characteristics in people with shoulder impingement and predictors of successful outcomes following physiotherapy treatment | DRKSO00005780 | Not recruiting | 4A                       |
| Nordic-walking as an adjunct to conventional physiotherapy for shoulder-impingement syndrome | ISRCTN78361279 | Not recruiting | 4A                       |
| The effect of an eccentric exercise program on patients with shoulder pain and disability which is caused by dysfunction of the rotator cuff | NTR4427 | Recruiting | 4A                       |
| A comparison between a traditional exercise program and an eccentric exercise program in patients with anterior shoulder pain | ACTRN12613000859785 | Not recruiting | 4A                       |
| The effects of a therapeutic exercise programme plus or minus manual handling and tape for painful restriction of shoulder movement and function | | | 4A                       |
| Use of adhesive strip compared to physiotherapy in treating shoulder pain | RBR-5rt76n | Recruiting | 4A                       |
| Physiotherapy for shoulder impingement syndrome | ISRCTN86900354 | Not recruiting | 4A                       |
| Effect of physical therapy in patients with shoulder impingement syndrome | ISRCTN20736216 | Not recruiting | 4A                       |
| Exercise therapy for shoulder impingement syndrome | ISRCTN76701121 | Not recruiting | 4A                       |
| Physical therapy versus steroid injection for shoulder impingement syndrome | NCT01190891 | Completed | 4A, 4B                    |
| Exercise therapy and ultrasound guided injections in painful shoulder | NCT01506804 | Completed | 4A, 4B                    |
| Psychomotor therapy as complimentary treatment to patients with shoulder pain | NCT02629783 | Recruiting | 4A, 4B                    |
| Diacutaneous fibrolysis and subacromial syndrome | NCT01424579 | Completed | 4A, 4C                    |
| Noxipoint therapy versus standard physical therapy using electrical stimulation for chronic pain | NCT01578148 | Completed | 4A, 4C                    |
| Teres major muscle and subacromial impingement syndrome | NCT02374125 | Unknown status | 4A, 4C                    |
| Influence of interferential current therapy in the treatment of individuals with shoulder impact syndrome: a randomized, placebo controlled clinical trial | NCT02964819 | Completed | 4A, 4C                    |
| Comparison of two treatments for acute rotator cuff tendinopathy | NCT02813304 | Recruiting | 4A, 4C                    |
| The effects of yoga on patients with rotator cuff injuries | NCT02528084 | Completed | 4A, 3A                    |
| Comparison of 2 doses of corticosteroid subacromial injections for the treatment of painful shoulder | NCT00914836 | Withdrawn | 4B                       |
| Effects of intra-articular versus subacromial steroid injections on clinical outcomes in adhesive capsulitis | NCT00742846 | Withdrawn | 4B                       |
| Pulsed electromagnetic field (PEMF) in impingement shoulder | NCT01452204 | Completed | 4B                       |
| TRARO (Traumeel® S in rotator cuff syndrome)-study | NCT01702333 | Completed | 4B                       |

(continued)
| Title                                                                                                                                                                                                 | Registry No. | Recruitment Status         | Recommendation Addressed |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------------------|--------------------------|
| Ultrasound guided needling versus ultrasound guided corticosteroid injection alone, a randomized controlled trial                                                                                      | NCT01538758  | Unknown status            | 4B                       |
| Relationship to dose of triamcinolone acetonide and methylprednisolone to improvement in subacromial bursitis                                                                                             | NCT02242630  | Completed                 | 4B                       |
| Combined corticosteroid with low volume compared to high volume in impingement syndrome                                                                                                             | NCT03120923  | Completed                 | 4B                       |
| Effect of ultrasound-guided hyaluronic or corticosteroid injections in patients with chronic subacromial bursitis                                                                                          | NCT02702206  | Completed                 | 4B                       |
| Efficacy and tolerance of ultrasound-guided needling and lavage of calcific tendinitis of the rotator cuff performed with or without subacromial corticosteroid injection | NCT02403856  | Recruiting                | 4B                       |
| Standardized and modified corticosteroid subacromial injection for shoulder impingement syndrome                                                                                                | NCT03148353  | Not yet recruiting        | 4B                       |
| A dynamic elastic garment (DEG) in patients with rotator cuff tendinopathy                                                                                                                          | NCT03032432  | Not yet recruiting        | 4B                       |
| The pull test to determine responders to subacromial injection in patients with shoulder impingement                                                                                                  | NCT02686671  | Recruiting                | 4B                       |
| Treatment of calcific tendinitis of the rotator cuff                                                                                                                                                | NCT02419040  | Recruiting                | 4B                       |
| Effectiveness of multidirectional compare with single directional approach for subacromial injections in shoulder impingement syndrome                                                                  | TCTR20170316002 | Not recruiting | 4B                       |
| Comparison between intra-articular injection of corticosteroids and intra-articular injection of hyaluronic acid in the treatment of rotator cuff tendinopathy: a prospective clinical trial | EUCTR2011-003207-37-IT  | Authorized                | 4B                       |
| Treatment of chronic rotator cuff tendinopathy with local steroid injection or hyperthermia: a randomized prospective clinical study—ND                                                                 | EUCTR2008-003952-31-IT  | Not recruiting            | 4B                       |
| Defining a randomised controlled study of Ortho-ATI (Trademark) vs corticosteroid injection for treatment of rotator cuff tendinopathy and tear                                                                 | ACTRN1261700684325 | Not recruiting | 4B, 3B                   |
| Rotator cuff calcific tendonitis: needle us-guided treatment vs. subacromial corticosteroids—a randomized controlled trial                                                                                  | NTR2282      | Recruiting                | 4B, 4C                   |
| Extracorporeal shock-wave therapy for supraspinatus calcifying tendinitis: a randomized clinical trial comparing two different energy levels                                                              | NCT01602653  | Completed                 | 4C                       |
| Efficacy and safety of spa treatment in chronic shoulder pain due to rotator cuff tendinopathy                                                                                                          | NCT01692249  | Completed                 | 4C                       |
| Efficacy of electrotherapy in subacromial impingement syndrome                                                                                                                                                                                                  | NCT01073956  | Unknown status            | 4C                       |
| Ultrasoundography guided subacromial sodium hyaluronate injection in rotator cuff disease                                                                                                              | NCT01735058  | Unknown status            | 4C                       |
| Effectiveness of two electrotherapy techniques to treat subacromial impingement syndrome                                                                                                               | NCT02110030  | Completed                 | 4C                       |
| Low level laser therapy associated with exercise in subacromial impingement syndrome                                                                                                                  | NCT02725749  | Completed                 | 4C                       |
| Functional massage of teres major muscle                                                                                                                                                                                                                         | NCT02374073  | Completed                 | 4C                       |
| Effects of cryotherapy on joint function and pressure pain threshold in patients with subacromial impingement syndrome                                                                                     | NCT02351886  | Completed                 | 4C                       |
| Transcranial direct current stimulation to enhance rehabilitation in individuals with rotator cuff tendinopathy                                                                                           | NCT03104218  | Recruiting                | 4C                       |
| Subacromial impingement syndrome approach using high intensity laser therapy                                                                                                                          | NCT02971215  | Active, not recruiting    | 4C                       |
| Calcific tendinitis: comparing minimally invasive modalities                                                                                                                                             | NCT02367560  | Recruiting                | 4C                       |
| Radial extracorporeal shock wave therapy (rESWT) treatment of subacromial shoulder pain                                                                                                               | NCT01441830  | Unknown status            | 4C                       |
| An experimental study of low-intensity pulsed ultrasound (LIPUS) treatment for shoulder disorders                                                                                                       | JPRN-UMIN000020149 | Not recruiting | 4C                       |
| Treatment of small acute cuff tears, a randomized study                                                                                                                                                | NCT02059473  | Recruiting                | 5, 3A                    |
| Long term prognosis of MRI diagnosed partial thickness tears of the rotator cuff                                                                                                                        | NCT00779415  | Completed                 | 7A                       |
| Workers compensation board: rotator cuff tear management                                                                                                                                                | NCT01498198  | Unknown status            | 7A                       | (continued)
### TABLE A2 (continued)

| Title                                                                 | Registry No.         | Recruitment Status | Recommendation Addressed |
|----------------------------------------------------------------------|----------------------|--------------------|--------------------------|
| A study of quantitative evaluation of muscle atrophy and fatty infiltration of the rotator cuff muscle using magnetic resonance imaging | JPRN-UMIN000018961   | Not recruiting      | 7A                       |
| Cost-effectiveness of biceps tenotomy with or without cuff repair in patients with stage 2-3 Goutallier fatty degenerative cuff lesions: a randomized controlled trial | NTR4182              | Not recruiting      | 7A                       |
| Operative versus non-operative management of subacromial impingement | NCT00637013          | Active, not recruiting | 8, 4A                   |
| Comparison of tendon repair and physiotherapy in the treatment of small and medium-sized tears of the rotator cuff | NCT00852657          | Active, not recruiting | 8, 4A                   |
| Operative or conservative treatment for subacromial impingement syndrome? | NCT00428870          | Active, not recruiting | 8, 4A                   |
| Intra-operative corticosteroid injection during arthroscopic shoulder surgery | NCT02867904          | Not yet recruiting  | 8, 2, 9                 |
| Study evaluating heated lidocaine/tetracaine topical patch in treatment of patients with shoulder impingement syndrome | NCT01055444          | Completed           | 11B                     |
| Pilot study to evaluate the restore orthobiologic implant in rotator cuff tear repair | NCT00208338          | Completed           | 11A                     |

### TABLE A3

Included Studies From PubMed and EMBASE Addressing the AAOS Recommendations

| Recommendation Addressed | Title                                                                 | Identification     |
|--------------------------|----------------------------------------------------------------------|--------------------|
| **PubMed Results**       |                                                                      |                    |
| 2                        | Surgical treatment of rotator cuff tears after 65 years of age: a systematic review | /pubmed/28555558   |
| 2                        | One-stage surgical treatment for concomitant rotator cuff tears with shoulder stiffness has comparable results with isolated rotator cuff tears: a systematic review | /pubmed/28478897   |
| 2                        | Patient outcomes as a function of shoulder surgeon volume: a systematic review | /pubmed/28456358   |
| 2                        | Predictors of outcomes after rotator cuff repair—a meta-analysis    | /pubmed/28237073   |
| 2                        | Difference in vascular patterns between transosseous-equivalent and transosseous rotator cuff repair | /pubmed/27545051   |
| 2                        | Initial treatment of complete rotator cuff tear and transition to surgical treatment: systematic review of the evidence | /pubmed/27331030   |
| 2                        | [Current concepts for treatment of massive rotator cuff tears]       | /pubmed/26662370   |
| 2                        | A systematic review and meta-analysis comparing clinical outcomes after concurrent rotator cuff repair and long head biceps tenodesis or tenotomy | /pubmed/26137174   |
| 2                        | Are delayed operations effective for patients with rotator cuff tears and concomitant stiffness? An analysis of immediate versus delayed surgery on outcomes | /pubmed/25306517   |
| 2                        | Is rotator cuff repair appropriate in patients older than 60 years of age? Prospective, randomised trial in 103 patients with a mean four-year follow-up | /pubmed/25155203   |
| 2                        | Repair of full-thickness rotator cuff tears in patients aged younger than 55 years | /pubmed/25064751   |
| 2                        | Rotator cuff repair: published evidence on factors associated with repair integrity and clinical outcome | /pubmed/24753240   |

(continued)
| Recommendation Addressed | Title                                                                 | Identification   |
|--------------------------|----------------------------------------------------------------------|------------------|
| 2                        | Assessment of rotator cuff repair integrity using ultrasound and     | /pubmed/24751529 |
|                          | magnetic resonance imaging in a multicenter study                    |                  |
| 2                        | Efficacy of surgery for rotator cuff tendinopathy: a systematic     | /pubmed/24682606 |
|                          | review                                                               |                  |
| 2                        | [Evidence-based treatment of combined rotator cuff and               | /pubmed/24129723 |
|                          | SLAP lesions]                                                        |                  |
| 2                        | Deep partial rotator cuff tear: transtendon repair or tear           | /pubmed/23689964 |
|                          | completion and repair? A randomized clinical trial                   |                  |
| 2                        | Articular-sided rotator cuff tears: which is the best repair?        | /pubmed/23580030 |
|                          | A three-year prospective randomised controlled trial                 |                  |
| 2                        | General surgical principles of open rotator cuff repair in the       | /pubmed/23395018 |
|                          | management of failed arthroscopic cuff repairs                       |                  |
| 2                        | Transosseous-equivalent rotator cuff repair: a systematic review on  | /pubmed/23369482 |
|                          | the biomechanical importance of tying the medial row                |                  |
| 2                        | Intraoperative determinants of rotator cuff repair integrity: an     | /pubmed/23104609 |
|                          | analysis of 500 consecutive repairs                                   |                  |
| 2                        | Repairable rotator cuff tears with concomitant long-head biceps     | /pubmed/22349543 |
|                          | lesions: tenotomy or tenotomy/tenodesis?                             |                  |
| 2                        | The role of subacromial decompression in patients undergoing         | /pubmed/22305327 |
|                          | arthroscopic repair of full-thickness tears of the rotator cuff: a   |                  |
|                          | systematic review and meta-analysis                                   |                  |
| 2                        | Repair of partial tears of the rotator cuff                          | /pubmed/22089290 |
| 2                        | Operative management of partial- and full-thickness                  | /pubmed/21986049 |
|                          | rotator cuff tears                                                   |                  |
| 2                        | Results of surgical management of symptomatic shoulders with partial | /pubmed/21186203 |
|                          | thickness tears of the rotator cuff                                   |                  |
| 2                        | Does the literature confirm superior clinical results in radiologically | /pubmed/20206051 |
|                          | healed rotator cuffs after rotator cuff repair?                      |                  |
| 2                        | Prospective analysis of arthroscopic rotator cuff repair: subgroup   | /pubmed/19269861 |
|                          | analysis                                                              |                  |
| 5                        | Acute shoulder injuries in adults                                     | /pubmed/27419328 |
| 6                        | Dexamethasone for pain after outpatient shoulder surgery: a randomised, | /pubmed/24825530 |
|                          | double-blind, placebo-controlled trial                               |                  |
| 8                        | Does concomitant acromioplasty facilitate arthroscopic repair of     | /pubmed/27350920 |
|                          | full-thickness rotator cuff tears? A meta-analysis with trial        |                  |
|                          | sequential analysis of randomized controlled trials                  |                  |
| 8                        | Is acromioplasty necessary in the setting of full-thickness rotator   | /pubmed/26003837 |
|                          | cuff tears? A systematic review                                       |                  |
| 8                        | The role of acromioplasty for rotator cuff problems                  | /pubmed/24684915 |
| 8                        | The efficacy of acromioplasty in the arthroscopic repair of small-    | /pubmed/22261136 |
|                          | to medium-sized rotator cuff tears without acromial spur:          |                  |
|                          | prospective comparative study                                        |                  |
| 8                        | Arthroscopic subacromial decompression:                             | /pubmed/22096430 |
|                          | acromioplasty versus bursectomy alone: does it really matter? A     |                  |
|                          | systematic review                                                     |                  |
| 8                        | Does arthroscopic acromioplasty provide any additional value in the  | /pubmed/19794168 |
|                          | treatment of shoulder impingement syndrome? A two-year randomised    |                  |
|                          | controlled trial                                                     |                  |
| 8                        | Bursectomy compared with acromioplasty in the management of subacromial | /pubmed/19336812 |
|                          | impingement syndrome: a prospective randomised study                |                  |

(continued)
TABLE A3 (continued)

| Recommendation Addressed | Title                                                                 | Identification       |
|--------------------------|----------------------------------------------------------------------|----------------------|
| 9                       | Improved external rotation with concomitant reverse total shoulder arthroplasty and latissimus dorsi tendon transfer: a systematic review | /pubmed/28699404     |
| 9                       | Latissimus dorsi transfer in posterior irreparable rotator cuff tears | /pubmed/28400877     |
| 9                       | Arthroscopic repair of articular surface partial-thickness rotator cuff tears: transtendon technique versus repair after completion of the tear—a meta-analysis | /pubmed/27462471     |
| 9                       | [Irreparable rotator cuff tears: debridement, partial reconstruction, tendon transfer or reversed shoulder arthroplasty] | /pubmed/26768144     |
| 9                       | The CSAW Study (Can Shoulder Arthroscopy Work?)—a placebo-controlled surgical intervention trial assessing the clinical and cost effectiveness of arthroscopic subacromial decompression for shoulder pain: study protocol for a randomised controlled trial | /pubmed/25956385     |
| 9                       | Tendon transfer for irreparable rotator cuff tears: indications and surgical rationale | /pubmed/25767779     |
| 9                       | Arthroscopic-assisted latissimus dorsi tendon transfer for irreparable posterosuperior cuff tears | /pubmed/25498458     |
| 9                       | Pectoralis major transfer for treatment of irreparable subscapularis tear: a systematic review | /pubmed/25145944     |
| 9                       | Humeral resurfacing arthroplasty in combination with latissimus dorsi tendon transfer in patients with rotator cuff tear arthropathy and preserved subscapularis muscle function: preliminary report and short-term results | /pubmed/24664451     |
| 9                       | Pectoralis major tendon transfer for irreparable subscapularis tears | /pubmed/24656310     |
| 9                       | Tendon transfers for irreparable rotator cuff tears | /pubmed/23908255     |
| 9                       | [Latissimus dorsi transfer for the treatment of irreparable rotator tears: indication, surgical technique, and modifications] | /pubmed/23104498     |
| 9                       | Latissimus dorsi tendon transfer for irreparable rotator cuff tears: a systematic review | /pubmed/22617916     |
| 9                       | Latissimus dorsi tendon transfer for massive irreparable rotator cuff tears: a systematic review | /pubmed/22089293     |
| 9                       | Massive rotator cuff tears: functional outcome after debridement or arthroscopic partial repair | /pubmed/20198404     |
| 9                       | Modified minimally invasive latissimus dorsi transfer in the treatment of massive rotator cuff tears: a two-year follow-up of 26 consecutive patients | /pubmed/19415274     |
| 9                       | Calcifying tendinitis of the shoulder: advances in imaging and management | /pubmed/19296885     |
| 12                      | Compressive cryotherapy versus ice—a prospective, randomized study on postoperative pain in patients undergoing arthroscopic rotator cuff repair or subacromial decompression | /pubmed/25825138     |
| 14                      | Effect of preemptive intra-articular morphine and ketamine on pain after arthroscopic rotator cuff repair: a prospective, double-blind, randomized controlled study | /pubmed/26476719     |
| 14                      | Administration of analgesics after rotator cuff repair: a prospective clinical trial comparing glenohumeral, subacromial, and a combination of glenohumeral and subacromial injections | /pubmed/25648969     |
| 14                      | Postoperative fentanyl patch versus subacromial bupivacaine infusion in arthroscopic shoulder surgery | /pubmed/23809446     |
| Recommendation Addressed | Title                                                                 | Identification   |
|--------------------------|----------------------------------------------------------------------|------------------|
| 14                       | Efficacy of continuous subacromial bupivacaine infusion for pain control after arthroscopic rotator cuff repair | /pubmed/23668921 |
| 14                       | Pain pump use after shoulder arthroscopy as a cause of glenohumeral chondrolysis | /pubmed/19501296 |
| 2, 8                     | Arthroscopic treatment of rotator cuff tear in the over-60s: repair is preferable to isolated acromioplasty-tenotomy in the short term | /pubmed/21798838 |
| 1, 3A                    | Effectiveness of physical therapy in treating atraumatic full-thickness rotator cuff tears: a multicenter prospective cohort study | /pubmed/23540577 |
| 1, 3A, 2                 | Clinical and radiological outcome of conservative vs. surgical treatment of atraumatic degenerative rotator cuff rupture: design of a randomized controlled trial | /pubmed/21269421 |
| 1, 2, 8, 3A              | Treatment of non-traumatic rotator cuff tears: a randomised controlled trial with one-year clinical results | /pubmed/24395315 |
| 10A                      | Augmentation of rotator cuff repair with soft tissue scaffolds         | /pubmed/26665095 |
| 10B                      | A biomechanical analysis of anchor placement for Bankart repair: effect of portal placement | /pubmed/26942475 |
| 10B                      | Predicting failures of suture anchors used for rotator cuff repair: a CT-based 3-dimensional finite element analysis | /pubmed/26407199 |
| 10B                      | Does suture technique affect re-rupture in arthroscopic rotator cuff repair? A meta-analysis | /pubmed/25828166 |
| 10B                      | Adverse events associated with biodegradable lactide-containing suture anchors | /pubmed/24650833 |
| 10B                      | Clinical and radiologic results of arthroscopic biceps tenodesis with suture anchor in the setting of rotator cuff tear | /pubmed/24021158 |
| 10B                      | The evolution of suture anchors in arthroscopic rotator cuff repair | /pubmed/23876609 |
| 10B                      | Tissue anchor use in arthroscopic glenohumeral surgery | /pubmed/22751165 |
| 10B                      | Arthroscopic knots and strength sutures for rotator cuff repair | /pubmed/21822109 |
| 10B                      | Proximal humerus osteolysis after revision rotator cuff repair with bioabsorbable suture anchors | /pubmed/21720602 |
| 10B                      | Arthroscopic rotator cuff repair with metal and biodegradable suture anchors: a prospective randomized study | /pubmed/20692119 |
| 10B, 2                   | Arthroscopic knotless-anchor rotator cuff repair: a clinical and radiological evaluation | /pubmed/24792075 |
| 10B, 2                   | Prospective randomized clinical trial of single- versus double-row suture anchor repair in 2- to 4-cm rotator cuff tears: clinical and magnetic resonance imaging results | /pubmed/21444007 |
| 10B, 2                   | Single-row versus double-row arthroscopic rotator cuff repair in small- to medium-sized tears | /pubmed/20303287 |
| 10B, 2                   | Outcomes of single-row and double-row arthroscopic rotator cuff repair: a systematic review | /pubmed/20194334 |
| 10B, 2                   | Single-row versus double-row rotator cuff repair: techniques and outcomes | /pubmed/20118325 |
| 10B, 2                   | Does the literature support double-row suture anchor fixation for arthroscopic rotator cuff repair? A systematic review comparing double-row and single-row suture anchor configuration | /pubmed/19896055 |
| Recommendation Addressed | Title                                                                 | Identification |
|-------------------------|----------------------------------------------------------------------|----------------|
| 10B, 2                  | Clinical outcomes of double-row versus single-row rotator cuff repairs | /pubmed/19896054 |
| 10B, 2                  | Double-row vs single-row rotator cuff repair: a review of the biomechanical evidence | /pubmed/19833290 |
| 10B, 2                  | A prospective randomized clinical trial comparing arthroscopic single- and double-row rotator cuff repair: magnetic resonance imaging and early clinical evaluation | /pubmed/19204365 |
| 10B, 2                  | Single-row versus double-row arthroscopic rotator cuff repair: a prospective randomized clinical study | /pubmed/19111212 |
| 10B, 2                  | Summary of meta-analyses dealing with single-row versus double-row repair techniques for rotator cuff tears | /pubmed/27708735 |
| 10C                     | The impact of re-tear on the clinical outcome after rotator cuff repair using open or arthroscopic techniques—a systematic review | /pubmed/28400878 |
| 10C                     | Comparison of clinical outcomes in all-arthroscopic versus mini-open repair of rotator cuff tears: a randomized clinical trial | /pubmed/28296750 |
| 10C                     | Radial extracorporeal shock-wave therapy in patients with chronic rotator cuff tendinitis: a prospective randomised double-blind placebo-controlled multicentre trial | /pubmed/24151273 |
| 10C, 10B, 2             | Which method of rotator cuff repair leads to the highest rate of structural healing? A systematic review | /pubmed/20357403 |
| 10C, 10B, 2             | Meta-analysis of clinical and radiographic outcomes after arthroscopic single-row versus double-row rotator cuff repair | /pubmed/23016017 |
| 10C, 2                  | [Arthroscopic subacromial decompression] | /pubmed/27259482 |
| 10C, 2                  | Systematic review of all-arthroscopic versus mini-open repair of rotator cuff tears: a meta-analysis | /pubmed/26947557 |
| 10C, 2                  | Clinical effectiveness and cost-effectiveness of open and arthroscopic rotator cuff repair [the UK Rotator Cuff Surgery (UKUFF) randomised trial] | /pubmed/26463717 |
| 10C, 2                  | Systematic review of biceps tenodesis: arthroscopic versus open | /pubmed/26427631 |
| 10C, 2                  | Recovery of subscapularis and shoulder function following arthroscopic treatment of isolated anterior and combined anterosuperior rotator cuff lesions | /pubmed/26388036 |
| 10C, 2                  | Arthroscopic repair for chronic massive rotator cuff tears: a systematic review | /pubmed/26364549 |
| 10C, 2                  | Strength recovery after arthroscopic anterosuperior cuff repair: analysis of a consecutive series | /pubmed/25957552 |
| 10C, 2                  | Clinical and structural outcomes after arthroscopic repair of full-thickness rotator cuff tears with and without platelet-rich product supplementation: a meta-analysis and meta-regression | /pubmed/25450417 |
| 10C, 2                  | Arthroscopic versus mini-open rotator cuff repair: an up-to-date meta-analysis of randomized controlled trials | /pubmed/25442664 |
| 10C, 2                  | Comparison of functional gains after arthroscopic rotator cuff repair in patients over 70 years of age versus patients under 50 years of age: a prospective multicenter study | /pubmed/25442647 |
| 10C, 2                  | Arthroscopic treatment options for irreparable rotator cuff tears of the shoulder | /pubmed/25405083 |
| 10C, 2                  | Long-term outcome after arthroscopic rotator cuff treatment | /pubmed/25145945 |
| Recommendation Addressed | Title                                                                 | Identification       |
|--------------------------|----------------------------------------------------------------------|----------------------|
| 10C, 2                   | All-arthroscopic versus mini-open repair of small to large sized rotator cuff tears: a meta-analysis of clinical outcomes | /pubmed/24728326     |
| 10C, 2                   | A randomized clinical trial comparing open and arthroscopic stabilization for recurrent traumatic anterior shoulder instability: two-year follow-up with disease-specific quality-of-life outcomes | /pubmed/24599195     |
| 10C, 2                   | Arthroscopic subscapularis repair                                    | /pubmed/24486754     |
| 10C, 2                   | Results of arthroscopic treatment of rotator cuff tear with the resection of symptomatic acromioclavicular joint with degenerative changes | /pubmed/24231671     |
| 10C, 2                   | Arthroscopic repair of the rotator cuff: prospective study of tendon healing after 70 years of age in 145 patients | /pubmed/24200997     |
| 10C, 2                   | Arthroscopic versus mini-open rotator cuff repair: a prospective, randomized study with 24-month follow-up | /pubmed/23812851     |
| 10C, 2                   | Shoulder arthroscopy: basic principles of positioning, anesthesia, and portal anatomy | /pubmed/23728958     |
| 10C, 2                   | Clinical outcome in all-arthroscopic versus mini-open rotator cuff repair in small to medium-sized tears: a randomized controlled trial in 100 patients with 1-year follow-up | /pubmed/23206691     |
| 10C, 2                   | Arthroscopic repair of subscapularis tears: preliminary data from a prospective multicentre study | /pubmed/23153667     |
| 10C, 2                   | [The isolated subscapularis tendon tear: arthroscopic and open repair] | /pubmed/23104499     |
| 10C, 2                   | Arthroscopic rotator cuff repair: techniques in 2012                 | /pubmed/23040550     |
| 10C, 2                   | Early postoperative outcomes between arthroscopic and mini-open repair for rotator cuff tears | /pubmed/22955400     |
| 10C, 2                   | Outcomes of arthroscopic and open surgical repair of isolated subscapularis tendon tears | /pubmed/22607828     |
| 10C, 2                   | A comparison of 2 repair techniques for partial-thickness articular-sided rotator cuff tears | /pubmed/2200411      |
| 10C, 2                   | Combined tears of the subscapularis and supraspinatus tendon: clinical outcome, rotator cuff strength and structural integrity following open repair | /pubmed/21990030     |
| 10C, 2                   | Arthroscopic transosseous rotator cuff repair                        | /pubmed/21986052     |
| 10C, 2                   | Outcomes of arthroscopic versus open rotator cuff repair: a systematic review of the literature | /pubmed/21720577     |
| 10C, 2                   | Prevention and management of stiffness after arthroscopic rotator cuff repair: systematic review and implications for rotator cuff healing | /pubmed/21624680     |
| 10C, 2                   | Long-term follow-up of arthroscopic rotator cuff repair              | /pubmed/21620635     |
| 10C, 2                   | Prospective randomised comparison of arthroscopic versus mini-open rotator cuff repair of the supraspinatus tendon | /pubmed/21533643     |
| 10C, 2                   | Multimedia article: The arthroscopic management of partial-thickness rotator cuff tears: a systematic review of the literature | /pubmed/21296545     |
| 10C, 2                   | Trans-tendon arthroscopic repair for partial-thickness articular side tears of the rotator cuff | /pubmed/21229232     |
| 10C, 2                   | [Arthroscopic treatment strategies for the long head of the biceps tendon] | /pubmed/21161169     |
| 10C, 2                   | Rotator cuff integrity after arthroscopic repair for large tears with less-than-optimal footprint coverage | /pubmed/19801287     |
| 10C, 2                   | Evaluating equivalency of treatment effectiveness: the example of arthroscopic and mini-open rotator cuff repairs | /pubmed/19232917     |
| Recommendation Addressed | Title                                                                 | Identification          |
|--------------------------|-----------------------------------------------------------------------|-------------------------|
| 10C, 2                   | Open, mini-open, and all-arthroscopic rotator cuff repair surgery: indications and implications for rehabilitation | /pubmed/19194025        |
| 10C, 2                   | [Arthroscopic versus open anterior shoulder stabilization: a systematic validation] | /pubmed/19093098        |
| 10C, 2                   | Treating full-thickness cuff tears in the athlete: advances in arthroscopic techniques | /pubmed/19064152        |
| 10C, 2                   | New approaches to diagnosis and arthroscopic management of partial-thickness cuff tears | /pubmed/19064151        |
| 10C, 2                   | Rotator cuff tears after 70 years of age: a prospective, randomized, comparative study between decompression and arthroscopic repair in 154 patients | /pubmed/24211128        |
| 10C, 2                   | Massive rotator cuff tears: arthroscopy to arthroplasty               | /pubmed/20415384        |
| 10C, 2, 10B              | Arthroscopic rotator cuff repair: suture anchor properties, modes of failure and technical considerations | /pubmed/21542709        |
| 10C, 2, 13B              | Early mobilisation following mini-open rotator cuff repair: a randomised control trial | /pubmed/26330594        |
| 10C, 2, 13B              | Prospective randomized study of arthroscopic rotator cuff repair using an early versus delayed postoperative physical therapy protocol | /pubmed/22554876        |
| 10C, 8                   | Arthroscopic versus open acromioplasty: a meta-analysis               | /pubmed/19188562        |
| 10C, 8, 2                | Arthroscopic repair of full-thickness rotator cuff tears with and without acromioplasty: randomized prospective trial with 2-year follow-up | /pubmed/24733157        |
| 10C, 2                   | Complications following arthroscopic rotator cuff tear repair: a systematic review of terms and definitions with focus on shoulder stiffness | /pubmed/26665096        |
| 11A                      | A randomized clinical trial to compare the effectiveness of rotator cuff repair with or without augmentation using porcine small intestine submucosa for patients with moderate to large rotator cuff tears: a pilot study | /pubmed/27545050        |
| 11A                      | [Patch augmentation of the rotator cuff: a reasonable choice or a waste of money?] | /pubmed/26754656        |
| 11A                      | Synthetic and degradable patches: an emerging solution for rotator cuff repair | /pubmed/23837794        |
| 11A, 11B                 | Graft utilization in the bridging reconstruction of irreparable rotator cuff tears: a systematic review | /pubmed/28345960        |
| 11A, 11B                 | Can grafts provide superior tendon healing and clinical outcomes after rotator cuff repairs? A meta-analysis | /pubmed/28203585        |
| 11A, 11B                 | Graft augmentation versus bridging for large to massive rotator cuff tears: a systematic review | /pubmed/27956233        |
| 11A, 11B                 | Use of grafts in rotator cuff re-rupture                              | /pubmed/27453346        |
| 11A, 11B                 | Outcomes after patch use in rotator cuff repair                       | /pubmed/27157657        |
| 11A, 11B                 | A prospective, multicenter study to evaluate clinical and radiographic outcomes in primary rotator cuff repair reinforced with a xenograft dermal matrix | /pubmed/27139784        |
| 11A, 11B                 | Graft utilization in the augmentation of large-to-massive rotator cuff repairs: a systematic review | /pubmed/26847487        |
| 11B                      | Acellular dermal matrix in rotator cuff surgery                       | /pubmed/27552454        |
| 11B                      | Orthopedic applications of acellular human dermal allograft for shoulder and elbow surgery | /pubmed/26043051        |
| 11B                      | Early versus delayed passive range of motion after rotator cuff repair: a systematic review and meta-analysis | /pubmed/25296646        |
| 11B                      | Orthopedic interface tissue engineering for the biological fixation of soft tissue grafts | /pubmed/19064172        |
| Recommendation Addressed | Title                                                                 | Identification       |
|--------------------------|-----------------------------------------------------------------------|----------------------|
| 11B, 11C                 | Effects of slow and accelerated rehabilitation protocols on range of motion after arthroscopic rotator cuff repair | /pubmed/25637728     |
| 13A                      | Does a brace influence clinical outcomes after arthroscopic rotator cuff repair? | /pubmed/25957544     |
| 13A                      | Does early versus delayed active range of motion affect rotator cuff healing after surgical repair? A systematic review and meta-analysis | /pubmed/25943112     |
| 13A                      | Early versus delayed rehabilitation following arthroscopic rotator cuff repair: a systematic review | /pubmed/25797067     |
| 13A, 13B, 13C            | Rehabilitation following rotator cuff repair: a systematic review     | /pubmed/27582966     |
| 13A, 13B, 13C            | Knowing the speed limit: weighing the benefits and risks of rehabilitation progression after arthroscopic rotator cuff repair | /pubmed/25818711     |
| 13B                      | Does early motion lead to a higher failure rate or better outcomes after arthroscopic rotator cuff repair? A systematic review of overlapping meta-analyses | /pubmed/28619382     |
| 13B                      | Early versus delayed motion after rotator cuff repair                  | /pubmed/28288280     |
| 13B                      | Immobilization after rotator cuff repair: what evidence do we have now? | /pubmed/26614931     |
| 13B                      | Passive mobilization after arthroscopic rotator cuff repair is not detrimental in the early postoperative period | /pubmed/26435245     |
| 13B                      | Rehabilitation protocol after arthroscopic rotator cuff repair: early versus delayed motion | /pubmed/26309485     |
| 13B                      | Early versus delayed passive range of motion exercise for arthroscopic rotator cuff repair: a meta-analysis of randomized controlled trials | /pubmed/25143489     |
| 13B                      | Delayed versus early motion after arthroscopic rotator cuff repair: a meta-analysis | /pubmed/25127908     |
| 13B                      | Does immobilization after arthroscopic rotator cuff repair increase tendon healing? A systematic review and meta-analysis | /pubmed/25027677     |
| 13B                      | Early passive motion versus immobilization after arthroscopic rotator cuff repair | /pubmed/24813324     |
| 13B                      | Effect of immobilization without passive exercise after rotator cuff repair: randomized clinical trial comparing four and eight weeks of immobilization | /pubmed/24647511     |
| 13B                      | Immediate passive motion versus immobilization after endoscopic supraspinatus tendon repair: a prospective randomized study | /pubmed/22944392     |
| 13B                      | Is early passive motion exercise necessary after arthroscopic rotator cuff repair? | /pubmed/22287641     |
| 13B                      | The effectiveness of continuous passive motion on range of motion, pain and muscle strength following rotator cuff repair: a systematic review | /pubmed/20943710     |
| 13B, 13C                 | Rehabilitation after rotator cuff repair                              | /pubmed/28400983     |
| 13B, 13C                 | Effectiveness of early compared with conservative rehabilitation for patients having rotator cuff repair surgery: an overview of systematic reviews | /pubmed/28039127     |
| 13B, 13C                 | Effectiveness of standardized physical therapy exercises for patients with difficulty returning to usual activities after decompression surgery for subacromial impingement syndrome: randomized controlled trial | /pubmed/26916927     |
| 13B, 13C                 | Efficacy of informed versus uninformed physiotherapy on postoperative retear rates of medium-sized and large rotator cuff tears | /pubmed/26190666     |

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TABLE A3 (continued)

| Recommendation Addressed | Title                                                                 | Identification     |
|--------------------------|----------------------------------------------------------------------|--------------------|
| 13B, 13C                 | Effects of one-month continuous passive motion after arthroscopic rotator cuff repair: results at 1-year follow-up of a prospective randomized study | /pubmed/20383685   |
| 13B, 13C                 | Early loading in physiotherapy treatment after full-thickness rotator cuff repair: a prospective randomized pilot-study with a two-year follow-up | /pubmed/19482895   |
| 13B, 13C                 | Are pulley exercises initiated 6 weeks after rotator cuff repair a safe and effective rehabilitative treatment? A randomized controlled trial | /pubmed/27159310   |
| 13B, 13C, 13D            | Rehabilitation following surgical repair of the rotator cuff: a systematic review | /pubmed/26510584   |
| 13B, 13C, 13D            | Rehabilitation following arthroscopic rotator cuff repair: a prospective randomized review | /pubmed/26137178   |
| 13B, 13C, 13D            | Rehabilitation following rotator cuff repair: a survey of current UK practice | /pubmed/27582979   |
| 13B, 13C, 13D            | Does adding a 12-month exercise programme to usual care after a rotator cuff repair effect disability and quality of life at 12 months? A randomized controlled trial | /pubmed/25172089   |
| 13B, 13C, 13D            | Rehabilitation following arthroscopic rotator cuff repair: a review of current literature | /pubmed/24382719   |
| 13B, 13C, 13D            | Rehabilitation following arthroscopic rotator cuff repair: an immobilization compared with early motion | /pubmed/22085347   |
| 13B, 13C, 13D            | [Comparison of the results of supervised physiotherapy program and home-based exercise program in patients treated with arthroscopic-assisted mini-open rotator cuff repair] | /pubmed/22014477   |
| 13B, 13C, 13D            | Effect of two rehabilitation protocols on range of motion and healing rates after arthroscopic rotator cuff repair: aggressive versus limited early passive exercises | /pubmed/21478659   |
| 13B, 13C, 13D            | Comparison of slow and accelerated rehabilitation protocol after arthroscopic rotator cuff repair: pain and functional activity | /pubmed/20226314   |
| 13B, 13C, 13D            | Rehabilitation following arthroscopic rotator cuff repair            | /pubmed/19711171   |
| 13B, 13C, 13D            | Post-operative rehabilitation after surgical repair of the rotator cuff | /pubmed/23015863   |
| 13B, 13C, 13D            | Rotator cuff repair rehabilitation: a level I and II systematic review | /pubmed/22287203   |
| 13B, 13C, 13D            | Supervised versus uncontrolled rehabilitation of patients after rotator cuff repair—clinical and neurophysiological comparative study | /pubmed/22124602   |
| 13C, 13D                 | Supervised strengthening exercises versus home-based movement exercises after arthroscopic acromioplasty: a randomized clinical trial | /pubmed/26797698   |
| 2, 10B                   | Double-row repair lowers the retear risk after accelerated rehabilitation | /pubmed/26694067   |
| 2, 10B                   | [Rotator cuff repair: single- vs double-row: clinical and biomechanical results] | /pubmed/25990829   |
| 2, 10B                   | [Open double-row rotator cuff repair using the LASA-DR screw]         | /pubmed/25361362   |
| 2, 10B                   | Incidence of retear with double-row versus single-row rotator cuff repair | /pubmed/24821226   |

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| Recommendation Addressed | Title                                                                 | Identification       |
|--------------------------|----------------------------------------------------------------------|----------------------|
| 2, 10B                   | Clinical and structural outcomes after arthroscopic single-row versus double-row rotator cuff repair: a systematic review and meta-analysis of level I randomized clinical trials | /pubmed/24411671     |
| 2, 10B                   | Meta-analysis comparing single-row and double-row repair techniques in the arthroscopic treatment of rotator cuff tears | /pubmed/24183478     |
| 2, 10B                   | Ultrasound evaluation of arthroscopic full-thickness supraspinatus rotator cuff repair: single-row versus double-row suture bridge (transosseous equivalent) fixation: results of a prospective, randomized study | /pubmed/24012360     |
| 2, 10B                   | Single-row or double-row fixation technique for full-thickness rotator cuff tears: a meta-analysis | /pubmed/23874649     |
| 2, 10B                   | Outcomes of single-row versus double-row arthroscopic rotator cuff repair: a systematic review and meta-analysis of current evidence | /pubmed/23711754     |
| 2, 10B                   | Arthroscopic single-row versus double-row rotator cuff repair: a meta-analysis of the randomized clinical trials | /pubmed/23369480     |
| 2, 10B                   | A multicenter randomized controlled trial comparing single-row with double-row fixation in arthroscopic rotator cuff repair | /pubmed/22810395     |
| 2, 10B                   | Single-row versus double-row arthroscopic repair in the treatment of rotator cuff tears: a prospective randomized clinical study | /pubmed/22584619     |
| 2, 10B                   | Does double-row rotator cuff repair improve functional outcome of patients compared with single-row technique? A systematic review | /pubmed/22156169     |
| 2, 10B                   | Double row repair: is it worth the hassle? | /pubmed/22089283     |
| 2, 10B                   | Repair integrity and functional outcome after arthroscopic rotator cuff repair: double-row versus suture-bridge technique | /pubmed/22074913     |
| 2, 10B                   | Single- and double-row repair for rotator cuff tears—biology and mechanics | /pubmed/21986051     |
| 2, 10B                   | Clinical outcome and imaging of arthroscopic single-row and double-row rotator cuff repair: a prospective randomized trial | /pubmed/21982391     |
| 2, 10B                   | A systematic review of the clinical outcomes of single row versus double row rotator cuff repairs | /pubmed/21281917     |
| 2, 10B                   | Medial versus lateral supraspinatus tendon properties: implications for double-row rotator cuff repair | /pubmed/20929937     |
| 2, 10B                   | Single versus double-row repair of the rotator cuff: does double-row repair with improved anatomical and biomechanical characteristics lead to better clinical outcome? | /pubmed/20737134     |
| 2, 10B                   | Bridging self-reinforcing double-row rotator cuff repair: we really are doing better | /pubmed/20434667     |
| 2, 10B                   | Single-row repair versus double-row repair of full-thickness rotator cuff tears | /pubmed/21693349     |
| 2, 10C                   | Arthroscopic repair of isolated subscapularis tears: a systematic review of technique-specific outcomes | /pubmed/28082063     |
| 2, 10C                   | Effectiveness of open and arthroscopic rotator cuff repair (UKUFF): a randomised controlled trial | /pubmed/28053265     |
| 2, 10C                   | Costs, quality of life and cost-effectiveness of arthroscopic and open repair for rotator cuff tears: an economic evaluation alongside the UKUFF trial | /pubmed/27909127     |
| 2, 10C                   | Complications associated with arthroscopic rotator cuff tear repair: definition of a core event set by Delphi consensus process | /pubmed/27496354     |
| Recommendation Addressed | Title                                                                 | Identification        |
|--------------------------|----------------------------------------------------------------------|-----------------------|
| 2, 10C                   | The etiology and arthroscopic surgical management of cam lesions     | /pubmed/27343392      |
| 2, 10C, 10B              | The clinical effect of a rotator cuff retear: a meta-analysis of arthroscopic single-row and double-row repairs | /pubmed/27416991      |
| 2, 10C, 10B              | Retear rates after arthroscopic single-row, double-row, and suture bridge rotator cuff repair at a minimum of 1 year of imaging follow-up: a systematic review | /pubmed/26188783      |
| 2, 10C, 10B              | Arthroscopic single-row versus double-row technique for repairing rotator cuff tears: a systematic review and meta-analysis | /pubmed/25430714      |
| 2, 10C, 8, 13B           | Efficacy of different rotator cuff repair techniques                 | /pubmed/26055023      |
| 2, 11A, 11B              | Outcome of large to massive rotator cuff tears repaired with and without extracellular matrix augmentation: a prospective comparative study | /pubmed/25891222      |
| 2, 3A                    | Surgery or conservative treatment for rotator cuff tear: a meta-analysis | /pubmed/27385156      |
| 2, 3A                    | Tendon repair compared with physiotherapy in the treatment of rotator cuff tears: a randomized controlled study in 103 cases with a five-year follow-up | /pubmed/25232074      |
| 2, 3A                    | Comparison between surgery and physiotherapy in the treatment of small and medium-sized tears of the rotator cuff: a randomised controlled study of 103 patients with one-year follow-up | /pubmed/20044684      |
| 2, 3A                    | Comparing surgical repair with conservative treatment for degenerative rotator cuff tears: a randomized controlled trial | /pubmed/26189808      |
| 2, 8, 10C                | Arthroscopic rotator cuff repair with and without acromioplasty in the treatment of full-thickness rotator cuff tears: a multicenter, randomized controlled trial | /pubmed/22048089      |
| 3A                       | PEDro systematic review update: the effectiveness of physiotherapy exercises in subacromial impingement syndrome | /pubmed/23881891      |
| 3A                       | A prospective randomized controlled trial comparing occupational therapy with home-based exercises in conservative treatment of rotator cuff tears | /pubmed/23523073      |
| 3A, 12, 13C, 13D         | A systematic review of cost-effective treatment of postoperative rotator cuff repairs | /pubmed/28314695      |
| 3A, 3C, 4A, 4B           | Effectiveness of conservative interventions including exercise, manual therapy and medical management in adults with shoulder impingement: a systematic review and meta-analysis of RCTs | /pubmed/28630217      |
| 3A, 3C, 4A, 4B, 4C       | Manual therapy and exercise for rotator cuff disease                 | /pubmed/27283590      |
| 3A, 3C, 4A, 4C           | Systematic review of nondrug, nonsurgical treatment of shoulder conditions | /pubmed/26554433      |
| 3A, 4A                   | Prognostic models in adults undergoing physical therapy for rotator cuff disorders: systematic review | /pubmed/26637648      |
| 3A, 4A                   | Self-managed loaded exercise versus usual physiotherapy treatment for rotator cuff tendinopathy: a pilot randomised controlled trial | /pubmed/23954024      |
| 3A, 4A                   | A mixed methods study to evaluate the clinical and cost-effectiveness of a self-managed exercise programme versus usual physiotherapy for chronic rotator cuff disorders: protocol for the SELF study | /pubmed/22545990      |
| 3A, 4A                   | Exercise for rotator cuff tendinopathy: a systematic review          | /pubmed/22507359      |

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| Recommendation Addressed | Title                                                                 | Identification |
|--------------------------|----------------------------------------------------------------------|-----------------|
| 3A, 4A                   | Early activation or a more protective regime after arthroscopic subacromial decompression: a description of clinical changes with two different physiotherapy treatment protocols: a prospective, randomized pilot study with a two-year follow-up | /pubmed/18955427 |
| 3A, 8, 2                 | Treatment of nontraumatic rotator cuff tears: a randomized controlled trial with two years of clinical and imaging follow-up | /pubmed/26537160 |
| 3A, 3B, 3C               | Nonsurgical treatment for rotator cuff injury in the elderly | /pubmed/18992694 |
| 4B                       | Ultrasound-guided versus blind subacromial-subdeltoid bursa injection in adults with shoulder pain: a systematic review and meta-analysis | /pubmed/26590864 |
| 4B                       | Comparison of efficacy of kinesiological taping and subacromial injection therapy in subacromial impingement syndrome | /pubmed/25403253 |
| 3B                       | Corticosteroids injection in rotator cuff tears in elderly patient: pain outcome prediction | /pubmed/24131759 |
| 3B                       | Injection of the subacromial bursa in patients with rotator cuff syndrome: a prospective, randomized study comparing the effectiveness of different routes | /pubmed/22992814 |
| 3B                       | Effects of corticosteroids injection in rotator cuff tears | /pubmed/21951654 |
| 4B                       | Ultrasound-guided versus blind subacromial corticosteroid injections for subacromial impingement syndrome: a randomized, double-blind clinical trial | /pubmed/26717970 |
| 3B, 4B                   | Intra-articular and soft tissue injections, a systematic review of relative efficacy of various corticosteroids | /pubmed/24651914 |
| 3B, 4B                   | Imaging-guided subacromial therapeutic injections: prospective study comparing abnormalities on conventional radiography with patient outcomes | /pubmed/24059377 |
| 4B                       | Calcific tendinitis of the rotator cuff: a randomized controlled trial of ultrasound-guided needling and lavage versus subacromial corticosteroids | /pubmed/23696211 |
| 3B, 4B                   | Subacromial ultrasound guided or systemic steroid injection for rotator cuff disease: randomised double blind study | /pubmed/19168537 |
| 3C                       | Tendonitis of the rotator cuff treated with extracorporeal shock wave therapy: radiographic monitoring to identify prognostic factors for disintegration | /pubmed/28078874 |
| 3C, 4C                   | Ultrasound-guided interventional procedures about the shoulder: anatomy, indications, and techniques | /pubmed/27468666 |
| 3C, 4C                   | Efficacy of transcutaneous electrical nerve stimulation for rotator cuff tendinopathy: a systematic review | /pubmed/26619821 |
| 3C, 4C                   | Intense focused ultrasound stimulation of the rotator cuff: evaluation of the source of pain in rotator cuff tears and tendinopathy | /pubmed/26058842 |
| 3C, 4C                   | Functional results of type A botulinum toxin versus oral anti-inflammatory agents in the rehabilitation of painful shoulder syndrome caused by rotator cuff lesion | /pubmed/26021089 |
| 3C, 4C                   | The efficacy of therapeutic ultrasound for rotator cuff tendinopathy: a systematic review and meta-analysis | /pubmed/25824429 |
| 3C, 4C                   | A systematic review of shockwave therapies in soft tissue conditions: focusing on the evidence | /pubmed/23918444 |
| 4A                       | Specific or general exercise strategy for subacromial impingement syndrome—does it matter? A systematic literature review and meta analysis | /pubmed/28416022 |
| Recommendation Addressed | Title                                                                 | Identification       |
|-------------------------|----------------------------------------------------------------------|----------------------|
| 4A                      | Efficacy of exercise therapy in workers with rotator cuff tendinopathy: a systematic review | /pubmed/27488037     |
| 4A                      | Effects of stretching and strengthening exercises, with and without manual therapy, on scapular kinematics, function, and pain in individuals with shoulder impingement: a randomized controlled trial | /pubmed/26471852     |
| 4A                      | Effectiveness of the eccentric exercise therapy in physically active adults with symptomatic shoulder impingement or lateral epicondylar tendinopathy: a systematic review | /pubmed/26304796     |
| 4A                      | A self-managed single exercise programme versus usual physiotherapy treatment for rotator cuff tendinopathy: a randomised controlled trial (the SELF study) | /pubmed/26160149     |
| 4A                      | Efficacy of proprioceptive exercises in patients with subacromial impingement syndrome: a single-blinded randomized controlled study | /pubmed/26098920     |
| 4A                      | Home exercises and supervised exercises are similarly effective for people with subacromial impingement: a randomised trial | /pubmed/26093810     |
| 4A                      | Evaluation of the effectiveness of three physiotherapeutic treatments for subacromial impingement syndrome: a randomised clinical trial | /pubmed/26051846     |
| 4A                      | [Eccentric strength training for the rotator cuff tendinopathies with subacromial impingement: current evidence] | /pubmed/25982614     |
| 4A                      | 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 | /pubmed/25920340     |
| 4A                      | Short-term effectiveness of precut kinesiology tape versus an NSAID as adjuvant treatment to exercise for subacromial impingement: a randomized controlled trial | /pubmed/25915145     |
| 4A                      | Therapeutic exercise for rotator cuff tendinopathy: a systematic review of contextual factors and prescription parameters | /pubmed/25715230     |
| 4A                      | Progressive high-load strength training compared with general low-load exercises in patients with rotator cuff tendinopathy: study protocol for a randomised controlled trial | /pubmed/25622594     |
| 4A                      | Eccentric training as a new approach for rotator cuff tendinopathy: review and perspectives | /pubmed/25405092     |
| 4A                      | The impact of adding an eccentric-exercise component to the rehabilitation program of patients with shoulder impingement: a critically appraised topic | /pubmed/25364914     |
| 4A                      | Effectiveness of physiotherapy and costs in patients with clinical signs of shoulder impingement syndrome: one-year follow-up of a randomized controlled trial | /pubmed/25211291     |
| 4A                      | The clinical and sonographic effects of kinesiotaping and exercise in comparison with manual therapy and exercise for patients with subacromial impingement syndrome: a preliminary trial | /pubmed/25108752     |
| 4A                      | Physiotherapy assessment of patients with rotator cuff pathology | /pubmed/27582940     |
| 4A                      | A specific exercise strategy reduced the need for surgery in subacromial pain patients | /pubmed/24970843     |

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TABLE A3 (continued)

| Recommendation Addressed | Title                                                                                   | Identification       |
|--------------------------|-----------------------------------------------------------------------------------------|----------------------|
| 4A                       | Conservative treatment or surgery for shoulder impingement: systematic review and meta-analysis | /pubmed/24694286     |
| 4A                       | Optimal management of shoulder impingement syndrome                                      | /pubmed/24648778     |
| 4A                       | The efficacy of oral non-steroidal anti-inflammatory drugs for rotator cuff tendinopathy: a systematic review and meta-analysis | /pubmed/24626286     |
| 4A                       | Effect of isokinetic training on shoulder impingement                                   | /pubmed/24615039     |
| 4A                       | The therapeutic role of motor imagery on the functional rehabilitation of a stage II shoulder impingement syndrome | /pubmed/24575717     |
| 4A                       | Neurocognitive therapeutic exercise improves pain and function in patients with shoulder impingement syndrome: a single-blind randomized controlled clinical trial | /pubmed/24429918     |
| 4A                       | Subacromial impingement syndrome: effectiveness of physiotherapy and manual therapy      | /pubmed/24217037     |
| 4A                       | Does kinesio taping in addition to exercise therapy improve the outcomes in subacromial impingement syndrome? A randomized, double-blind, controlled clinical trial | /pubmed/23619543     |
| 4A                       | Physiotherapy in patients with clinical signs of shoulder impingement syndrome: a randomized controlled trial | /pubmed/23584840     |
| 4A                       | Mobilization with movement and kinesiotaping compared with a supervised exercise program for painful shoulder: results of a clinical trial | /pubmed/22921332     |
| 4A                       | The effectiveness of physiotherapy exercises in subacromial impingement syndrome: a systematic review and meta-analysis | /pubmed/22607807     |
| 4A                       | Does adding heavy load eccentric training to rehabilitation of patients with unilateral subacromial impingement result in better outcome? A randomized, clinical trial | /pubmed/22581193     |
| 4A                       | Effect of specific exercise strategy on need for surgery in patients with subacromial impingement syndrome: randomised controlled study | /pubmed/22349588     |
| 4A                       | Conservative treatment and rotator cuff tear progression                               | /pubmed/21986048     |
| 4A                       | The effectiveness of scapular stabilization exercise in the patients with subacromial impingement syndrome | /pubmed/21849731     |
| 4A                       | [May eccentric training be effective in the conservative treatment of chronic supraspinatus tendinopathies? A review of the current literature] | /pubmed/21157654     |
| 4A                       | High-dosage medical exercise therapy in patients with long-term subacromial shoulder pain: a randomized controlled trial | /pubmed/21110409     |
| 4A                       | Comprehensive impairment-based exercise and manual therapy intervention for patients with subacromial impingement syndrome: a case series | /pubmed/20710088     |
| 4A                       | Effectiveness of individualized physiotherapy on pain and functioning compared to a standard exercise protocol in patients presenting with clinical signs of subacromial impingement syndrome: a randomized controlled trial | /pubmed/20534140     |
| 4A                       | Efficacy of standardised manual therapy and home exercise programme for chronic rotator cuff disease: randomised placebo controlled trial | /pubmed/20530557     |
| Recommendation Addressed | Title | Identification |
|--------------------------|-------|---------------|
| 4A                       | [Comparison of the effects of two different exercise programs on pain in subacromial impingement syndrome] | /pubmed/20134218 |
| 4A                       | Clinical outcomes of exercise in the management of subacromial impingement syndrome: a systematic review | /pubmed/20103573 |
| 4A                       | Effects of physiotherapy in patients with shoulder impingement syndrome: a systematic review of the literature | /pubmed/19841837 |
| 4A                       | Progressive resistance training in patients with shoulder impingement syndrome: literature review | /pubmed/19633794 |
| 4A                       | Exercise in the treatment of rotator cuff impingement: a systematic review and a synthesized evidence-based rehabilitation protocol | /pubmed/18895532 |
| 4A, 3A                   | Rehabilitation of shoulder impingement syndrome and rotator cuff injuries: an evidence-based review | /pubmed/20371557 |
| 4A, 4B                   | One-year outcome of subacromial corticosteroid injection compared with manual physical therapy for the management of the unilateral shoulder impingement syndrome: a pragmatic randomized trial | /pubmed/25089860 |
| 4A, 4B                   | Subacromial impingement syndrome and pain: protocol for a randomised controlled trial of exercise and corticosteroid injection (the SUPPORT trial) | /pubmed/24625273 |
| 4A, 4B                   | Pulsed electromagnetic field and exercises in patients with shoulder impingement syndrome: a randomized, double-blind, placebo-controlled clinical trial | /pubmed/24139986 |
| 4A, 4B                   | Cost-effectiveness of exercise therapy after corticosteroid injection for moderate to severe shoulder pain due to subacromial impingement syndrome: a trial-based analysis | /pubmed/236930367 |
| 4A, 4B                   | Subacromial impingement syndrome: effectiveness of pharmaceutical interventions—nonsteroidal anti-inflammatory drugs, corticosteroid, or other injections: a systematic review | /pubmed/23246416 |
| 4A, 4B                   | A double-blind randomized controlled trial comparing the effects of subacromial injection with corticosteroid versus NSAID in patients with shoulder impingement syndrome | /pubmed/23177167 |
| 4A, 4B                   | Subacromial corticosteroid injection or acupuncture with home exercises when treating patients with subacromial impingement in primary care: a randomized clinical trial | /pubmed/21378086 |
| 4A, 4B                   | Exercise therapy after corticosteroid injection for moderate to severe shoulder pain: large pragmatic randomised trial | /pubmed/20584793 |
| 4A, 4B, 4C, 9            | Treatments for shoulder impingement syndrome: a PRISMA systematic review and network meta-analysis | /pubmed/25761173 |
| 4A, 4C                   | Is extracorporeal shockwave therapy combined with isokinetic exercise more effective than extracorporeal shockwave therapy alone for subacromial impingement syndrome? A randomized clinical trial | /pubmed/27477254 |
| 4A, 4C                   | Effects of low-level laser therapy in combination with physiotherapy in the management of rotator cuff tendinitis | /pubmed/22052627 |
| 4A, 4C                   | Are ultrasound, laser and exercise superior to each other in the treatment of subacromial impingement syndrome? A randomized clinical trial | /pubmed/21946399 |
| Recommendation Addressed | Title                                                                                                                                                                                                 | Identification       |
|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|
| 4A, 4C                   | Additive effects of low-level laser therapy with exercise on subacromial syndrome: a randomised, double-blind, controlled trial                                                                        | /pubmed/21538218     |
| 4A, 4C                   | Supervised exercises compared with radial extracorporeal shock-wave therapy for subacromial shoulder pain: 1-year results of a single-blind randomized controlled trial                                      | /pubmed/21088117     |
| 4A, 4C                   | Radial extracorporeal shockwave treatment compared with supervised exercises in patients with subacromial pain syndrome: single blind randomised study                                                     | /pubmed/19755551     |
| 4A, 8                    | Which patients do not recover from shoulder impingement syndrome, either with operative treatment or with nonoperative treatment?                                                                     | /pubmed/25809315     |
| 4A, 8                    | Comparison of open acromioplasty, arthroscopic acromioplasty and physiotherapy in patients with subacromial impingement syndrome: a prospective randomised study                                         | /pubmed/25385527     |
| 4B                       | Injectable corticosteroids: take precautions and use caution                                                                                                                                            | /pubmed/28002861     |
| 4B                       | Efficacy of triamcinolone acetate and methylprednisolone acetone for intrabursal injection after ultrasound-guided percutaneous treatment in painful shoulder calcific tendonitis: a randomized controlled trial | /pubmed/27856801     |
| 4B                       | The comparative efficacy of kinesio taping and local injection therapy in patients with subacromial impingement syndrome                                                                               | /pubmed/27670388     |
| 4B                       | CORR Insights®: corticosteroid injections give small and transient pain relief in rotator cuff tendinosis: a meta-analysis                                                                              | /pubmed/27572298     |
| 3B                       | Subacromial injection of autologous platelet-rich plasma versus corticosteroid for the treatment of symptomatic partial rotator cuff tears                                                             | /pubmed/27544678     |
| 4B                       | Corticosteroid injections give small and transient pain relief in rotator cuff tendinosis: a meta-analysis                                                                                              | /pubmed/27469590     |
| 3B                       | The effect of subacromial injections of autologous conditioned plasma versus cortisone for the treatment of symptomatic partial rotator cuff tears                                                          | /pubmed/26017742     |
| 4B                       | Comparison of subacromial tenoxicam and steroid injections in the treatment of impingement syndrome                                                                                                     | /pubmed/25741915     |
| 4B                       | A multi-center, double-blind, randomized, placebo-controlled trial protocol to assess Traumeel injection vs dexamethasone injection in rotator cuff syndrome: the Traumeel in rotator cuff syndrome (TRARO) study protocol | /pubmed/25649543     |
| 4B                       | Effectiveness of blind & ultrasound guided corticosteroid injection in impingement syndrome                                                                                                              | /pubmed/26925901     |
| 4B                       | The pain quality response profile of a corticosteroid injections and heated lidocaine/tetracaine patch in the treatment of shoulder impingement syndrome                                                          | /pubmed/25329142     |
| 4B                       | Determination of steroid injection sites using lidocaine test in adhesive capsulitis: a prospective randomized clinical trial                                                                           | /pubmed/24965759     |
| 4B                       | Corticosteroid injection for shoulder pain: single-blind randomized pilot trial in primary care                                                                                                        | /pubmed/24325987     |
| 4B                       | Is radiofrequency treatment effective for shoulder impingement syndrome? A prospective randomized controlled study                                                                                       | /pubmed/23994459     |
| 4A                       | Eccentric training for the treatment of tendinopathies                                                                                                                                                  | /pubmed/23669088     |

(continued)
| Recommendation Addressed | Title                                                                 | Identification   |
|--------------------------|----------------------------------------------------------------------|------------------|
| 4B                       | Efficacies of corticosteroid injection at different sites of the shoulder for the treatment of adhesive capsulitis | /pubmed/22999847 |
| 4B                       | The effectiveness of injections of hyaluronic acid or corticosteroid in patients with subacromial impingement: a three-arm randomised controlled trial | /pubmed/22933498 |
| 4B                       | Image-guided versus blind glucocorticoid injection for shoulder pain | /pubmed/22895984 |
| 4B                       | Blind or ultrasound-guided corticosteroid injections and short-term response in subacromial impingement syndrome: a randomized, double-blind, prospective study | /pubmed/22561385 |
| 4B                       | Efficacy and safety of corticosteroid injections and other injections for management of tendinopathy: a systematic review of randomised controlled trials | /pubmed/20970844 |
| 4B                       | A double-blind randomised controlled study comparing subacromial injection of tenoxicam or methylprednisolone in patients with subacromial impingement | /pubmed/20044683 |
| 4B                       | [The contribution of subacromial injection to the conservative treatment of impingement syndrome] | /pubmed/19809230 |
| 4B, 10C, 2               | Efficacy of multimodal analgesia injection combined with corticosteroids after arthroscopic rotator cuff repair | /pubmed/26563923 |
| 4B, 3B                   | Corticosteroid and other injections in the management of tendinopathies: a review | /pubmed/22064721 |
| 4B, 4C                   | Shockwave therapy for pain associated with upper extremity orthopedic disorders: a review of the clinical and cost-effectiveness [internet] | /pubmed/27554465 |
| 4B, 4C                   | Extracorporeal shock wave therapy, ultrasound-guided percutaneous lavage, corticosteroid injection and combined treatment for the treatment of rotator cuff calcific tendinopathy: a network meta-analysis of RCTs | /pubmed/27283591 |
| 4B, 4C                   | Extracorporeal shockwaves versus ultrasound-guided percutaneous lavage for the treatment of rotator cuff calcific tendinopathy: a randomized controlled trial | /pubmed/26365144 |
| 4B, 4C                   | Current knowledge on evidence-based shockwave treatments for shoulder pathology | /pubmed/26361863 |
| 4B, 4C                   | Are intra-articular corticosteroid injections better than conventional TENS in treatment of rotator cuff tendinitis in the short run? A randomized study | /pubmed/20926997 |
| 4B, 4C, 10C, 2           | The effectiveness of high-energy extracorporeal shockwave therapy versus ultrasound-guided needling versus arthroscopic surgery in the management of chronic calcific rotator cuff tendinopathy: a systematic review | /pubmed/26382637 |
| 4B, 4C, 4A               | Is radial extracorporeal shock wave therapy (rESWT) combined with supervised exercises (SE) more effective than sham rESWT and SE in patients with subacromial shoulder pain? Study protocol for a double-blind randomised, sham-controlled trial | /pubmed/26361756 |
| 4C                       | Short-term effects of high-intensity laser therapy, manual therapy, and kinesio taping in patients with subacromial impingement syndrome | /pubmed/27220527 |
| 4C                       | Efficiency of therapeutic ultrasound on pain, disability, anxiety, depression, sleep and quality of life in patients with subacromial impingement syndrome: a randomized controlled study | /pubmed/27002665 |
| Recommendation Addressed | Title                                                                 | Identification       |
|--------------------------|----------------------------------------------------------------------|----------------------|
| 4C                       | Comparative effectiveness of ultrasonophoresis and iontophoresis in impingement syndrome: a double-blind, randomized, placebo controlled trial | /pubmed/25862770     |
| 4C                       | The efficacy of low-level laser therapy for shoulder tendinopathy: a systematic review and meta-analysis of randomized controlled trials | /pubmed/25450903     |
| 4C                       | High-energy extracorporeal shock-wave therapy for treating chronic calcific tendinitis of the shoulder: a systematic review | /pubmed/24733195     |
| 4C                       | Extracorporeal shock wave therapy for non-calcific supraspinatus tendinitis—10-year follow-up of a randomized placebo-controlled trial | /pubmed/24728846     |
| 4C                       | Low-level laser therapy versus ultrasound therapy in the treatment of subacromial impingement syndrome: a randomized clinical trial | /pubmed/24346151     |
| 4C                       | Clinical improvement and resorption of calcifications in calcific tendinitis of the shoulder after shock wave therapy at 6 months' follow-up: a systematic review and meta-analysis | /pubmed/23499780     |
| 4C                       | Extracorporeal shock-wave therapy for supraspinatus calcifying tendinitis: a randomized clinical trial comparing two different energy levels | /pubmed/22745199     |
| 4C                       | Short-term outcomes of extracorporeal shock wave therapy for the treatment of chronic non-calcific tendinopathy of the supraspinatus: a double-blind, randomized, placebo-controlled trial | /pubmed/22672772     |
| 4C                       | Radial extracorporeal shock wave therapy in the treatment of shoulder calcific tendinitis | /pubmed/22220440     |
| 4C                       | Extracorporeal shockwave therapy in calcifying tendinitis of the shoulder | /pubmed/21431373     |
| 4C                       | Evidence for effectiveness of extracorporeal shock-wave therapy (ESWT) to treat calcific and non-calcific rotator cuff tendinosis: a systematic review | /pubmed/21396877     |
| 4C                       | Reduced local perfusion after shock wave treatment of rotator cuff tendinopathy | /pubmed/21316560     |
| 4C                       | The midterm effectiveness of extracorporeal shockwave therapy in the management of chronic calcific shoulder tendinitis | /pubmed/21232988     |
| 4C                       | [Extracorporeal shock wave therapy (ESWT) and radial extracorporeal shock wave therapy (rESWT) in chronic musculoskeletal pain] | /pubmed/21139662     |
| 4C                       | The effectiveness of low laser therapy in subacromial impingement syndrome: a randomized placebo controlled double-blind prospective study | /pubmed/21120304     |
| 4C                       | High- versus low-energy extracorporeal shock wave therapy of rotator cuff tendinopathy: a prospective, randomised, controlled study | /pubmed/19774810     |
| 4C                       | Short-term effects of high-intensity laser therapy versus ultrasound therapy in the treatment of people with subacromial impingement syndrome: a randomized clinical trial | /pubmed/19482902     |
| 4C                       | Extracorporeal shock wave therapy in chronic calcific tendinitis of the shoulder: is it effective? | /pubmed/19358394     |
| 4C                       | Low-level laser therapy in subacromial impingement syndrome | /pubmed/19250050     |
| 4C                       | The effectiveness of low-level laser therapy on shoulder function in subacromial impingement syndrome | /pubmed/19031167     |
| 4C                       | Methylprednisolone versus triamcinolone in painful shoulder using ultrasound-guided injection | /pubmed/19023644     |

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| Recommendation Addressed | Title                                                                 | Identification   |
|--------------------------|----------------------------------------------------------------------|------------------|
| 4C, 3C, 4A, 3A           | Effectiveness of low-level laser therapy combined with an exercise program to reduce pain and increase function in adults with shoulder pain: a critically appraised topic | /pubmed/23069702  |
| 7A                      | A systematic review of preoperative fatty infiltration and rotator cuff outcomes | /pubmed/27385947  |
| 7A                      | Immunobiological factors aggravating the fatty infiltration on tendons and muscles in rotator cuff lesions | /pubmed/27160936  |
| 7A                      | Does preoperative subscapularis fatty muscle infiltration really matter in anterosuperior rotator cuff tears repair outcomes? A prospective multicentric study | /pubmed/24947497  |
| 7A                      | Fatty infiltration and rotator cuff atrophy                          | /pubmed/24084435  |
| 7A                      | Systematic review of rotator cuff tears in workers’ compensation patients | /pubmed/22016341  |
| 7A                      | Role of fatty infiltration in the pathophysiology and outcomes of rotator cuff tears | /pubmed/21770040  |
| 7A                      | Do outcomes differ after rotator cuff repair for patients receiving workers’ compensation? | /pubmed/18784971  |
| 7A                      | Difference in outcome of shoulder surgery between workers’ compensation and nonworkers’ compensation populations | /pubmed/18094970  |
| 7A, 7B                  | Systematic review on risk factors of rotator cuff tears              | /pubmed/28211286  |
| 7A, 7B                  | Risk factors, pathobiomechanics and physical examination of rotator cuff tears | /pubmed/27708731  |
| 7A, 7B                  | 2013 Neer Award: predictors of failure of nonoperative treatment of chronic, symptomatic, full-thickness rotator cuff tears | /pubmed/27422460  |
| 7A, 7B                  | Impact of cardiovascular risk factor on the prevalence and severity of symptomatic full-thickness rotator cuff tears | /pubmed/26321466  |
| 7A, 7B                  | Prognostic factors influencing the outcome of rotator cuff repair: a systematic review | /pubmed/26197937  |
| 7A, 7B                  | Factors affecting healing after arthroscopic rotator cuff repair     | /pubmed/25793161  |
| 7A, 7B                  | Specific patient-related prognostic factors for rotator cuff repair: a systematic review | /pubmed/24725900  |
| 7A, 7B                  | Clinical, socio-demographic and radiological predictors of short-term outcome in rotator cuff disease | /pubmed/20950433  |
| 7B                      | Arthroscopy and obesity                                             | /pubmed/26552647  |
| 7B                      | Smoking predisposes to rotator cuff pathology and shoulder dysfunction: a systematic review | /pubmed/25801046  |
| 7B                      | Obesity as a risk factor for tendinopathy: a systematic review       | /pubmed/25214839  |
| 7B                      | The effect of smoking on rotator cuff and glenoid labrum surgery: a systematic review | /pubmed/24859982  |
| 7B                      | Does body mass index affect outcomes of ambulatory knee and shoulder surgery? | /pubmed/24731386  |
| 7B                      | Impact of diabetes mellitus on surgical outcomes in sports medicine  | /pubmed/24231598  |
| 7B                      | The impact of aging on rotator cuff tear size                        | /pubmed/23588834  |
| 7B                      | Outcomes of arthroscopic rotator cuff repairs in obese patients       | /pubmed/21324416  |

**EMBASE Results**

1. Isolated subscapularis repair for massive rotator cuff tear  
   *Orthopedics.* 2014;37(11):e962-e967.

2. Outcome of rotator cuff repair in large-to-massive tear with pseudoparalysis: a comparative study with propensity score matching  
   *Am J Sports Med.* 2011;39(7):1413-1420.
| Recommendation Addressed | Title | Identification |
|--------------------------|-------|----------------|
| 2                        | Long-term survivorship and outcomes after surgical repair of full-thickness rotator cuff tears | *J Shoulder Elbow Surg.* 2011;20(4):591-597. |
| 2                        | Surgical treatment of confirmed intratendinous rotator cuff tears: retrospective analysis after an average of eight years of follow-up | *J Shoulder Elbow Surg.* 2010;19(6):837-846. |
| 2                        | Glenohumeral joint motion after subscapularis tendon repair: an analysis of cadaver shoulder models | *J Orthop Surg Res.* 2014;9:41. |
| 2                        | Combined subscapularis tears in massive posterosuperior rotator cuff tears: do they affect postoperative shoulder function and rotator cuff integrity? | *Am J Sports Med.* 2016;44(1):183-190. |
| 8                        | Biomechanical effects of acromioplasty on superior capsule reconstruction for irreparable supraspinatus tendon tears | *Am J Sports Med.* 2016;44(1):191-197. |
| 9                        | Biomechanics of latissimus dorsi transfer for irreparable posterosuperior rotator cuff tears | *Clin Biomech.* 2009;24(3):261-266. |
| 9                        | Recovery of active external rotation and elevation in young active men with irreparable posterosuperior rotator cuff tear using arthroscopically assisted latissimus dorsi transfer | *J Shoulder Elbow Surg.* 2016;25(9):e265-e275. |
| 9                        | Pectoralis major transfer for the treatment of irreparable anterosuperior rotator cuff tears | *Int Orthop.* 2010;34(5):689-694. |
| 9                        | Time-dependent changes after latissimus dorsi transfer: tenodesis or tendon transfer? | *Clin Orthop Relat Res.* 2014;472(12):3880-3888. |
| 9                        | Latissimus dorsi tendon transfer for treatment of irreparable posterosuperior rotator cuff tears: long-term results at a minimum follow-up of ten years | *J Bone Joint Surg Am.* 2013;95(21):1920-1926. |
| 9                        | Biomechanical effect of thickness and tension of fascia lata graft on glenohumeral stability for superior capsule reconstruction in irreparable supraspinatus tears | *Arthroscopy.* 2016;32(3):418-426. |
| 9                        | Are there any prognostic prediction parameters (PPPs) in the treatment of the massive rotator cuff tear with latissimus dorsi transfer? Latissimus dorsi transfer in massive rotator cuff tears | *Acta Chir Orthop Traumatol Cech.* 2013;80(2). |
| 9                        | Pigmented villonodular synovitis of the shoulder associated with massive rotator cuff tear treated by arthroscopic synovecctomy and debridement | *Musculoskelet Surg.* 2013;97(suppl 1):S79-S84. |
| 10C, 2                   | Clinical results of arthroscopic superior capsule reconstruction for irreparable rotator cuff tears | *Arthroscopy.* 2013;29(3):459-470. |
| 10C, 2                   | Lesions of the rotator cuff footprint: diagnostic performance of MR arthrography compared with arthroscopy | *Musculoskelet Surg.* 2013;97(suppl 2):S197-S202. |
| 10C, 2                   | Does open repair of anterosuperior rotator cuff tear prevent muscular atrophy and fatty infiltration? | *Clin Orthop Relat Res.* 2012;470(10):2776-2784. |
| 10C, 2                   | Arthroscopic treatment of anterosuperior rotator cuff tears | *Orthopedics.* 2013;36(11):e1394-e1400. |
| 10C, 2                   | Arthroscopic partial repair of irreparable, massive rotator cuff tears | *Arthroscopy Techn.* 2017;6(1):e143-e147. |
| 10C, 2                   | Arthroscopic repair of anterosuperior rotator cuff tears: InContinuity technique vs disruption of subscapularis supraspinatus tear margin comparison of clinical outcomes and structural integrity between the two techniques | *J Bone Joint Surg Am.* 2014;96(24):2056-2061. |
| 10C, 2                   | An arthroscopic-plus-open method of repair for combined tears of the subscapularis, supraspinatus, and infraspinatus tendons | *Am J Orthop (Belle Mead NJ).* 2009;38(12):602-605. |
| 10C, 2                   | The isolated subscapularis tendon tear: arthroscopic and open repair [German] | *Operative Orthopadie und Traumatologie.* 2012;24(6):468-478. |

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| Recommendation Addressed | Title                                                                 | Identification                          |
|--------------------------|----------------------------------------------------------------------|-----------------------------------------|
| 10C, 2                   | The clinical and structural long-term results of open repair of massive tears of the rotator cuff | *J Bone Joint Surg Am.* 2008;90(11):2423-2431. |
| 10C, 2                   | Arthroscopic partial repair of irreparable rotator cuff tears: preoperative factors associated with outcome deterioration over 2 years | *Am J Sports Med.* 2015;43(8):1965-1975. |
| 10C, 2                   | Outcome of arthroscopic rotator cuff repair in large tears: the exposed footprint | *Acta Orthop Belg.* 2011;77(6):743-750. |
| 10C, 2                   | Arthroscopic repair techniques for massive rotator cuff tears          | *Inst Course Lect.* 2012;61:121-130.     |
| 10C, 2                   | Arthroscopic repair of concomitant type II SLAP lesions in large to massive rotator cuff tears with biceps tenotomy | *Am J Sports Med.* 2012;40(12):2786-2793. |
| 10C, 2                   | Transtendon arthroscopic repair of high grade partial-thickness articular surface tears of the rotator cuff with biceps tendon augmentation: technical note and preliminary results | *Arch Orthop Trauma Surg.* 2011;1:8.    |
| 11A                      | Effect of platelet-rich plasma and porcine dermal collagen graft augmentation for rotator cuff healing in a rabbit model | *Am J Sports Med.* 2013;41(12):2909-2918. |
| 11A                      | The benefit of synthetic versus biological patch augmentation in the repair of posterosuperior massive rotator cuff tears: a 3-year follow-up study | *Acta Orthop Belg.* 2013;79(6):620-625. |
| 11A                      | Treatment of massive rotator-cuff tears with a polyester ligament (LARS) patch | *Am J Sports Med.* 2012;40(1):141-147.   |
| 11B                      | Dermal tissue allograft for the repair of massive irreparable rotator cuff tears | *J Shoulder Elbow Surg.* 2013;22(8):1011-1018. |
| 13A                      | Optimal shoulder immobilization postures following surgical repair of rotator cuff tears: a simulation analysis | *J Biomech.* 2013;46(1):179-182.        |
| 13A                      | Estimating optimal shoulder immobilization postures following surgical repair of massive rotator cuff tears | *Am J Sports Med.* 2013;41(4):872-879.   |
| 2, 11B                   | Massive or 2-tendon rotator cuff tears in active patients with minimal glenohumeral arthritis: clinical and radiographic outcomes of reconstruction using dermal tissue matrix xenograft | *Am J Sports Med.* 2012;40(2):359-366.  |
| 3A                       | Predictors of pain and function in patients with symptomatic, atraumatic full-thickness rotator cuff tears: a time-zero analysis of a prospective patient cohort enrolled in a structured physical therapy program | *J Shoulder Elbow Surg.* 2016;25(4):641-649. |
| 3A                       | Effects of exercise therapy for the treatment of symptomatic full-thickness supraspinatus tears on in vivo glenohumeral kinematics | *Skeletal Radiol.* 2013;42(9):1259-1267. |
| 7A                       | Fatty degeneration of the rotator cuff muscles on pre- and postoperative CT arthrography (CTA): is the Goutallier grading system reliable? | *Arch Orthop Trauma Surg.* 2014;134(7):985-990. |
| 7A                       | Fatty degeneration and atrophy of the rotator cuff muscles after arthroscopic repair: do it improve, halt or deteriorate? | *Arthroscopy.* 2013;29(3):449-458.       |
| 7A                       | Changes in appearance of fatty infiltration and muscle atrophy of rotator cuff muscles on magnetic resonance imaging after rotator cuff repair: establishing new time-zero traits | *Arthroscopy.* 2016;32(10):1947-1952.    |
| 7A                       | Morphologic risk factors in predicting symptomatic structural failure of arthroscopic rotator cuff repairs: tear size, location, and atrophy matter | *Arthroscopy.* 2009;1(2):96-104.         |
| 7A                       | The factors affecting the clinical outcome and integrity of arthroscopically repaired rotator cuff tears of the shoulder | *Clin Orthop Surg.* 2009;1(2):96-104.    |
| 7A, 10C, 2               | Effect of fatty degeneration of the infraspinatus on the efficacy of arthroscopic patch autograft procedure for large to massive rotator cuff tears | *Am J Sports Med.* 2015;43(5):1108-1117. |
| Title                                                                 | Type of Study          | Recommendation |
|----------------------------------------------------------------------|------------------------|----------------|
| Clinical and radiological outcome of conservative vs. surgical treatment of atraumatic degenerative rotator cuff rupture: design of a randomized controlled trial | Randomized trial       | 1              |
| Treatment of non-traumatic rotator cuff tears: a randomised controlled trial with one-year clinical results | Randomized trial       | 1              |
| Surgical treatment of rotator cuff tears after 65 years of age: a systematic review | Systematic review      | 2              |
| Initial treatment of complete rotator cuff tear and transition to surgical treatment: systematic review of the evidence | Systematic review      | 2              |
| Repair of full-thickness rotator cuff tears in patients aged younger than 55 years | Systematic review      | 2              |
| Intraoperative determinants of rotator cuff repair integrity: an analysis of 500 consecutive repairs | Review                 | 2              |
| Operative management of partial- and full-thickness rotator cuff tears | Case series            | 2              |
| Prospective analysis of arthroscopic rotator cuff repair: subgroup analysis | Retrospective          | 2              |
| Isolated subscapularis repair for massive rotator cuff tear | Case series            | 2              |
| Outcome of rotator cuff repair in large-to-massive tear with pseudoparalysis: a comparative study with propensity score matching | Case series            | 2              |
| Long-term survivorship and outcomes after surgical repair of full-thickness rotator cuff tears | Retrospective          | 2              |
| Combined subscapularis tears in massive posterosuperior rotator cuff tears: do they affect postoperative shoulder function and rotator cuff integrity? | Cohort                 | 2              |
| Arthroscopic partial repair of irreparable, massive rotator cuff tears | Case series            | 2              |
| Arthroscopic repair of anterosuperior rotator cuff tears: InContinuity technique vs. disruption of subscapularis supraspinatus tear margin comparison of clinical outcomes and structural integrity between the two techniques | Review                 | 2              |
| The clinical and structural long-term results of open repair of massive tears of the rotator cuff | Case series            | 2              |
| Arthroscopic partial repair of irreparable rotator cuff tears: preoperative factors associated with outcome deterioration over 2 years | Case series            | 2              |
| Outcome of arthroscopic rotator cuff repair in large tears: the exposed footprint | Retrospective          | 2              |
| Arthroscopic repair of concomitant type II SLAP lesions in large to massive rotator cuff tears: comparison with biceps tenotomy | Cohort                 | 2              |
| Massive or 2-tendon rotator cuff tears in active patients with minimal glenohumeral arthritis: clinical and radiographic outcomes of reconstruction using dermal tissue matrix xenograft | Case series            | 2              |
| Arthroscopic repair for chronic massive rotator cuff tears: a systematic review | Systematic review      | 2              |
| Clinical and structural outcomes after arthroscopic repair of full-thickness rotator cuff tears with and without platelet-rich product supplementation: a meta-analysis and meta-regression | Meta-analysis          | 2              |
| Comparison of functional gains after arthroscopic rotator cuff repair in patients over 70 years of age versus patients under 50 years of age: a prospective multicenter study | Case series            | 2              |
| Arthroscopic treatment options for irreparable rotator cuff tears of the shoulder | Review                 | 2              |
| Arthroscopic versus mini-open rotator cuff repair: a prospective, randomized study with 24-month follow-up | Randomized trial       | 2              |
| Combined tears of the subscapularis and supraspinatus tendon: clinical outcome, rotator cuff strength and structural integrity following open repair | Prospective            | 2              |
| Outcomes of arthroscopic versus open rotator cuff repair: a systematic review of the literature | Systematic review      | 2              |
| Treating full-thickness cuff tears in the athlete: advances in arthroscopic techniques | Review                 | 2              |
| Massive rotator cuff tears: arthroscopy to arthroplasty | Review                 | 2              |
| Arthroscopic repair of full-thickness rotator cuff tears with and without acromioplasty: randomized prospective trial with 2-year follow-up | Randomized trial       | 2              |
| Single-row or double-row fixation technique for full-thickness rotator cuff tears: a meta-analysis | Meta-analysis          | 2              |
| Single-row repair versus double-row repair of full-thickness rotator cuff tears | Meta-analysis          | 2              |
| The clinical effect of a rotator cuff retear: a meta-analysis of arthroscopic single-row and double-row repairs | Meta-analysis          | 2              |
| Arthroscopic single-row versus double-row technique for repairing rotator cuff tears: a systematic review and meta-analysis | Systematic review      | 2              |
| Surgery or conservative treatment for rotator cuff tear: a meta-analysis | Meta-analysis          | 2              |
| Arthroscopic rotator cuff repair with and without acromioplasty in the treatment of full-thickness rotator cuff tears: a multicenter, randomized controlled trial | Randomized trial       | 2              |
| Predictors of pain and function in patients with symptomatic, atraumatic full-thickness rotator cuff tears: a time-zero analysis of a prospective patient cohort enrolled in a structured physical therapy program | Cohort                 | 3A             |
| Effects of exercise therapy for the treatment of symptomatic full-thickness supraspinatus tears on in vivo glenohumeral kinematics | Case series            | 3A             |

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| Title                                                                 | Type of Study       | Recommendation |
|----------------------------------------------------------------------|---------------------|----------------|
| Effectiveness of physical therapy in treating atraumatic full-thickness rotator cuff tears: a multicenter prospective cohort study | Cohort              | 3A             |
| Treatment of non-traumatic rotator cuff tears: a randomised controlled trial with one-year clinical results | Randomized trial    | 3A             |
| Surgery or conservative treatment for rotator cuff tear: a meta-analysis | Meta-analysis       | 3A             |
| Treatment of nontraumatic rotator cuff tears: a randomized controlled trial with two years of clinical and imaging follow-up | Randomized trial    | 3A             |
| Injection of the subacromial bursa in patients with rotator cuff syndrome: a prospective, randomized study comparing the effectiveness of different routes | Randomized trial    | 3B             |
| Effects of corticosteroids injection in rotator cuff tears          | Randomized trial    | 3B             |
| Exercise for rotator cuff tendinopathy: a systematic review         | Systematic review   | 4A             |
| Evaluation of the effectiveness of three physiotherapeutic treatments for subacromial impingement syndrome: a randomised clinical trial | Randomized trial    | 4A             |
| A specific exercise strategy reduced the need for surgery in subacromial pain patients | Randomized trial    | 4A             |
| The efficacy of oral non-steroidal anti-inflammatory drugs for rotator cuff tendinopathy: a systematic review and meta-analysis | Systematic review   | 4A             |
| The effectiveness of physiotherapy exercises in subacromial impingement syndrome: a systematic review and meta-analysis | Systematic review   | 4A             |
| Effect of specific exercise strategy on need for surgery in patients with subacromial impingement syndrome: randomised controlled study | Randomized trial    | 4A             |
| High-dosage medical exercise therapy in patients with long-term subacromial shoulder pain: a randomized controlled trial | Randomized trial    | 4A             |
| Efficacy of standardised manual therapy and home exercise programme for chronic rotator cuff disease: randomised placebo controlled trial | Randomized trial    | 4A             |
| Exercise in the treatment of rotator cuff impingement: a systematic review and a synthesized evidence-based rehabilitation protocol | Systematic review   | 4A             |
| A double-blind randomized controlled trial comparing the effects of subacromial injection with corticosteroid versus NSAID in patients with shoulder impingement syndrome | Randomized trial    | 4A             |
| Intra-articular and soft tissue injections, a systematic review of relative efficacy of various corticosteroids | Systematic review   | 4B             |
| Imaging-guided subacromial therapeutic injections: prospective study comparing abnormalities on conventional radiography with patient outcomes | Systematic review   | 4B             |
| Calcific tendinitis of the rotator cuff: a randomized controlled trial of ultrasound-guided needling and lavage versus subacromial corticosteroids | Randomized trial    | 4B             |
| Subacromial ultrasound guided or systemic steroid injection for rotator cuff disease: randomised double blind study | Randomized trial    | 4B             |
| One-year outcome of subacromial corticosteroid injection compared with manual physical therapy for the management of the unilateral shoulder impingement syndrome: a pragmatic randomized trial | Randomized trial    | 4B             |
| Subacromial impingement syndrome and pain: protocol for a randomised controlled trial of exercise and corticosteroid injection (the SUPPORT trial) | Randomized trial    | 4B             |
| Pulsed electromagnetic field and exercises in patients with shoulder impingement syndrome: a randomized, double-blind, placebo-controlled clinical trial | Randomized trial    | 4B             |
| Subacromial impingement syndrome: effectiveness of pharmaceutical interventions-nonsteroidal anti-inflammatory drugs, corticosteroid, or other injections: a systematic review | Systematic review   | 4B             |
| A double-blind randomized controlled trial comparing the effects of subacromial injection with corticosteroid versus NSAID in patients with shoulder impingement syndrome | Randomized trial    | 4B             |
| CORR Insights*: corticosteroid injections give small and transient pain relief in rotator cuff tendinosis: a meta-analysis | Meta-analysis       | 4B             |
| Corticosteroid injections give small and transient pain relief in rotator cuff tendinosis: a meta-analysis | Meta-analysis       | 4B             |
| Comparison of subacromial tenoxicam and steroid injections in the treatment of impingement syndrome | Randomized trial    | 4B             |
| A multi-center, double-blind, randomized, placebo-controlled trial protocol to assess Traumeel injection vs dexamethasone injection in rotator cuff syndrome: the Traumeel in rotator cuff syndrome (TRARO) study protocol | Randomized trial    | 4B             |
| Effectiveness of blind & ultrasound guided corticosteroid injection in impingement syndrome | Randomized trial    | 4B             |
| The effectiveness of injections of hyaluronic acid or corticosteroid in patients with subacromial impingement: a three-arm randomised controlled trial | Randomized trial    | 4B             |

(continued)
| Title                                                                                                                                                                                                 | Type of Study          | Recommendation |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|----------------|
| Blind or ultrasound-guided corticosteroid injections and short-term response in subacromial impingement syndrome: a randomized, double-blind, prospective study                                                                 | Randomized trial       | 4B             |
| A double-blind randomised controlled study comparing subacromial injection of tenoxicam or methylprednisolone in patients with subacromial impingement                                                                 | Randomized trial       | 4B             |
| Extracorporeal shock wave therapy, ultrasound-guided percutaneous lavage, corticosteroid injection and combined treatment for the treatment of rotator cuff calcific tendinopathy: a network meta-analysis of RCTs | Meta-analysis           | 4B             |
| Are intra-articular corticosteroid injections better than conventional TENS in treatment of rotator cuff tendinitis in the short run? A randomized study                                                                 | Randomized trial       | 4B             |
| The effectiveness of high-energy extracorporeal shockwave therapy versus ultrasound-guided needling versus arthroscopic surgery in the management of chronic calcific rotator cuff tendinopathy: a systematic review | Systematic review      | 4B             |
| Efficacy of transcutaneous electrical nerve stimulation for rotator cuff tendinopathy: a systematic review                                                                                     | Systematic review      | 4C             |
| The efficacy of therapeutic ultrasound for rotator cuff tendinopathy: a systematic review and meta-analysis                                                                                   | Systematic review      | 4C             |
| Are ultrasound, laser and exercise superior to each other in the treatment of subacromial impingement syndrome? A randomized clinical trial                                                      | Randomized trial       | 4C             |
| Supervised exercises compared with radial extracorporeal shock-wave therapy for subacromial shoulder pain: 1-year results of a single-blind randomized controlled trial                                 | Randomized trial       | 4C             |
| Radial extracorporeal shockwave treatment compared with supervised exercises in patients with subacromial pain syndrome: single blind randomised study                                             | Randomized trial       | 4C             |
| Extracorporeal shockwaves versus ultrasound-guided percutaneous lavage for the treatment of rotator cuff calcific tendinopathy: a randomized controlled trial                                                | Randomized trial       | 4C             |
| Are intra-articular corticosteroid injections better than conventional TENS in treatment of rotator cuff tendinitis in the short run? A randomized study                                                                 | Randomized trial       | 4C             |
| The effectiveness of high-energy extracorporeal shockwave therapy versus ultrasound-guided needling in the management of chronic calcific rotator cuff tendinopathy: a systematic review                 | Systematic review      | 4C             |
| Efficiency of therapeutic ultrasound on pain, disability, anxiety, depression, sleep and quality of life in patients with subacromial impingement syndrome: a randomized controlled study                  | Randomized trial       | 4C             |
| Comparative effectiveness of ultrasonophoresis and iontophoresis in impingement syndrome: a double-blind, randomized, placebo controlled trial                                               | Randomized trial       | 4C             |
| The efficacy of low-level laser therapy for shoulder tendinopathy: a systematic review and meta-analysis of randomized controlled trials                                                        | Systematic review      | 4C             |
| High-energy extracorporeal shock-wave therapy for treating chronic calcific tendinitis of the shoulder: a systematic review                                                                     | Systematic review      | 4C             |
| Extracorporeal shock wave therapy for non-calcific supraspinatus tendinosis—10-year follow-up of a randomized placebo-controlled trial                                                               | Randomized trial       | 4C             |
| Low-level laser therapy versus ultrasound therapy in the treatment of subacromial impingement syndrome: a randomized clinical trial                                                                 | Randomized trial       | 4C             |
| Clinical improvement and resorption of calcifications in calcific tendinitis of the shoulder after shock wave therapy at 6 months’ follow-up: a systematic review and meta-analysis                  | Systematic review      | 4C             |
| Extracorporeal shockwave therapy for supraspinatus calcifying tendinitis: a randomized clinical trial comparing two different energy levels                                                         | Randomized trial       | 4C             |
| Short-term outcomes of extracorporeal shock wave therapy for the treatment of chronic non-calcific tendinopathy of the supraspinatus: a double-blind, randomized, placebo-controlled trial         | Randomized trial       | 4C             |
| Radial extracorporeal shock wave therapy in the treatment of shoulder calcific tendinitis                                                                                                           | Cohort                 | 4C             |
| Extracorporeal shockwave therapy in calcifying tendinitis of the shoulder                                                                                                                             | Prospective            | 4C             |
| Evidence for effectiveness of extracorporeal shock-wave therapy (ESWT) to treat calcific and non-calcific rotator cuff tendinosis: a systematic review                                                                 | Systematic review      | 4C             |
| The midterm effectiveness of extracorporeal shockwave therapy in the management of chronic calcific shoulder tendinitis                                                                             | Systematic review      | 4C             |
| The effectiveness of low laser therapy in subacromial impingement syndrome: a randomized placebo controlled double-blind prospective study                                                             | Randomized trial       | 4C             |
| High- versus low-energy extracorporeal shock wave therapy of rotator cuff tendinopathy: a prospective, randomised, controlled study                                                                  | Randomized trial       | 4C             |
| Short-term effects of high-intensity laser therapy versus ultrasound therapy in the treatment of people with subacromial impingement syndrome: a randomized clinical trial                               | Randomized trial       | 4C             |

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| Title                                                                 | Type of Study        | Recommendation |
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| Dexamethasone for pain after outpatient shoulder surgery: a randomised, double-blind, placebo-controlled trial | Randomized trial     | 6              |
| A systematic review of preoperative fatty infiltration and rotator cuff outcomes | Systematic trial     | 7A             |
| Does preoperative subscapularis fatty muscle infiltration really matter in anterosuperior rotator cuff tears repair outcomes? A prospective multicentric study | Cohort               | 7A             |
| Fatty infiltration and rotator cuff atrophy                          | Review               | 7A             |
| Systematic review of rotator cuff tears in workers’ compensation patients | Systematic review   | 7A             |
| Role of fatty infiltration in the pathophysiology and outcomes of rotator cuff tears | Review               | 7A             |
| Do outcomes differ after rotator cuff repair for patients receiving workers’ compensation? | Prognostic           | 7A             |
| Difference in outcome of shoulder surgery between workers’ compensation and nonworkers’ compensation populations | Systematic review   | 7A             |
| Prognostic factors influencing the outcome of rotator cuff repair: a systematic review | Systematic review   | 7A             |
| Factors affecting healing after arthroscopic rotator cuff repair | Review               | 7A             |
| Specific patient-related prognostic factors for rotator cuff repair: a systematic review | Systematic review   | 7A             |
| Clinical, socio-demographic and radiological predictors of short-term outcome in rotator cuff disease | Randomized trial     | 7A             |
| Changes in appearance of fatty infiltration and muscle atrophy of rotator cuff muscles on magnetic resonance imaging after rotator cuff repair: establishing new time-zero traits | Case series          | 7A             |
| Morphologic risk factors in predicting symptomatic structural failure of arthroscopic rotator cuff repairs: tear size, location, and atrophy matter | Retrospective        | 7A             |
| The factors affecting the clinical outcome and integrity of arthroscopically repaired rotator cuff tears of the shoulder | Retrospective        | 7A             |
| Long-term functional outcomes after repair of rotator cuff tears correlated with atrophy of the supraspinatus muscles on magnetic resonance images | Case series          | 7A             |
| 2013 Neer Award: predictors of failure of nonoperative treatment of chronic, symptomatic, full-thickness rotator cuff tears | Cohort               | 7B             |
| Prognostic factors influencing the outcome of rotator cuff repair: a systematic review | Systematic review   | 7B             |
| Factors affecting healing after arthroscopic rotator cuff repair | Review               | 7B             |
| Specific patient-related prognostic factors for rotator cuff repair: a systematic review | Systematic review   | 7B             |
| The effect of smoking on rotator cuff and glenoid labrum surgery: a systematic review | Systematic review   | 7B             |
| Impact of diabetes mellitus on surgical outcomes in sports medicine | Review               | 7B             |
| Outcomes of arthroscopic rotator cuff repairs in obese patients | Retrospective        | 7B             |
| Does concomitant acromioplasty facilitate arthroscopic repair of full-thickness rotator cuff tears? A meta-analysis with trial sequential analysis of randomized controlled trials | Meta-analysis        | 8              |
| Is acromioplasty necessary in the setting of full-thickness rotator cuff tears? A systematic review | Systematic review   | 8              |
| The efficacy of acromioplasty in the arthroscopic repair of small- to medium-sized rotator cuff tears without acromial spur: prospective comparative study | Prospective comparative study | 8 |
| Arthroscopic treatment of rotator cuff tear in the over-60s: repair is preferable to isolated acromioplasty-tenotomy in the short term | Randomized trial     | 8              |
| Arthroscopic repair of full-thickness rotator cuff tears with and without acromioplasty: randomized prospective trial with 2-year follow-up | Randomized trial     | 8              |
| Arthroscopic rotator cuff repair with and without acromioplasty in the treatment of full-thickness rotator cuff tears: a multicenter, randomized controlled trial | Randomized trial     | 8              |
| Improved external rotation with concomitant reverse total shoulder arthroplasty and latissimus dorsi tendon transfer: a systematic review | Systematic review   | 9              |
| Latissimus dorsi transfer in posterior irreparable rotator cuff tears | Review               | 9              |
| [Irreparable rotator cuff tears: debridement, partial reconstruction, tendon transfer or reversed shoulder arthroplasty] | Review               | 9              |
| Tendon transfer for irreparable rotator cuff tears: indications and surgical rationale | Review               | 9              |
| Arthroscopic-assisted latissimus dorsi tendon transfer for irreparable posterosuperior cuff tears | Case series          | 9              |
| Pectoralis major transfer for treatment of irreparable subscapularis tear: a systematic review | Systematic review   | 9              |
| Humeral resurfacing arthroplasty in combination with latissimus dorsi tendon transfer in patients with rotator cuff tear arthropathy and preserved subscapularis muscle function: preliminary report and short-term results | Case series          | 9              |
| Tendon transfers for irreparable rotator cuff tears | Review               | 9              |
| Latissimus dorsi tendon transfer for irreparable rotator cuff tears: a systematic review | Systematic review   | 9              |
| Latissimus dorsi tendon transfer for massive irreparable rotator cuff tears: a systematic review | Systematic review   | 9              |
| Time-dependent changes after latissimus dorsi transfer: tenodesis or tendon transfer? | Therapeutic          | 9              |

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| Title                                                                 | Type of Study     | Recommendation |
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| Title                                                                 | Type of Study         | Recommendation |
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| Rehabilitation after rotator cuff repair                           | Review                | 13C            |
| Effectiveness of early compared with conservative rehabilitation for patients having rotator cuff repair surgery: an overview of systematic reviews | Systematic review     | 13C            |
| A comparison of rehabilitation methods after arthroscopic rotator cuff repair: a systematic review | Systematic review     | 13C            |
| Rehabilitation following arthroscopic rotator cuff repair: a review of current literature | Review                | 13C            |
| [Comparison of the results of supervised physiotherapy program and home-based exercise program in patients treated with arthroscopic-assisted mini-open rotator cuff repair] | Prospective nonrandomized | 13D            |
| Supervised versus uncontrolled rehabilitation of patients after rotator cuff repair—clinical and neurophysiological comparative study | Randomized trial      | 13D            |
| Supervised strengthening exercises versus home-based movement exercises after arthroscopic acromioplasty: a randomized clinical trial | Randomized trial      | 13D            |
| Massive or 2-tendon rotator cuff tears in active patients with minimal glenohumeral arthritis: clinical and radiographic outcomes of reconstruction using dermal tissue matrix xenograft | Case series           | 2, 11B         |
| Administration of analgesics after rotator cuff repair: a prospective clinical trial comparing glenohumeral, subacromial, and a combination of glenohumeral and subacromial injections | Randomized trial      | 14             |
| Postoperative fentanyl patch versus subacromial bupivacaine infusion in arthroscopic shoulder surgery | Randomized trial      | 14             |
| Efficacy of continuous subacromial bupivacaine infusion for pain control after arthroscopic rotator cuff repair | Randomized trial      | 14             |