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RAPID RECOMMENDATIONS

Subacromial decompression surgery for adults with shoulder pain: a clinical practice guideline

Per Olav Vandvik,[1 2] Tuomas Lähdeoja,[3 4] Clare Ardern,[5 6] Rachelle Buchbinder,[7] Jaydeep Moro,[8] Jens Ivar Brox,[9] Jako Burgers,[10 11] Qiukui Hao,[12 13] Teemu Karjalainen,[7] Michel van den Bekerom,[14] Julia Noorduyn,[14] Lyubov Lytvyn,[13] Reed A C Siemieniuk,[13] Alexandra Albin,[15] Sean Chua Shunjie,[16] Florian Fisch,[17] Laurie Proulx,[18] Gordon Guyatt,[13] Thomas Agoritsas,[19] Rudolf W Poolman[14]

Full author details can be found at the end of the article

Correspondence to: R W Poolman
rwp@jointresearch.org

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ABSTRACT

Clinical question Do adults with atraumatic shoulder pain for more than 3 months diagnosed as subacromial pain syndrome (SAPS), also labelled as rotator cuff disease, benefit from subacromial decompression surgery? This guideline builds on to two recent high quality trials of shoulder surgery.

Current practice SAPS is the common diagnosis for shoulder pain with several first line treatment options, including analgesia, exercises, and injections. Surgeons frequently perform arthroscopic subacromial decompression for prolonged symptoms, with guidelines providing conflicting recommendations.

Recommendation The guideline panel makes a strong recommendation against surgery.

How this guideline was created A guideline panel including patients, clinicians, and methodologists produced this recommendation in adherence with standards for trustworthy guidelines and the GRADE system. The recommendation is based on two linked systematic reviews on (*a*) the benefits and harms of subacromial decompression surgery and (*b*) the minimally important differences for patient reported outcome measures. Recommendations are made actionable for clinicians and their patients through visual overviews. These provide the relative and absolute benefits and harms of surgery in multilayered evidence summaries and decision aids available in MAGIC (www.magicapp.org) to support shared decisions and adaptation.

The evidence Surgery did not provide important improvements in pain, function, or quality of life compared with placebo surgery or other options. Frozen shoulder may be more common with surgery.

Understanding the recommendation The panel concluded that almost all informed patients would choose to avoid surgery because there is no benefit but there are harms and it is burdensome. Subacromial decompression surgery should not be offered to patients with SAPS. However, there is substantial uncertainty in what alternative treatment is best.

Visual summary of recommendation

Population

Including:

- Subacromial pain syndrome (SAPS)
- Rotator cuff disease (RCD)

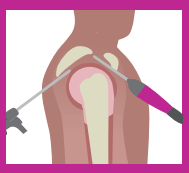
Does not apply to patients with:

- Traumatic shoulder pain
- Other differential diagnoses

Interventions compared

Subacromial decompression surgery

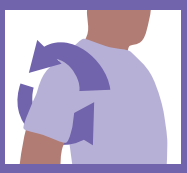
Arthroscopic subacromial decompression plus nonoperative management



or

Nonoperative management only

Including guided physical therapy, exercise programmes, NSAIDs, and steroid injections



Recommendation

Strong | Weak | Weak | Strong

We recommend against subacromial decompression surgery

Comparison of benefits and harms

Favours surgery | No important difference | Favours nonoperative management

After 1 year					**Evidence quality**
		Visual analogue scale (0–10)			
Pain (Mean)	2.6	No important difference	2.9	★★★★	High
		Constant score scale (0–100)			
Function (Mean)	72	No important difference	69	★★★★	High
		EQ-5D scale (-0.59–1)			
Quality of life (Mean)	0.70	No important difference	0.73	★★★★	High
		Events per 1000 people			
Global perceived effect	699	No important difference	635	★★★☆	Moderate
At work	859	No important difference	818	★★☆☆	Low
Within 30 days		**Events per 1000 people**			
Serious harms	6	6 fewer	0	★★★☆	Moderate

Key practical issues

Surgery	Nonoperative management
Recovery time varies from months to years and may include sick leave	
Day surgery with general anaesthesia and/or nerve block	
After surgery, 2 weeks off work are typically needed	
Avoid heavy lifting for one to three weeks, overhead activities for 3 months	

Values and preferences

The panel believes that all or almost all patients would place a high value on avoiding even minimal risk of complications and burden from surgery, if it is not helpful.

Up to a quarter of adults have experienced shoulder pain over the past year, and it represents the third most common musculoskeletal problem.[1 2] About half of those affected will recover completely within six months.[3] Pain beyond three months is associated with poorer recovery, disability, and reduced ability to work.[3]

Subacromial pain is the most common form (up to 70%) of shoulder pain, and it can impair the ability to work or do household tasks.[4-6] Most patients presenting with subacromial pain, without a history of trauma, receive a diagnosis of subacromial pain syndrome (SAPS), shoulder impingement, or rotator cuff disease. Each of these labels describe similar clinical presentations, but there is inconsistency about how they are defined and overlap between these diagnoses. Here, we use the term SAPS (see box 1 for details of its presentation). This recommendation addresses the role of surgery for adults with symptoms lasting more than three months, who approach health professionals for treatment.

This *BMJ* Rapid Recommendation is in response to two recent trials[12 13] which found that subacromial decompression surgery provided no benefit over placebo surgery. The recommendation is based on two linked systematic reviews on benefits and harms of subacromial decompression surgery and minimally important differences in patient reported outcome measures for shoulder pain, function and quality of life.[14 15] The main infographic provides an overview of the relative and absolute benefits and harms of surgery in standard GRADE format. Box 2 shows all of the articles and evidence linked in this Rapid Recommendation package. Table 2 below shows evidence that has emerged since the publication of this article.

Current practice

First line treatment options for SAPS include simple analgesia such as paracetamol, non-steroidal anti-inflammatory drugs (NSAIDs), glucocorticoid injections, and exercise therapy.[8] Subacromial acromial decompression surgery is a second line treatment option for patients with more longstanding symptoms. Current guidelines provide inconsistent recommendations (table 1). Such surgery includes removal of the subacromial bursa (bursectomy) and removal of bone from the under surface of the acromion (acromioplasty).[8] Surgeons initially performed subacromial decompression surgery as an open procedure. It evolved to less invasive keyhole surgery: arthroscopy.

Despite trials dating back to 1993[18] and systematic reviews failing to demonstrate benefit from surgery,[19] the number of arthroscopies performed has risen dramatically, although there is substantial geographical variation.[20 21] There were 21 000 procedures performed in NHS hospitals in 2010, which cost approximately £50 million.[21]

Box 1 | Details of subacromial pain syndrome (SAPS)

Common symptoms—Pain at the upper outer arm when lifting the arm (classically a painful arc through shoulder abduction), difficulty moving the arm (especially with forward flexion, external rotation, and abduction), reduced strength in the arm, and sleep problems due to pain[7 8]

Key differential diagnoses—Adhesive capsulitis ("frozen shoulder") and glenohumeral osteoarthritis[8 9]

Imaging—Patients with SAPS can have degeneration and partial thickness rotator cuff tears or abnormalities in the subacromial bursa on imaging. These imaging findings are also common in people without symptoms[10]

Pathophysiology—Remains poorly understood. Cadaver studies suggested that pain might occur from rotator cuff tendons being caught ("impinging") between the acromion or coracoacromial ligament and the humerus.[11] These studies provided the initial rationale for subacromial decompression surgery

Box 2 | Linked articles in this *BMJ* Rapid Recommendation cluster

- Vandvik PO, Lähdeoja T, Ardern C, et al. Subacromial decompression surgery for adults with shoulder pain: a clinical practice guideline. *BMJ* 2019;364:l294
  - Summary of the results from the Rapid Recommendation process
- Hao Q, Devji T, Zeraatkar D, et al. Minimal important differences for improvement in shoulder condition patient-reported outcomes: a systematic review to inform a BMJ Rapid Recommendation. *BMJ Open* 2019; doi:10.1136/bmjopen-2018-028777[14]
  - Review of minimally important differences in outcomes from shoulder conditions
- Lähdeoja T, Karjalainen T, Jokihaara J, et al. Subacromial decompression surgery versus conservative management in patients with shoulder pain: a systematic review with meta-analysis. *Br J Sports Med* 2019; doi:10.1136/bjsports-2018-100486[15]
  - Review and meta-analysis of all available randomised trials that assessed effects of surgery for SAPS
- Karjalainen TV, Jain NB, Page CM, et al. Subacromial decompression surgery for rotator cuff disease. *Cochrane Database Syst Rev* 2019;(1):CD005619. doi:10.1002/14651858.CD005619.pub3[16]
  - Updated Cochrane systematic review on subacromial decompression surgery for rotator cuff disease
- MAGICapp (www.magicapp.org/public/guideline/nBMa0L)
  - Expanded version of the results with multilayered recommendations, evidence summaries, and decision aids for use on all devices (see appendix 3 on bmj.com)

Table 1 | Major guideline recommendations on subacromial decompression surgery for subacromial pain syndrome (SAPS)*

Organisation	Recommendation
European Society for Surgery of the Shoulder and the Elbow	No recommendation for or against subacromial surgery
British Elbow and Shoulder Society/British Orthopaedic Association 2015. Statement of upcoming update 2018†	Recommended in the absence of a rotator cuff tear if impingement symptoms fail to resolve with nonoperative treatment
Dutch Orthopaedic Association 2014[17]	Not recommended
American Academy of Orthopaedic Surgeons, 2010 (AOA guidelines)	No recommendation for or against subacromial surgery, suggests initial nonoperative management
Australian Orthopaedic Association 2017 (AOA Statement 2017)	Recommended for significant and persistent symptoms unresponsive to nonoperative management (including injections and physiotherapy)
Canadian Medical Association and Canadian Orthopaedic Association-Arthroscopy Association of Canada	No recommendation for or against subacromial decompression surgery

*These guidelines have not included new evidence captured in our Rapid Recommendation.
†Accredited by National Institute of Clinical Excellence (NICE). A guideline update, based on the CSAW trial, has been announced.[13]

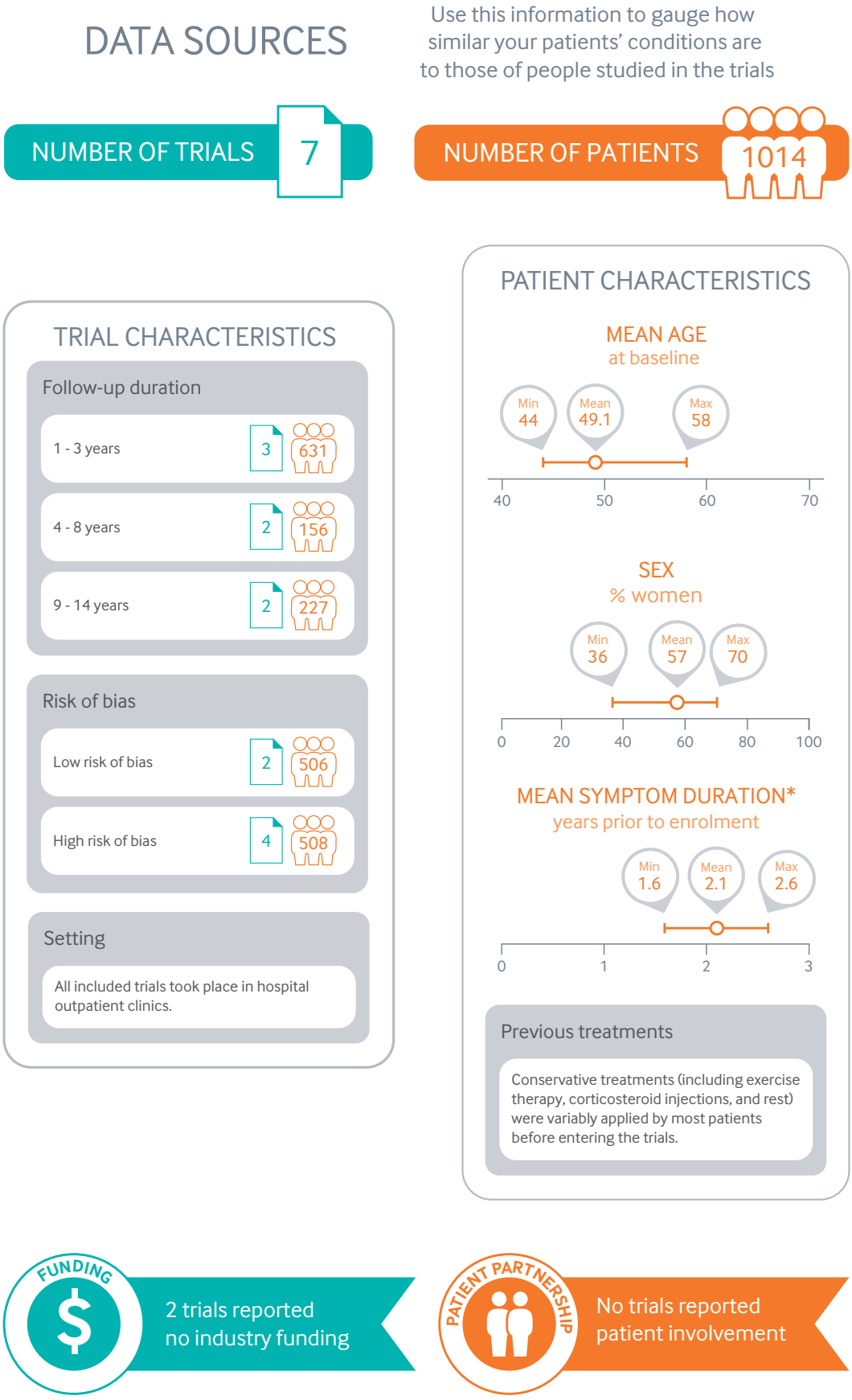


Fig 2| Characteristics of participants and trials included in the systematic review of the effects of surgery for subacromial pain syndrome (SAPS)

HOW THIS RECOMMENDATION WAS CREATED

Our international panel included patients with lived experience of shoulder pain and surgery, orthopaedic surgeons, physiotherapists, a rheumatologist, general internists, a general practitioner, epidemiologists, and methodologists. No person had financial conflicts of interest; intellectual and professional conflicts were minimised and managed (see appendix 1 on bmj.com for details of panel members and their competing interests). The panel initially decided on the scope of the recommendation and the outcomes that are most important to patients.

The panel identified the following important outcomes: pain, patient global perceived effect, physical function, participation in work and recreation activities, health related quality of life, development of full-thickness rotator cuff tears, and potential harms from surgery (such as frozen shoulder, death, infection, venous thromboembolism, and anaesthesia related events). This selection was also informed by the Outcome Measures in Rheumatology (OMERACT) preliminary shoulder trial core domain outcome set.[28]

To inform the recommendation the panel members requested two systematic reviews addressing the following questions:

1 What is the smallest change in pain, function and quality of life that patients with shoulder conditions such as SAPS consider important—the minimally important difference—to make surgery worthwhile? Such patient-reported outcomes measures (PROMs) were measured with a variety of instruments in the trials and are challenging to interpret.
2 What are the benefits and harms of subacromial decompression surgery in patients with SAPS, as compared to placebo and nonoperative management strategies?

Parallel teams conducted these systematic reviews.[14 15] Another team updated a Cochrane systematic review synchronised with this *BMJ* Rapid Recommendation.[16] The panel asked the review team to explore potential subgroup effects for risk of bias in trials and different types of comparisons to surgery, such as exercise therapy.

The panel used this evidence and followed *BMJ* Rapid Recommendations procedures for creating a trustworthy recommendation. This includes the GRADE approach. The panel met by videoconference to discuss the evidence and formulate a recommendation (see appendix 2 on bmj.com).[29 30] The panel considered the balance of benefits, harms, and burdens of surgery versus placebo surgery and nonoperative treatments, the certainty of the evidence for each outcome, typical and expected variations in patient values and preferences, as well as feasibility and acceptability (practical issues).[23] Recommendations using GRADE can be strong or weak, for or against a course of action.[30] The panel made the recommendation from an individual patient's perspective assuming that all options were available and affordable to the patient. It does not take a public health, societal, or health payer perspective. Healthcare systems can adapt these recommendations by including costs and other key issues of relevance, contextualised to national and local circumstances.[23]

The evidence

What is the minimum difference in symptoms and function important to patients?

The systematic review of minimally important differences (MIDs) identified 22 original studies of 5562 patients. They reported results for 74 MID estimates judged to be of variable and mostly low credibility.[14] The most credible MID estimates were used to help interpret the results of the systematic review, as shown in the infographic.

The panel were, due to credible estimates, confident that patients valued

- A difference in pain of at least 1.5 units as important (visual analogue scale 0-10)
- A difference in function of at least 8.3 units as important (constant score 0-100)

The panel were less confident in the difference in health related quality of life reported by patients to be important (EQ 5-D, MID 0.07 units, low credibility median estimate).

What are the benefits and harms of subacromial decompression surgery?

The linked systematic review and meta-analysis pooled data from seven randomised controlled trials with 1014 participants diagnosed with SAPS.[15] In general, the patients included in the trials are representative of patients with SAPS presenting to primary care centres and outpatient clinics (fig 2). Participants were around 49 years (median) and had had symptoms for around two years (median).

Planned evaluation of trials at lower risk of bias

The panel planned to focus on evidence at lower risk of bias. Two trials included placebo surgery and were at low risk of bias.[12 13] At one year after treatment, they showed that surgery did not have meaningful benefit over placebo surgery:

- High certainty evidence for little or no effect on
  - Pain (mean difference −0.26 (95% confidence interval −0.84 to 0.33), MID 1.5)
  - Function (mean difference 2.8 (−1.4 to 6.9), MID 8.3)
  - Health related quality of life (mean difference −0.03 points (−0.11 to 0.06), MID 0.07)
- Moderate certainty evidence for little or no global perceived effect (risk ratio 1.10 (0.94 to 1.30))
- Low certainty evidence for little or no effect on return to work (risk ratio 1.05 (0.89 to 1.23)).

Similar results were seen at six months, two years, and at five year follow-up, with the latter supported by low certainty evidence due to imprecise estimates from unblinded trials.[15]

Planned evaluation of surgery compared with exercise therapy

This analysis compared subacromial decompression surgery (including postoperative exercise therapy) with exercise therapy alone. Six trials reported such comparisons, and all were at high risk of bias due to lack of blinding. Some had imprecise estimates of effect. Compared with exercise therapy, there was no important benefit of surgery on pain, function, quality of life, global perceived effect, and return to work.[15]

About a third (32%) of all participants included in the trials continued to have more than minor symptoms (such as mild to moderate pain) at one year, irrespective of treatment. The average pain scores in the trials at two years were 1.6 to 3.0 units (0-10 scale), reflecting mild to moderate pain.

Harms

Potential harms from surgery were incompletely reported in the trials. The trials were also underpowered to detect rare events. There were around 12 more frozen shoulders per 1000 patients undergoing subacromial decompression surgery, based on the two placebo controlled trials (low certainty evidence).

Because harms data from randomised trials were anticipated to be so limited, the guideline panel requested the systematic review to include observational studies designed to evaluate harms after subacromial decompression surgery.[15] The systematic review assessed 140 publications in full text, of which four reported results from a large prospective cohort study from the United States considered to represent best current evidence on serious harms.[10-22] This registry study investigated 30-day complications resulting in readmission to hospitals after mixed arthroscopic procedures including subacromial decompression surgery from 2006 to 2013.[9 23]

PRACTICAL ISSUES

	Surgery	Non-operative management
MEDICATION ROUTINE	Day surgery performed in an outpatient clinic	Guided physical therapy and exercise programme offered at outpatient clinics, such as by physiotherapists. Other treatments may also be offered, such as NSAIDS or steroid injections in the shoulder
TEST & VISIT	Need for outpatient visit to an orthopaedic surgeon before surgery	Guided physical therapy and exercise programme, performed at home with outpatient clinic visits every few weeks. Visit to general practitioner for referral may be needed
PROCEDURE & DEVICE	General anaesthesia and/or local nerve block during keyhole surgery. Recovery period of 2-10 hours with numbness up to 24 hours after surgery	
RECOVERY & ADAPTATION	Recovery time varies from months to years Recovery directly related to surgery takes four to six weeks. You may use a sling for a few days few days after surgery	
COORDINATION OF CARE	You may need someone to drive you home after surgery	
COSTS & ACCESS	Out of pocket costs for surgery is generally high	Costs depend on health policy and health insurance
EXERCISE & ACTIVITIES	Avoid heavy lifting for 7-21 days Avoid overhead activities such as sports requiring shoulder use for 6 weeks and front crawl for 3 months	A guided physical therapy and exercise programme including information, advice, and supervised exercises. Exercises are also often performed daily at home
WORK & EDUCATION	Sick leave is typically offered the first few weeks after surgery	Potential sick leave depending on symptoms, kind of work, health care visits and other health conditions
TRAVEL TIME & DRIVING	You can start driving as soon as you feel able to steer, normally after one week	

Fig 3| Practical issues for surgery and nonoperative management of subacromial pain syndrome (SAPS)

EDUCATION INTO PRACTICE

- What would be your approach to managing subacromial pain syndrome (SAPS), based on the information you have read in this article?
- How can this article help you explain the new evidence to patients considering surgery for their shoulder pain? How should you respond if patients ask about surgery?
- What would you tell your colleagues about best practice for managing SAPS?

HOW PATIENTS WERE INVOLVED IN THE CREATION OF THIS ARTICLE

Four people with lived experience of subacromial pain syndrome and shoulder surgery were full panel members. These panel members identified important outcomes and participated in the teleconferences and email discussions on the evidence and the recommendation. They contributed to the identification of practical issues related to the decision to have surgery and met all authorship criteria for the present article. We thank them for their time and contribution.

The risk of serious harms after mixed shoulder arthroscopic procedures was 0.5% (95% confidence interval 0.4% to 0.7%) during years 2006-11 and 0.6% (0.5% to 0.7%) during 2011-13. Reported harms included events such as major bleeding, deep infections, serious anaesthetic complications, venous thromboembolism, and peripheral nerve injury. The indirectness caused by inclusion of mixed arthroscopic shoulder procedures in the registry study results in moderate certainty evidence for estimated harms.

Understanding the recommendation

The panel concluded that almost all well informed patients would decline surgery and therefore made a strong recommendation against subacromial decompression surgery. The panel was confident that surgery provides no important benefit on pain, function, quality of life, and global perceived effect informed by moderate to high certainty evidence in a one year timeframe. Surgery also comes with burdens and the risk of harm (see main infographic).

Clinicians should not offer patients subacromial decompression surgery unprompted, and clinicians, public healthcare providers, and others should make efforts to educate the public regarding the ineffectiveness of surgery. Although we did not take costs and resources into account beyond direct costs to patients (such as out-of-pocket costs), surgery cannot be cost effective given the lack of important benefit, potential for harm, and associated costs.

Figure 3 includes the practical issues linked to surgery, compared with physical therapy because this was the key comparison in the trials and a relevant treatment option. This would differ for other treatment options such as analgesia or injection.

Uncertainty

Clinicians and patients might question what other therapies could be offered to patients diagnosed with SAPS or rotator cuff disease and whether any therapy is effective. Here we recognise the limitation of our *BMJ* Rapid Recommendations, made to provide guidance on new evidence that might change practice. For guidance on treatment alternatives beyond surgery, we point readers to a clinically focused overview article and to guidelines with a broader scope (table 1).[8]

The whole area of best management of SAPS is uncertain, as reflected in the following brief summary on available treatment options:

- Glucocorticoid injections and NSAIDs may provide moderate to small short term benefits on shoulder pain compared with placebo.[8 24]
- Exercise, manual therapy, and electrotherapies are of uncertain benefit to patients compared with watchful waiting, and guidelines vary in their recommendations.[25 26]
- A holistic approach to care, with appropriate communication including reassurance and education, is likely to benefit patients but is poorly studied.[27]

Key research questions to inform decision makers and future guidelines include:

- What are the best strategies to de-implement inefficient and potentially harmful subacromial decompression surgery for SAPS?
- How can we educate patients and clinicians to understand and adopt evidence, particularly when it goes against accepted beliefs?

Table 2 | New evidence which has emerged after initial publication

Date	New evidence	Citation	Findings	Implications for recommendation(s)
There are currently no updates to the article.				

Updates to this article

Table 2 shows evidence that has emerged since the publication of this article. As new evidence is published, a group will assess the new evidence and make a judgement on the extent it is expected to alter the recommendation.

Competing interests: All authors have completed the *BMJ* Rapid Recommendations interest disclosure form and a detailed, contextualised description of all disclosures is reported in appendix 1 on bmj.com. As with all *BMJ* Rapid Recommendations, the executive team and *The BMJ* judged that no panel member had any financial conflict of interest. Professional and academic interests are minimised as much as possible, while maintaining necessary expertise on the panel to make fully informed decisions.

Funding: The Dutch Orthopaedic Society has provided the MAGIC Foundation with €35 000 to support development of two rapid recommendations for orthopaedic surgery. The society had no role in the guideline development process for this *BMJ* Rapid Recommendation. The recommendation on shoulder surgery will be adapted into an updated recommendation in their guidelines.

Transparency: R Poolman and P O Vandvik affirm that the manuscript is an honest, accurate, and transparent account of the recommendation being reported; that no important aspects of the recommendation have been omitted; and that any discrepancies from the recommendation as planned (and, if relevant, registered) have been explained.

Provenance and peer review: Commissioned; externally peer reviewed

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[1]Department of Medicine, Lovisenberg Diaconal Hospital, Oslo, Norway
[2]Institute of Health and Society, Faculty of Medicine, University of Oslo, Oslo, Norway
[3]Finnish Center of Evidence based Orthopaedics (FICEBO), University of Helsinki, Helsinki, Finland
[4]Department of Orthopaedics and Traumatology, HUS Helsinki University Hospital, Helsinki, Finland
[5]Division of Physiotherapy, Linköping University, Linköping, Sweden
[6]School of Allied Health, La Trobe University, Melbourne, Australia
[7]Monash Department of Clinical Epidemiology, Cabrini Institute and Department of Epidemiology and Preventive Medicine, School of Public Health and Preventive Medicine, Monash University
[8]Division of Orthopaedic Surgery, McMaster University, Hamilton, Ontario, Canada
[9]Department of Physical Medicine and Rehabilitation, Oslo University Hospital and Faculty of Medicine, University of Oslo, Norway
[10]Dutch College of General Practitioners, Utrecht, The Netherlands
[11]Care and Public Health Research Institute, Department Family Medicine, Maastricht, The Netherlands
[12]Center of Gerontology and Geriatrics (National Clinical Research Center for Geriatrics), West China Hospital, Sichuan University, Chengdu, China
[13]Department of Health Research Methods, Evidence and Impact, McMaster University, Hamilton, Canada.
[14]Department of Orthopaedic Surgery and Traumatology, Joint Research, OLVG, Amsterdam, The Netherlands
[15]Society for Participatory Medicine Member, USA
[16]MOH Holdings, 1 Maritime Square, Singapore
[17]Gryphenhübeliweg 28, 3006 Bern, Switzerland
[18]Canadian Arthritis Patient Alliance, Canada
[19]Division General Internal Medicine & Division of Clinical Epidemiology, University Hospitals of Geneva, Geneva, Switzerland