

Arthritis UK MSK Decision Aids –Shoulder Pain Rapid Evidence summaries Notes:

- (1) RCT evidence included in the NICE guidelines is unlikely to pick up adverse events, particularly in the long term. Trials also tend to exclude people who will be using treatments in the real world, including those who are older, have comorbidities, etc. Additional evidence from observational studies would better estimate harm.
- (2) Presenting average improvements in pain or function with treatment would be possible, but as discussed with the oversight group, may be misleading as future likely changes strongly depend on an individual patient's current level of pain and disability. The same holds for data regarding response rates.
- (3) The evidence consistently showed only small or moderate average effects for most (if not all) treatment options
- (4) Consistency and way of describing harms and benefits in the green column has been agreed with the oversight group (aligns with text included in the decision aids)

Brief description of the most common shoulder pain presentations

Shoulder pain can be due to a number of causes. The most common causes are (i) rotator cuff disorders, (ii) frozen shoulder; (iii) osteoarthritis of the shoulder; (iv) instability disorders; (v) acromioclavicular joint disorders. In some people shoulder pain may actually be 'referred pain' caused by conditions in the neck, or of the lungs, heart, or structures close to the diaphragm.

Rotator cuff disorders: The term 'rotator cuff' refers to the group of muscles and tendons that surround and stabilise the shoulder joint. Rotator cuff disorders cause subacromial shoulder pain, which is felt in the top and side of the shoulder, and down the side of the upper arm. It is exaggerated by overhead activity and can be associated with night pain. It is the most common presentation of shoulder pain (up to 70%). It typically affects people between the ages of 35 and 75. There may be a history of repetitive movements at or above shoulder height, or of heavy lifting.

Frozen shoulder: Frozen shoulder is an extremely painful and disabling condition, which typically affects people aged between 40-60 years. It is characterised by increasing stiffness of shoulder movement and is usually described to have a pain-dominant phase followed by a stiffness-dominant phase. It can occur without clear reason, but it can occur after an injury of the shoulder and is more common in people with diabetes, cardiovascular disease, hemiparesis, and thyroid dysfunction. It may reoccur in the other shoulder.

Osteoarthritis of the shoulder: Osteoarthritis of the shoulder can cause significant pain, stiffness, and disability. As the shoulder is a non-weight bearing joint, it is less common than knee and hip osteoarthritis and rarely occurs in isolation from other osteoarthritis in other joints. It may follow from trauma or other longstanding shoulder disorders

Acromioclavicular disorders: In some people the pain originates from the joint between the clavicle and acromion (front part of the shoulder blade). Causes may include osteoarthritis of this joint, or injuries of the ligaments in this joint.

Atraumatic instability disorders? Instability can best be described as abnormal motion or position of the shoulder that leads to pain, subluxations, dislocations and functional impairment, but importantly it happens without any history of a significant preceding injury. Instability disorders usually occur in people aged less than 35 years of age. The person may feel the shoulder occasionally moves partly or completely 'out of joint' and may be concerned their shoulder may dislocate during certain activities or sports. There may be other non-specific symptoms such as shoulder ache or intermittent clicking. If the instability is longstanding, there may be hand or arm weakness, tingling or numbness.

This evidence summary mainly includes evidence regarding the two most common shoulder pain presentations: subacromial pain and frozen (painful stiff) shoulder. It excludes acute trauma, systematic inflammatory conditions, and post-stroke shoulder pain

PART 1: Early presentation of shoulder pain						
Sources	Guideline recommendations	Accuracy	Impact on decision making	Impact on patient outcomes	Adverse events	Interpretation of results (for decision aid)
Imaging (X-ray, CT scan, MRI)						
NICE CKS 2017; BESS patient pathways for subacromial shoulder pain, frozen shoulder, glenohumeral osteoarthritis;	- Imaging of the rotator cuff with ultrasound (US) or magnetic resonance imaging (MRI) is rarely indicated in primary care. - Ultrasound is user-dependent and the accuracy of US in identifying rotator cuff tears varies. - Partial thickness tears are common, can be asymptomatic and can be the consequence of false positive reporting. - Shoulder X-rays with two views in primary care can be useful in patients not improving with conservative treatment, and to confirm a diagnosis of osteoarthritis. - Imaging is therefore more usefully performed after secondary care referral to inform further decision-making.	MRI and US have good diagnostic accuracy for detection of full thickness tears in people with shoulder pain for whom surgery is being considered. However, both MRI and US may have poor sensitivity for detecting partial thickness tears, and the sensitivity of US may be much lower than that of MRI. [Lenza et al. Cochrane review 2013] Rotator cuff tears are common in people without shoulder pain (prevalence 4 to 51% increasing with age)[43-46], and do not always correlate with symptom severity.[e.g. Unruh et al. 2014]	There is limited evidence regarding the impact of imaging on decision making for shoulder pain. One study in the USA [Friedman et al 2017] showed that in 591 (63.2%) of 935 patients, treatment plans were changed after US. 423/744 (56.9%) initially prescribed conservative treatment were subsequently prescribed a more invasive form of treatment; 46/191 (23.1%) planned to have invasive treatment were changed to non-invasive treatment.	In one RCT (n=129, Netherlands), no statistically significant differences in recovery were found after 1 year between patients for whom treatment was tailored based on US findings (72.5% (37/51)) and usual primary care (60% (30/50), OR 2.24 (95% CI 0.72 to 6.89; p=0.16)). Also, healthcare use was similar. [Ottenheijm et al. 2016] In one cohort study in the US n=101) routine pre-evaluation with MRI did not have a significant effect on the treatment or outcome (pain, function, QoL) in people with atraumatic shoulder pain.[Bradley et al. 2005]	Evidence regarding the negative consequences of imaging is scarce	--- 0 +++ Usually a health professional can diagnose someone from their symptoms and by examining them. That means that most people do not need tests or scans. Small tears in the rotator cuff are common when people get older, and may not be related to shoulder pain. If a person's shoulder problems do not get better after they try self care and primary care, they may need an X-ray. An X-ray can help a health professional to decide whether to make a referral. Most of the time, people do not need more scans before a provider makes a referral. But if someone needs other scans, a specialist can arrange them.

Sources	Guideline recommendations	Overall response rate	Pain intensity	Function	Adverse events	Interpretation of results (for decision aid)
Self-care and self-management						
NICE CKS; Elbers et al. 2018	- Consider the person's work and leisure activities. - Advise the person to carry out normal activities as much as they are able to. - Advise rest from activities that worsen the shoulder pain for a few weeks, such as sport. - Explain that although common shoulder problems tend to be self-limiting, the rehabilitation period can be at least 6 months. - Take pain relief as advised - In bed, support the arm with pillows	We could not identify studies or systematic reviews investigating effects of self-management in people with shoulder pain specially, and have selected a recent systematic review and meta-analysis of self-management for MSK pain more generally [Elbers et al. 2018].	From Elbers et al. 2018 (meta-analysis, 4 RCTs): statistically significant difference (up to 12 months) favouring the self-management group: SMD -0.28 (95%CI -0.56 to -0.01), equivalent to a difference of 0.48 points on a 0-10 NRS scale	From Elbers et al. 2018 (meta-analysis, 8 RCTs): SMD -0.28 (95% CI -0.52 to -0.03) favouring the self-management group, equivalent to a difference of 4.12 points on the Pain Disability Index (lower than a minimal important change of 8.5 points). Effects on self-efficacy at one year follow-up are in favour of self-management, but are small and not statistically significant.	No evidence of harm was reported	--- 0 +++ People with shoulder pain are likely to experience a small benefit from self-management (staying active, taking part in group activity)
Paracetamol						
NICE CKS 2017; Subacromial shoulder pain BESS/BOA Patient Care Pathways; Machado et al. 2015; meta-analysis of RCTs); Roberts et al. 2017, meta-analysis)	- Prescribe appropriate analgesia. - Offer paracetamol first line. If paracetamol is ineffective, consider an oral NSAID (for example, ibuprofen) or codeine. - The choice of analgesia should be based on clinical judgement, taking into account the severity of the person's symptoms and comorbidities.	We could not identify a systematic review focusing on shoulder pain specifically, and have selected a systematic review and meta-analysis of paracetamol for low back pain and osteoarthritis [Machado et al. 2015]	From Machado et al 2015: There was "high quality" evidence that paracetamol is not effective for reducing pain intensity in the short term (2-12 weeks; weighted mean difference (0-100 NRS): -0.5, (95% CI -2.9 to 1.9) in people with low back pain. For hip or knee osteoarthritis paracetamol provides a	From Machado et al 2015: There was "high quality" evidence that paracetamol is not effective for reducing disability (0.4, -1.7 to 2.5) in the short term (2-12 weeks) in people with back pain. For hip or knee osteoarthritis there was "high quality" evidence that paracetamol provides a significant, but not clinically important, effect	From Machado et al: The number of patients reporting any adverse was similar in the paracetamol and placebo groups. From Roberts et al: Dose-response shown for increased relative rate of mortality, increased risk ratio of all cardiovascular adverse events, increased relative rate of gastrointestinal adverse events	--- 0 +++ Taking paracetamol will help some people with shoulder pain. Paracetamol is less likely to cause side effects than most other medicines, so it may be good to try it first. Many people find that paracetamol works better if they take it regularly instead of waiting for pain to get bad.

			significant, but not clinically important, effect on pain (-3.7, 95% CI -5.5 to -1.9)	on disability: weighted mean difference: -2.9, 95% CI -4.9 to -0.9).	or bleeds and increasing odds ratio of ≥30% decrease in estimated glomerular filtration rate.	
NSAIDs						
NICE CKS 2017; Subacromial shoulder pain BESS/BOA Patient Care Pathways; Boudreault et al. 2014 (meta-analysis); Steuri et al, 2017 (meta-analysis)	- Prescribe appropriate analgesia. - If paracetamol is ineffective, consider an oral NSAID (for example, ibuprofen). - Consider contra-indications and balance of benefits and risks for the person, and consider gastro-protection with NSAIDs. - If there is no early benefit from an oral NSAID, discontinue its use. - <i>Do not use stronger opioids in the primary care management of shoulder pain</i>	Evidence for the effectiveness of NSAIDs in patients with frozen shoulder is scarce.	From et al. Boudreault et al: Compared to placebo, oral non-steroidal anti-inflammatory drugs were found to provide short-term (up to 1 month) pain relief (0-10) in people with subacromial pain, pooled mean difference: -2.69; 95% confidence interval: -1.96 to -3.41) From Steuri et al.: Nonsteroidal anti-inflammatory drugs (NSAIDs) had a small advantage over placebo in people with subacromial pain (1 study; n=306, SMD -0.29, 95% CI -0.53 to -0.05): small effect	From Boudreault et al.: Compared to placebo, oral non-steroidal anti-inflammatory drugs do not significantly improve function.	The majority of studies included in the systematic reviews were acute cases and underpowered to detect differences in adverse events. From Machado et al. 2017) In people with low back pain a significantly higher number of gastro-intestinal adverse events have been found in NSAID groups compared with placebo (RR 2.5, 95% CI 1.2 to 5.2); 28/702 (4%) for NSAIDs versus 9/465 (2%) for placebo.	-- - 0 + + + Most people with shoulder pain will have less pain if they take NSAID tablets, at least in the first month of taking them. These should be taken at the lowest dose that works for the shortest possible time. NSAIDs may not be right for people with some other health conditions. Most people should take tablets to protect the stomach together with NSAIDs. Many people find that NSAIDs work better if they take them regularly instead of waiting for pain to get bad.
Exercise						
NICE CKS 2017; BESS patient pathways for subacromial shoulder pain, frozen shoulder, atraumatic shoulder instability;	- An exercise programme can be started as soon as possible, unless the person cannot tolerate the exercises due to pain. - Physiotherapist-led exercise can also involve education and advice, and manual	From Page et al. No randomised trials have compared exercise (with or without mobilisations) with no treatment or usual care for frozen shoulder.	From Steuri et al: Exercise was superior to doing nothing for subacromial pain (5 studies, n=189, SMD -0.94, 95% CI -1.69 to -0.19): large effect From Gutiérrez-Espinoza et al:	From Steuri et al: Exercise was superior to doing nothing (4 studies, n=202, SMD -0.57, 95% CI -0.85 to -0.29): moderate effect From Gutiérrez-Espinoza et al:	There is insufficient reporting of adverse effects in RCTs of manual therapy. From Roddy et al. Exacerbation of shoulder pain after performing the exercises was reported by 59 (60%)	-- - 0 + + + Most people who have shoulder pain will get some help from an exercise programme. At first, a home-based strengthening programme may be just as

Steuri et al. 2017 (meta-analysis); Page et al. (2014 Cochrane review); Warby et al. 2014 (systematic review); Gutiérrez-Espinoza et al 2020 (meta-analysis) Roddy et al (2020)	therapy, especially for frozen shoulder. - Physiotherapy-led exercise is first line treatment for patients with atraumatic instability - Ensure adequate analgesia is provided, in some cases a corticosteroid injection may be needed to relieve pain.	From Warby et al. No randomised trials compared exercise with/without mobilisations for atraumatic instability. From Roddy et al. The proportion of people reporting much improvement or recovery was larger at 6 months for physiotherapy-led exercise than an exercise leaflet, but not statistically significant: 38 (41.3%) versus 28 (29.5%)	Supervised physical therapy and home-based progressive shoulder strengthening and stretching exercises for the rotator cuff and scapular muscles are equally effective in patients with subacromial pain; mean difference for pain 0.21 cm (95% CI: -1.36 to 1.78, 4 studies; up to 12 weeks follow-up). From Roddy et al. There were greater improvements in pain at 6 months (SPADI adjusted mean change: -9.25 (-15.74 to -2.75), but not at 6 weeks or 12 months	Supervised physical therapy and home-based progressive shoulder strengthening and stretching exercises for the rotator cuff and scapular muscles are equally effective in patients with subacromial pain; SMD for shoulder function -0.14 (95% CI: -1.04 to 0.76, 4 studies, up to 12 weeks follow-up) From Roddy et al: There were greater improvements in function at 6 months (SPADI adjusted mean change: -7.15 (-13.10, -1.19), but not at 6 weeks or 12 months	participants who received physiotherapist-led exercise and 60 (59%) who received the leaflet. This improved within a couple of hours in 22 (37%) and 21 (36%) respectively	helpful as a supervised exercise programme. Exercise may make pain worse at first, but this does not mean that the shoulder is being damaged. Many people find that it helps to start with a small amount of activity and build up over time. If home-based exercise does not help, a person may get more help from an individual exercise programme. This programme would be supervised by a physiotherapist or other professional. Over 6 months, supervised exercise can help with pain and function more than using an exercise leaflet.
Manual therapies: mobilisation or manipulation						
NICE CKS; BESS patient pathways for frozen shoulder; subacromial pain; Steuri et al. 2017 (meta-analysis); Page et al. 2016 (Cochrane review); Zavala-Gonzalez et al. 2019 (meta-analysis)	Physiotherapy for frozen shoulder can involve education and advice, exercises, and manual therapy. Physiotherapy for subacromial pain may include postural correction and motor control retraining, stretching, strengthening of the rotator cuff and scapular muscles		From Steuri et al. Manual therapy plus exercise was superior to exercise alone for subacromial pain, but only at the shortest follow-up (< 6 weeks, 9 studies, n=363, SMD -0.32, 95% CI -0.62 to -0.01): small effect	From Steuri et al. Manual therapy plus exercise was superior to exercise alone for subacromial pain, but only in the short-term follow-up (< 3 months, 7 studies, n=301, SMD -0.41, 95% CI -0.71 to -0.11): small effect. From Zavala-Gonzales et al. joint mobilisation increased range of motion more than control in	There is insufficient reporting of adverse effects in RCTs of manual therapy	--- 0 + + + People with shoulder pain may get some more help, at least in the short term, from manual therapies used with exercise.

	and manual therapy.			patients with frozen shoulder, for abduction mean difference 20.14 degrees (95% CI: 10.22 to 30.05): moderate effect.		
Corticosteroid injection						
NICE CKS 2017; BESS patient pathways for frozen shoulder, subacromial shoulder pain, atraumatic shoulder instability; Lin et al. 2019 (network meta-analysis); Wang et al. 2017	- Corticosteroid injection can be done in primary care if the expertise is available. - Advise the person to rest the injected joint as much as is practical for 24 hours following the injection. - Advise to seek medical advice if there is severe pain and/or fever after the injection. - Monitor people with diabetes following steroid injection, as hyperglycaemia may occur for 24–48 hours. - Do not give more than 2 injections. - Corticosteroid injections should NOT be used in patients with atraumatic instability, as they can cause unnecessary harm, and are unlikely to be of benefit.	-	From Lin et al: In the pairwise meta-analysis, the effectiveness of corticosteroid injection for pain relief in patients subacromial pain was better than that of the placebo only in the short term (3-6wk; SMD 0.51; 95% CI, 0.01 to 1.01): moderate effect From Wang et al: Pain relief (0-100) was larger for corticosteroid injection compared to control in patients with frozen shoulder only in the short term (up to 8 weeks; mean difference -16.30 (95% CI, -23.65 to -8.94, 4 trials): moderate effect	From Lin et al: In the pairwise meta-analysis, corticosteroid injection was more beneficial for improvement of function in patients with subacromial pain than placebo only in the short term (3-6wk; SMD 0.33; 95% CI, 0.00-0.67): small effect From Wang et al: Improvement in range of motion was larger for corticosteroid injection than control in patients with frozen shoulder (up until 24 weeks). Mean difference for abduction 11.95 degrees (95% CI 6.36 to 17.54): moderate effect	From NICE CKS: Adverse effects may include infection (rare if sterile technique used), tendon rupture, 'post-injection flare of pain', local tissue atrophy, hot flushes, and high blood glucose levels for 24-48 hours in people with diabetes. Women may experience a change in menstrual bleeding (rarely even post-menopausal). From BESS patient pathways for frozen shoulder: There appears to be added benefit with providing physiotherapy promptly following steroid injection compared to home exercise alone and physiotherapy alone	-- - 0 + + + Steroid injections help most people with shoulder pain that is very bad. People will get the most relief in the first 2 months after they get the injection. Getting more injections later may cause complications.
Return to work programmes						
NICE CKS 2017 Wynne-Jones et al 2018 (recent RCT); Van Vilsteren et al. 2015 (Cochrane Review)	- Advise the person to carry out normal activities as much as they are able to. - Consider a short time off work, for example, one week, if there appears to be a direct	We could not identify studies or systematic reviews investigating effects of return to work interventions in people with shoulder pain specially, and have selected a recent	From Van Visteren: In studies of workplace interventions, pain on average improved: standardised mean difference -0.26 (95% CI -0.47 to -0.06): small effect	From Van Visteren: In studies of workplace interventions, function on average improved: standardised mean difference -0.33, 95% CI -0.58 to -0.08): small-moderate effect.	From NICE: No evidence of harm	-- - 0 + + + Workplace interventions may reduce time to return to work in most people, but effects on pain and function are small.

	link between this and the shoulder pain. If relevant, advise 'light duties' at work for a few weeks.	RCT and Cchrane review and meta-analysis of self-management for MSK pain more generally From Van Visteren: Workplace interventions reduced time to lasting RTW among workers with musculoskeletal disorders more than usual care (HR 1.77, 95% CI 1.37 to 2.29): 80% faster.		From Wynne-Jones: Patients referred to a vocational advice service in primary care had fewer days work absence compared with usual care: mean difference 9.3 (sd 21.7) versus 14.4 (sd 27.7) days. They also improved at both 4 and 12 months in terms of return-to-work self-efficacy and performance at work.		Advice and support to return to work may lead to fewer days work absence in most people (on average 5 days)
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Sources	NICE recommendations	Overall response rate	Pain intensity	Function	Adverse events	Interpretation of results (for decision aid)
PART 2: Persistent/recurrent pain shoulder pain – long term care / referral options						
Referral is considered for people with persistent pain and/or stiffness which has not improved with conservative treatment. Referral is considered if symptoms or the impact of symptoms on everyday life is severe.						
Multi-disciplinary treatment						
BESS patient pathway for atraumatic shoulder instability (2018); Marin et al. 2017 (Cochrane review, back pain); Comer et al. 2018 (systematic review, non-inflammatory MSK)	Adopt a multidisciplinary team approach in managing patient's pain and psychological upset, low mood, or anxiety.	A multidisciplinary team approach is considered essential in complex cases of shoulder pain (in particular atraumatic instability), but there is very little evidence for shoulder pain or shoulder instability specifically. Both the BESS patient pathway document and one recent systematic review (Comer et al 2018) emphasize the lack of evidence and identified a strong need for RCTs on this intervention for people with shoulder pain or other non-inflammatory (and non-LBP) MSK conditions.	From Marin et al. 2017 in LBP): Compared to usual care, individuals receiving multidisciplinary biopsychological rehabilitation (MBR) had less pain at 12 months follow-up (4 studies, 336 participants): SMD -0.46, 95% CI -0.70 to -0.21): moderate effect. <i>Effects are similar compared to other active interventions (brief graded activity programmes, or brief interventions including psychosocial education).</i>	From Marin et al. 2017 in LBP): Compared to usual care, individuals receiving multidisciplinary biopsychological rehabilitation (MBR) reported less disability at 12 months follow-up (3 studies, 240 participants): SMD -0.44, 95% CI -0.87 to -0.01: moderate effect Participants also had increased likelihood of return to work (3 studies, 170 participants): OR 3.19, 95% CI 1.46 to 6.98, and fewer sick leave days (two studies with 210 participants; SMD -0.38 95% CI -0.66 to -0.10.	No evidence of harm reported.	--- 0 + + + Some people with persistent shoulder pain, particularly those with psychosocial obstacles to recovery, may find multidisciplinary psychosocial treatment beneficial
To be added (next search): Specialist injections (PRP, hyaluronic acid, ultrasound guided injection)						

Sources	NICE recommendations	Overall response rate	Pain intensity	Function	Adverse events	Interpretation of results (for decision aid)
Suprascapular nerve block (SSNB)						
BESS patient pathways for subacromial shoulder pain and frozen shoulder (2015); Favejee et al. (systematic review 2011); Chang et al (systematic review 2015)	Although evidence is limited series, there are several studies in the literature; therefore, suprascapular nerve modulation is useful in the management of shoulder symptoms, in the short-term in most cases.	From Favejee et al, 2011, reporting on 1 high quality RCT: a reduction of pain in the SSNB group compared with placebo was observed at 1-month follow-up (62% vs 13%, $p=0.03$). From Chang et al. 2015: <i>no data on response rates</i>	From Favejee et al. 2011 reporting on one 1 small RCT ($n=30$) significantly better results were found for pain ($p<0.001$) and ROM ($p<0.05$) in favour of SSNB at 12 weeks. From Chang et al. 2015 (meta-analysis): SMD for pain relief of SSNB versus placebo was 0.60 (3 RCTs, 95% CI, 0.24 1.91 to 0.95) after 4 weeks, and 0.70 (2 RCTs 95% CI, 0.40 to 1.00) after 12 weeks for pain [moderate short-term effect on pain].	From Chang et al. 2015 (meta-analysis): SMD for SSNB versus placebo was 1.55 (3 RCTs, 95% CI, 0.03 to 3.08) after 4 weeks, and 1.39 (2 RCTs 95% CI, -0.21 to 2.99 – <i>not significant</i> after 12 weeks for improvement in function [large short-term effect, but not consistent across RCTs, and low precision)	From Chang et al. 2015: Among the 11 included trials, adverse events were clearly documented in 7 trials, 2 of which had no events for both the SSNB groups and reference treatments. Overall risk of adverse events of SSNB compared to other treatments: Odds ratio: -0.01 (95% CI, -1.22 to 1.20) – very low and not statistically sign.	– – – 0 + + + Some people with shoulder pain get help for up to 3 months with injections or other treatments that block the nerves to the shoulder. These are called nerve blocks. There is a small risk of complications with nerve blocks.
Rotator cuff repair						
BESS patient pathway for subacromial shoulder pain (2015); Karjalainen et al. (Cochrane review 2019); Carr et al. 2015	Surgery is recommended in cases of chronic full-thickness rotator cuff tear with persistent shoulder pain and weakness if conservative treatment has failed (2017).	From Karjalainen et al. 2019: Participant-rated global success rate (satisfaction with treatment) was 48/55 (87%) for non-operative treatment and 52/55 (94%) for surgery corresponding to risk ratio (RR) of 1.08, 95% CI 0.96 to 1.22 (not significant, small effect) From UKUFF (Carr et al. 2015, not included in review): In patients aged > 50 years with a degenerative rotator cuff tear there is no difference	From Karjalainen et al. 2019: At one year (3 trials, 258 participants) surgery probably provides little or no improvement in pain: mean pain improved by 9% (95% CI: 4-13%) more in those receiving surgery, or 0.9 points on a 0-10 point scale. People receiving non-operative treatment rated their pain as 1.6 points, those receiving surgery as 0.7 points: small effect.	From Karjalainen et al. 2019: At one year (3 trials, 269 participants) mean function (zero to 100, higher score indicating better outcome) was 6 points (95% CI: 2.43 to 9.54) better with surgery: . People who had non-operative treatment scored 72 points, those who had surgery scored 78 points on average: small effect.	From Karjalainen et al. 2019: We were unable to estimate the risk of adverse events and serious adverse events as only one event was reported across 9 included trials. Trials did not assess if surgery could prevent long-term arthritic changes.	– – ? 0 + + + Based on available evidence it is uncertain if rotator cuff repair surgery provides any meaningful benefits for people with painful rotator cuff tears. Surgery may only recommended for those with persistent pain, weakness, and disability and for whom other treatments (e.g. an

		in clinical effectiveness or cost-effectiveness between open repair and arthroscopic repair at 2 years for shoulder pain related disability and all other secondary outcomes. Response rate 77% at 8 months, 85% at 24 months.				exercise programme has not helped).
Sources	NICE recommendations	Overall response rate	Pain intensity	Function	Adverse events	Interpretation of results (for decision aid)
Decompression surgery for subacromial shoulder pain						
NICE CKS 2017; BMJ Rapid Recommendation 2019; Karjalainen et al. (Cochrane review 2019); Paavola et al. 2018.	From NICE CKS 2017: Evidence for the efficacy of surgical treatments is limited. Therefore the BESS/BOA guideline recommends shared decision-making in the person's management, and that the clinician considers the severity of symptoms and the impact that these are having on the person. Following publication of two placebo-controlled trials in 2018: Decompression surgery should not be offered to patients with subacromial shoulder pain. There is substantial uncertainty in what alternative treatment is best (BMJ Rapid Recommendation 2019).	From Karjalainen et al. 2019 (2 trials, n=290): Treatment success (much better or no problems at all): 5% more people (95% CI -5 to 16%) rated their treatment a success: 66% (97/148) for sham surgery vs 71% (101/142) for surgery, with corresponding RR 1.08 (95% CI 0.93 to 1.27 (not significant, small negative effect).	From Karjalainen et al. 2019 (2 trials, n=284): At one year, pain improved by 3% (95% CI -3 to 8%), or 0.26 points on a zero to 10 scale (higher is more pain); mean score 2.9 points for sham surgery vs 2.6 points for decompression surgery. From Paavola et al. 2018: Compared with exercise, small differences in pain were found in favour of surgery at 2 years: -7.5 (0-100 scale), 95% CI -14.0 to -1.0: very small effect (not considered clinically important by the authors and high risk of bias).	From Karjalainen et al. 2019 (2 trials, n=274 participants): At one year, function improved by 3% (95% CI -1 to 7%) or 3 points on a zero to 100 scale; mean score 69 points for sham surgery vs 72 points for decompression surgery.	From Karjalainen et al. 2019: Serious adverse events including deep infection, pulmonary embolism, nerve injury, and death can occur following shoulder surgery. In observational studies the rate of serious adverse events was 0.5 - 0.6%.	— — — 0 + + + Surgery for subacromial shoulder pain is unlikely to offer important improvements in pain, function, or quality of life compared with placebo surgery or other options. Evidence regarding side effects is limited, but is a small risk of complications after shoulder surgery

Sources	NICE recommendations	Overall response rate	Pain intensity	Function	Adverse events	Interpretation of results (for decision aid)
Capsular release procedures for frozen shoulder: hydrodilatation/distension, manipulation under anaesthesia, capsular release surgery						
NICE CKS 2017; BESS patient pathways for frozen shoulder 2015; Maund et al. 2012, systematic review); Mun and Baeck 2016 (RCT); Longo et al. 2018 (systematic review)	From BESS patient pathways for frozen shoulder (2015): Evidence to underpin the use capsular release procedures for frozen shoulder is limited. The NIHR-HTA has commissioned the UK Frozen Shoulder Trial (UKFROST), which is one of the first multicentre randomized trials comparing (i) structured physiotherapy (education, reassurance, advice, mobilisations and exercise) with (ii) manipulation under anaesthesia and (iii) arthroscopic capsular release surgery. Data collection has been completed, but results have not yet been published.	From Longo et al. 2018: The rate of failure was higher after <i>arthroscopic capsular release</i> (3.6%) than after conservative treatment (0.8%), odds ratio 5.02; 95% CI 2.97 to 8.48.	From Mun & Baeck 2016 (n=120): <i>Hydrodilatation</i> combined with joint manipulation under an interscalene block provided earlier relief of pain and stiffness (at 12 weeks) compared with single intra-articular corticosteroid injection in patients with frozen shoulder. Outcomes were similar at 12 months follow-up.	From Maund et al. 2012: Two studies (high risk of bias) compared <i>distension/hydrodilatation</i> with steroid injection, and found no difference in pain, function or disability, but a short-term effect on range of movement A single trial of adequate quality (n=125) reported no significant difference between <i>manipulation under anaesthesia</i> (and home exercise) and home exercise alone in pain, function, range of motion or working ability at 6 weeks, 3, 6 and 12 months.	From Maund et al. 2012: Some patients <i>consider distension/hydrodilatation</i> injections to be very painful. From Longo et al. 2018: RCTs of <i>capsular release surgery</i> reported complications in less than 1% of participants (included septic arthritis in 0.4%). High proportion of ruptures or tears (not requiring treatment) have been reported for <i>manipulation and distension</i> (but are probably expected consequence of the treatment).	— — — 0 + + + There is little information about the effectiveness of procedure to release the joint capsule in people with frozen shoulder. Available studies indicate these procedures are unlikely to offer important improvements in pain, function, or quality of life compared with an injection or other non-invasive treatments. Evidence regarding side effects is limited, but is a small risk of complications after these procedures.

Sources	NICE recommendations	Overall response rate	Pain intensity	Function	Adverse events	Interpretation of results (for decision aid)
Joint replacement surgery for glenohumeral osteoarthritis						
NICE CKS 2017; BESS patient pathway for glenohumeral osteoarthritis 2016; Roberson et al. 2017 (systematic review); Neyton et al. 2019; Clark et al. 2019	From NICE CKS 2017: If symptoms do not improve with conservative treatments, then surgery may be considered. Options include arthroscopic interventions such as debridement, biological glenoid resurfacing with hemiarthroplasty, hemiarthroplasty and total shoulder replacement. <i>Could not find comparative studies, comparing joint replacement surgery with conservative treatment.</i>	From Roberson et al. 2017 (6 observational studies, n= ?): In people operated below 65 years of age, overall implant survivorship was reported at 60% to 80% at 10- to 20-year follow-up. From Neyton et al. 2019 (retrospective cohort, n=202): In young people (mean age 55.3 years at surgery), revision following total shoulder arthroplasty was 95% free of revision at 5 years, 83% at 10 years, and 60% at 20-year follow-up. Of those with hemiarthroplasty, 84% free from revision at 5 years and 79% at the final follow-up.	From Neyton et al. 2019 (retrospective cohort, n=202) TSA resulted in a significantly better range of motion, pain, subjective shoulder value, and Constant score compared with HA.	From Roberson et al. 2017 (6 observational studies, n= ?): Improvements in pain, range of motion, and patient-reported outcomes were found across all studies that reported these measures. Outcome measures including the Constant, American Shoulder and Elbow Surgeons, and Simple Shoulder Test scores were reported, with generally satisfactory but not excellent results between 3 and 10 years from surgery.	From Clark et al. 2019 (retrospective cohort, n=242): In people over 80 years of age, one patient (0.4%) died within the first 90 days. Medical complications occurred in six patients (3%) and surgical complications occurred in 21/179 patients (12%). Survivorship free from revision was 98.9% at two years and 98.3% at five years.	-- - 0 + + + People with persistent pain and disability from osteoarthritis of the shoulder, who no longer respond to other non-surgical treatments, may benefit from shoulder replacement surgery. There is a small risk of complications (<5%) following surgery. People who are older or have more health conditions are more likely to have complications.
Capsular shift procedure for shoulder instability						
BESS/BOA patient care pathways for atraumatic shoulder instability 2018; Longo et al. 2015 (systematic review)	Surgery should be adopted with extreme caution for atraumatic shoulder instability and only be considered if: - No concerning features warranting referral to	<i>Could not find large cohorts or comparative studies</i> From the BESS patient pathway 2018: It is difficult to compare	No RCTS found	No RCTs found	From Longo et al. 2015 (24 small cohorts and case series, n= 861 shoulders in 790 patients, median 24.3 years), median follow-up period of 4.2 years (9 months to	Refrained from weighing of effect in the light of limited evidence

	tertiary services are present - Six months of structured physiotherapy with good compliance has been undertaken. - There is a clear target for surgical intervention, i.e. labrum repair or capsular shift. - Improvement has been made in an athlete but their residual symptoms prevent their return to activities.	surgical procedures given the diverse nature of the pathology in this patient group and given the lack of standardisation to reporting outcomes. For this particularly difficult shoulder problem, surgical procedures should be individualised and address each patient's pathology rather than relying on one procedure for all.			16 years). Re-dislocation occurred in 17/226 (7.5%) shoulders with open capsular shift management, 21/268 (7.8%) with arthroscopic plication management, in 12/49 (24.5%) undergoing arthroscopic thermal shrinkage, and 11/55 (22%) shoulders undergoing arthroscopic laser-assisted capsulorrhaphy. Arthroscopic capsular plication and open capsular shift are the best surgical procedures for treatment of MDI after failure of rehabilitative management.	Operative interventions should be approached with caution in people with atraumatic shoulder instability, physiotherapy will always be the primary treatment option. If surgery is considered, careful discussion is needed regarding the optimal type of surgery.
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