

The health economic analysis of surgery versus rehabilitation in non-traumatic musculoskeletal shoulder disorders: a systematic review of trial-based studies

I. Introduction

Non-traumatic musculoskeletal shoulder disorders encompass a wide range of pathologies, including rotator cuff-related shoulder pain¹, calcific rotator cuff tendinopathy, frozen shoulder, glenohumeral osteoarthritis, glenohumeral instability, acromioclavicular joint disease, and conditions involving the glenoid labrum. The prevalence of these disorders appears to be continuing to increase² and their cumulative incidence ranges between 6.7 and 17.3 per 1,000 person-years in adults aged 40 years and over³. Collectively, non-traumatic musculoskeletal shoulder disorders have a detrimental impact on pain, function, and quality of life⁴.

Although these diagnoses represent a broad spectrum of pathologies, they share a commonality in potentially benefitting from both surgical and rehabilitation management⁵⁻⁷. Furthermore, in cases where efficacy comparisons are available, surgical management has not demonstrated superiority over non-surgical management (rehabilitation/exercise therapy, pharmacological interventions) for individuals seeking care for non-traumatic rotator cuff disorders^{8,9}, subacromial pain¹⁰, non-traumatic shoulder instability¹¹ and frozen shoulder¹². This suggests that, for these conditions, clinical outcomes are largely comparable.

The absence of clear clinical superiority of surgical management over rehabilitation for many non-traumatic musculoskeletal shoulder disorders

raises the question of the ideal healthcare pathway for managing these conditions.

When building healthcare pathways, analysing healthcare resource consumption (i.e., the cost-effectiveness) of each pathway is essential, given the scarcity of resources, including personnel, time, facilities, and equipment¹³. The long-term aim is to assist patients, clinicians, policymakers, insurers, and funders in prioritising resources to support healthcare sustainability.

The logical assumption is that a surgical pathway is systematically more expensive than a conservative one due to the need for inpatient admissions, surgical personnel, preoperative imaging, perioperative anaesthesia, pain medication, and the potential use of medical devices (screws, anchors, wires, surgical implants, etc.). However, this only holds when the rehabilitation episode is singular or short in duration. This is often not the case for a rehabilitation program for these conditions. It is rare that a single appointment resolves the pain, problems and issues. The available literature supports this and indicates that while long-term recovery outcomes are similar, conservative management leads to a delayed full recovery (said delay is clinically and statistically insignificant^{12,14}). This disparity in potential appointments and resource use during the recovery phase raises the question of the cost of differential healthcare pathways and their respective consumption. Hence, there is a need to review the health economic perspective comparing surgical versus rehabilitation treatment in this arena.

A systematic review has previously pooled economic evaluations regarding the surgical management of traumatic and non-traumatic rotator cuff disorders¹⁵. However, to date, no review has compared the costs associated with surgical versus rehabilitative management of non-traumatic musculoskeletal shoulder disorders.

The primary aim of this systematic review was therefore to evaluate all health economic studies comparing surgical and rehabilitative management of non-traumatic musculoskeletal shoulder disorders and to draw conclusions where possible.

II. Methods

This systematic review was performed following the Cochrane Handbook for systematic reviews ¹⁶ as well as health economic specific guidelines ¹⁷⁻²¹. The reporting followed the PRISMA guidelines ²². The review protocol was registered on Prospero on May 19th, 2021 (registration number: CRD42021255078)

(https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42021255078).

1. Eligibility criteria

The inclusion and exclusion criteria are summarized in Table 1. The targeted population were all adults over 18, diagnosed with non-traumatic musculoskeletal shoulder disorders. Given the potential variability in the definition of a traumatic aetiology, we chose to exclude all studies that mentioned a traumatic aetiology, as well as those that did not specify the injury mechanism. When classification codes (International Classification of Diseases, Orthopaedic Association) referred to traumatic or uncertain aetiologies, the studies were excluded. Studies involving populations where the initial aetiology may have been traumatic, but the acute presentation was described as non-traumatic, were included.

The intervention consisted of all existing surgical interventions. The comparator encompassed all rehabilitative interventions such as exercise, either isolated or combined with pharmacological intervention such as nonsteroidal anti-inflammatory drugs, corticosteroid injection therapy. All economic or health-economic outcomes were sought and all types of trial-

based health-economic studies were included. Model-based studies were excluded in accordance with the GRADE guidelines and Anderson et al.^{23,24} The country of origin for each study was noted, as variations in healthcare systems and resource valuation could affect data comparability.

INSERT Table 1

Table 1: Selection criteria

Full text articles, available either in English or in French languages were considered for inclusion. We excluded the articles for which we could not obtain full text versions, after contacting the corresponding authors twice.

2. Search strategy

The systematic electronic search was conducted in October 2021 and an update was conducted in March 2024. Studies published between 1 January 2000 and 9 February 2024 were included. The year 2000 was used as a cut-off due to changes in practice following the rise of arthroscopy, as well as inflation in currency values, which renders older comparisons less relevant. A systematic review of all economic evaluations of shoulder pathologies published between 1980 and 2010 found no articles that matched our inclusion criteria before the year 2000, thus supporting our decision²⁵. We searched on the following databases: PubMed, Embase, NHS Economic Evaluation Database, Cost-Effectiveness Analysis registry, Physiotherapy Evidence Database, Cochrane Library, Google Scholar. The research equation encompassed keywords referring to non-traumatic

musculoskeletal shoulder disorders, treatments (conservative / rehabilitation or surgical), and health economics. We used Boolean operators to encompass all fields. Full research equations for each database are presented in Supplementary material 1.

3. Selection process

Two reviewers (TL and AJ) independently assessed the databases. Discrepancies were discussed between both reviewers supported by a third party (NP) if necessary. Screening occurred through separate stages (title, abstract, full text) each separated by a cross-checking phase. Articles that didn't meet the eligibility criteria were excluded. Reviewers used the Zotero reference manager for the selection.

4. Data extraction

Two reviewers (TL and AJ) collected all study data independently using the Joanna Briggs Institute extraction form¹⁸, to which they added items required by the PRISMA guidelines (title of the study and number of patients recruited). Reviewers then agreed on the pooled data. The following variables were extracted: title, author(s), publication date, study design, Population/Intervention/Comparator/Outcome, methods, context, results, author's conclusions, and reviewer's reflection. All the outcomes (primary and secondary) were considered. As for the methods, any missing information was described as "not stated". The nature of the sensitivity analysis was detailed (number of replications for the bootstrap,

different scenarios). In the results column, all the health economic results were reported. When relevant, health effects were also collected. For reviewer's reflection, any remarks or confusing information regarding the studies were reported.

5. Risk of bias assessment

The Quality of Health Economic Studies instrument was used to assess the quality of the studies ²⁶⁻²⁸. It consists of 16 weighted dichotomous items. The questionnaire has a total score of 100, where 100 represents a perfect score. Two reviewers (AJ and TL) performed the assessment independently. After evaluating all studies, any discrepancies were resolved through discussion, and a final quality score was recorded once consensus was achieved.

6. Effect measures

The primary health economic outcome was the incremental cost-effectiveness ratio. This ratio represents the cost of one intervention compared with another to gain one health unit. The calculation consists of the division of the difference of costs by the difference of health effects between the two compared interventions. We retrieved incremental cost-effectiveness ratios comparing rehabilitative and surgical management to answer our primary objective, as well as incremental cost-effectiveness ratios comparing surgeries or rehabilitative interventions between

themselves. Other economic or health economic outcomes (cost-effectiveness ratios, mean costs etc.) were also analysed.

7. Synthesis methods

Results were summarized in a synthesis table (see Table 2). Studies were categorised by population: rotator cuff tears, rotator cuff related shoulder pain (also known as subacromial pain syndrome) and frozen shoulder.

III. Results

1. Study selection

We identified 4144 potential articles from the databases. The sequential steps for the selection process are summarised in the flow diagram (Figure 1). An update to the original search was conducted in March 2024 to ensure we had not missed new relevant studies, leaving us a total of 4 articles matching our inclusion criteria. The characteristics of the included studies are presented in the synthesis table (see Table 2).

INSERT Figure 1

Figure 1 Flowchart of the selection process

The perspectives used for the cost analyses (healthcare system, patient, societal) were heterogeneous and not elucidated in the low-quality studies. The time horizon for the measure of costs allowed for the measurement of all the consequences (given the condition studied) in the high-quality studies but too short in the low-quality studies.

The outcome measures used across the studies were heterogeneous (EuroQol-5-dimensions-instrument, visual analog pain rating scale, Subjective Shoulder Rating System and Constant-Murley Score).

2. Risk of bias assessment

The quality of the studies is heterogeneous, ranging from 20 to 100/100. The detailed risk of bias assessment, and total Quality of Health Economic Studies score, for each study can be found in Appendix 1.

3. Results of syntheses

This section presents the results regarding our primary comparative objective, together with their confidence intervals and standard deviations (when available). The detailed data extraction from those studies can be found in Table 2.

The results extracted from the four selected studies (883 patients) are the following:

Ketola et. al. compared subacromial decompression followed by exercise to a similar home-based program for rotator-cuff-related-shoulder-pain, with a 2-year follow-up ²⁹. The physiotherapist-led exercise program aimed to restore pain-free shoulder mobility and stability. Patients performed nine exercises using stretch bands and light weights, focusing on high-repetition, low-resistance movements. Training was done at least four times weekly, with resistance adjusted as strength improved, and progress monitored over seven visits before transitioning to independent maintenance. Arthroscopic decompressions were performed by an experienced orthopaedic surgeon under regional anaesthesia. Post-operative pain management included analgesics and anti-inflammatories,

with patients using a sling for one week and progressing to an exercise programme similar to the non-surgical group. Follow-ups were conducted at 3, 6, 12, and 24 months by a blinded physiotherapist, with the primary outcome being self-reported pain (VAS scale, MCID=2 points) at 24 months. NSAIDs and corticosteroid injections were allowed in both groups as needed. No significant differences were found between groups in terms of effectiveness, but significantly higher costs in the subacromial decompression group (incremental cost-effectiveness ratio=5431€/minimal clinically important difference). In one-way sensitivity analyses, the incremental cost-effectiveness ratios ranged from €2,740 to €8,965 per minimal clinically important difference unit, with extremes caused by a $\pm 50\%$ variation in acromioplasty costs, while other cost variables had minimal impact. This study was assessed to be of good methodological quality (Quality of Health Economic Studies= 80)

One study compared extracorporeal shock wave therapy associated with physiotherapy to subacromial decompression followed by physiotherapy for rotator-cuff-related-shoulder-pain³⁰. Extracorporeal shock wave therapy for calcifying tendinitis involved localization via axial x-ray, with two treatments of 2,000 impulses at an energy flow density of 0.35 mJ/mm², administered one week apart. For supraspinatus tendinitis, localization was guided by ultrasound, using three weekly treatments of 2,000 impulses at energy flow densities of 0.08–0.14 mJ/mm², administered without local anaesthetic. A significant difference between groups favoured the non-operative management (extracorporeal shock wave

therapy 3180€ vs subacromial decompression 22735€ $p < 0.01$). The average work discharge period was 66.9 days for the subacromial decompression group, and 7.7 days in the extracorporeal shock wave therapy+physiotherapy group. A one-way sensitivity analysis was conducted by calculating the impact on total costs by valuing €143 or €287 per workday lost. The risk of bias of this study was deemed to be high (Quality of Health Economic Studies=20).

Kukkonen et. al. randomised patient to either physiotherapy (Group 1), subacromial decompression and physiotherapy (Group 2) or physiotherapy plus subacromial decompression and rotator cuff repair (Group 3)³¹. Group 1 followed a home-based physiotherapy program with 10 supervised sessions over 6 months.

Group 2 underwent arthroscopic acromioplasty, subacromial debridement, and, if needed, biceps tenotomy or acromioclavicular resection, followed by the same physiotherapy as Group 1. Group 3 received rotator cuff repair with anchors in addition to the procedures in Group 2, followed by sling immobilization for 3 weeks and the same physiotherapy as Group 1. No difference in effectiveness (Constant-Murley Score, pain visual analog scale and patient satisfaction) was found at 2 years, but mean direct societal cost (i.e., the full cost including external cost imposed on society) was found to be lowest in the physiotherapy group (Group 1=€2348, Group 2=€4691, Group 3 =€5646; $p < 0.01$). The Quality of Health Economic Studies score was 43, as the economic evaluation was limited to a cost comparison and did not calculate an incremental cost-effectiveness

ratio or include a sensitivity analysis. It is therefore a moderate quality cost-effectiveness study.

Finally, Corbacho et al.³² compared manipulation under anaesthesia to arthroscopic capsular release and early structured physiotherapy in the management of frozen shoulder. In all groups, patients followed a standardized physiotherapy program (up to 12 sessions), with a home exercise component (detailed here³³). An intra-articular steroid injection was offered early in the treatment pathway, administered with or without imaging guidance. Group 1 received only physiotherapy. Group 2 underwent manipulation under anaesthesia (MUA) with a supplementary steroid injection, while Group 3 had arthroscopic capsular release (ACR) combined with MUA. Both surgical groups received the same physiotherapy as Group 1 post-procedure. At one-year post-randomisation, they found no differences in adjusted utility (mobilisation under anaesthesia=0.6765 Quality-Adjusted-Life-Year) > (early structured physiotherapy=0.6492 Quality-Adjusted-Life-Year) > (arthroscopic capsular release=0.6475 Quality-Adjusted-Life-Year). Manipulation under anaesthesia was £276 (95% CI: £66 to £487) more expensive than early structured physiotherapy and had an 86% probability (at a 20k£-per-Quality-Adjusted-Life-Year-gained threshold) of being cost-effective compared with early structured physiotherapy (incremental cost-effectiveness ratio=£6984/Quality-Adjusted-Life-Year). Arthroscopic capsular release had a 0% probability of being cost-effective compared when compared to manipulation under anaesthesia at a 20k£-per-Quality-

Adjusted-Life-Year-gained threshold. MUA consistently remained the most likely intervention to be cost-effective across all probabilistic and deterministic sensitivity analyses. This study was of high quality (Quality of Health Economic Studies=100).

Insert Table 2

Table 2: Detailed data extraction from the four comparative studies

IV. Discussion

All four studies further support the absence of statistically significant clinical differences between surgical and rehabilitative management for non-traumatic shoulder disorders. Subacromial decompression and early structured physiotherapy were not cost-effective when compared to physiotherapy and mobilisation under anaesthesia, respectively. Total costs were lower for the rehabilitation group across all four studies.

Cost drivers included hospital stays (one-third of the total cost in Haake's study) and work absenteeism. From a societal perspective, most of the total costs were due to indirect costs, with several studies identifying these as the primary cost driver (Arias-Buria: 77%³⁴, Bergman: 69-78%³⁵, De Bruijn³⁶). A minority of patients accounted for most of these costs, primarily due to lost work productivity^{36,37}. When indirect costs were excluded in sensitivity analyses, the incremental cost-effectiveness ratio significantly decreased. Hence, priority should be given to interventions that reduce productivity loss and facilitate patients' return to work as soon as possible.

Only one study followed methodological standards for economic evaluations perfectly, leading to a low risk of bias (Corbacho's study on frozen shoulder), and one adhered to these standards for the most part (Ketola's study on rotator cuff-related shoulder pain).

Corbacho et al. found that mobilisation under anaesthesia was as effective as early structured physiotherapy (with equivalent Oxford Shoulder Scores and Quality-Adjusted-Life-Years at 12 months) but more expensive in managing frozen shoulder³² (the arthroscopic capsular release group had a

null probability of being cost effective due to its high costs). The slight- but statistically insignificant - difference in adjusted Quality-Adjusted-Life-Years (0.0396 (-0.0008 to 0.0800)) allowed the incremental cost-effectiveness ratio to favour manipulation under anaesthesia. Furthermore, all groups received corticosteroid injection and some data suggests the efficacy of corticosteroid injection in the management of frozen shoulder³⁸. One interpretation is that corticosteroid injection might have been the only effective treatment in all three groups, but as there was no natural history group, this conclusion cannot be reached with confidence. Regarding the early structured physiotherapy group, the trial on which the economic analysis was based, demonstrated that that the patients allocated to the surgical interventions (manipulation under anaesthesia and arthroscopic capsular release) had longer waiting times, before beginning treatment, than the early structured physiotherapy patients¹². Given the equivalence in the effectiveness of both treatment options, the marginal difference in total cost (£276.51, 95%CI 65.67 to 487.35)³², the complications -although rare- related to the surgical options¹², and the qualitative patient-reported experiences of the pain-predominant (early) phases of frozen shoulder³⁹⁻⁴², one might consider early physiotherapy to be an essential part of the management of frozen shoulder.

Ketola et al. used the visual analog scale minimal clinically important difference gain as a measure of health effect, whereas the recommended measure is the quality adjusted life year.

In contrast, the Kukkonen and Haake studies had methodological flaws (unclear perspective, no discounting for costs evaluated over 12 months, no sensitivity analysis). The large differences in reported costs for similar interventions (subacromial decompression at ~€22k for Haake and ~€5k for Kukkonen) may be explained by these weaknesses. Kukkonen et. al. found that the mean direct cost of rotator cuff treatment was €5104 for physiotherapy and €9185 for physiotherapy associated with subacromial decompression and rotator cuff repair³¹. Given indisputable evidence of the lack of effectiveness of subacromial decompression¹⁰, and the absence of evidence regarding the clinical superiority of a surgical management for non-traumatic rotator cuff tears – whether partial or full thickness-^{8,9}, we think that a conservative management should systematically be considered as the first line of treatment.

Our study has several strengths. To our knowledge, this review is the first to examine the cost-effectiveness of physiotherapy in the management of non-traumatic shoulder disorders. Our objective is both original and clinically significant, and we believe clinicians should be made aware of the economic consequences of their decisions regarding referrals for surgical management. We made our research equations as sensitive as possible, resulting in the inclusion of over 4100 articles in the selection process, which provided a comprehensive understanding of the available literature.

However, some limitations must be acknowledged.

The limited available literature made us reconsider our methods; conducting a scoping review prior to this systematic review might have been more appropriate. We subsequently reviewed health economic studies related to surgical and rehabilitative interventions, even if they did not directly compare the two, identifying 39 additional studies. The findings from this secondary search reinforced those from our primary search: indirect costs (mainly related to sick leave) are the main drivers of expenses³⁴⁻³⁶. Additionally, Ketola's findings were confirmed by Rombach et al., who found subacromial decompression surgery to have a low probability of cost-effectiveness compared to no treatment or placebo arthroscopy (highest confidence, Quality of Health Economic Studies = 100)⁴³. The CSAW trial¹⁰ -which informed Rombach's health economic evaluation- further showed no clinical effectiveness (as measured by the Oxford Shoulder Score) of subacromial decompression compared to placebo or no treatment. Thus, subacromial decompression is not a cost-effective intervention for managing rotator cuff-related pain syndrome. The rest of the data from the secondary search is of low value for healthcare policy decision-making, and details are available in supplementary materials 2 and 3.

Regarding our selection criteria:

We targeted studies that included patients aged 18 years and older. However, non-traumatic shoulder instability is also observed in adolescent populations (from 12 years old), and our selection criteria may have led to the exclusion of relevant articles. Given the scarcity of literature on the treatment of non-traumatic instability—particularly in adolescent

populations—we consider it highly unlikely that any health economic evaluations comparing rehabilitative and surgical treatments were missed. Additionally, our criteria for defining a traumatic aetiology could be considered too strict and may have resulted in the exclusion of some articles. However, we chose to be more conservative in order to ensure the robustness of our conclusions. We considered it quite improbable that patients with a prior history of traumatic injury (e.g., shoulder instability) and an acute non-traumatic presentation (e.g., subluxation or recurrence) would be classified as non-traumatic in a clinical trial and its associated health economic evaluation. We also chose to exclude modelling studies because the GRADE guidelines recommend their exclusion from clinical practice guidelines to avoid double counting, which could otherwise give undue weight to the results derived from data from both trial and model-based studies²³. Anderson²⁴ also recommends not to join both —trial-based and model-based— designs in a same review in order to retain comparability among reviewed studies. A systematic review of model-based studies answering to the same objective as our review could therefore be conducted.

To assess the risk of bias in the studies, we used the Quality of Health Economic Studies score, a validated tool for evaluating the quality of economic articles^{26,27}. We did not select articles based on their quality scores (e.g. 50/100 for good quality and 75/100 for high quality), as some authors might suggest⁴⁴, due to the exploratory nature this review. A 50/100 cut-off would have led to the exclusion of two out of the four studies answering our objective ^{29,30}.

Out of the 154 full-text articles screened, 11 remained inaccessible to us—despite having institutional access—after two attempts to contact each corresponding author. Our lack of funding to purchase these papers underscores the barriers imposed by the current publication system on the dissemination of scientific knowledge.

High economic quality does not necessarily imply high clinical quality. Many trials on which health economic evaluations are based have methodological flaws that could challenge the relevance of their economic conclusions. Developing a "composite economic and clinical quality assessment tool" that scores both economic and clinical quality would be valuable.

Our findings, supported by existing evidence, indicate that subacromial decompression is economically inefficient compared to exercise therapy for rotator cuff-related shoulder pain. Although it was not as economically efficient, Physiotherapy could be a socially beneficial alternative to manipulation under anaesthesia in managing frozen shoulder due to delays in accessing surgical management during the pain-predominant phase.

Our findings, in addition to the available body of evidence, support the conclusion that subacromial decompression surgery is economically inefficient when compared with exercise therapy for Rotator-Cuff-Related-Shoulder-Pain. Physiotherapy could be a socially beneficial alternative to manipulation under anaesthesia in the early management of frozen

shoulder, even though it was not as economically efficient, due to the delays in accessing surgical management in the pain-predominant phase. For other non-traumatic shoulder conditions, it remains difficult to confidently determine the most economically efficient care pathway (surgical or rehabilitative). More high-quality health economic studies that adhere to established international guidelines are needed, particularly given the clear standards already in place¹³. Policymakers should therefore invest in conducting and replicating high-quality trials, including those with natural history comparators, along with their associated economic evaluations. This investment is crucial for defining optimal treatment pathways for non-traumatic shoulder disorders, particularly regarding the economic efficiency of rehabilitative management for rotator cuff-related shoulder pain and non-traumatic shoulder instability, where there is uncertainty about the superiority of surgery over rehabilitation^{9,11}. Finally, reducing productivity loss should be a major focus in reducing the social and financial burden of non-traumatic shoulder pathologies.

Clinical messages

- This is the first economic review comparing surgery to conservative treatment for shoulder issues
- Surgery might not be cost-effective for rotator-cuff-related shoulder pain
- Manipulation under anaesthesia showed equivalent utility when compared to physiotherapy and arthroscopic capsular release
- Physiotherapy could however be a good investment when treating frozen shoulder

Competing interests, and source of funding

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Contributors (CRediT author statement):

TL: Conceptualization, Methodology, Investigation, Writing - Original Draft, Writing - Review & Editing, Visualization, Project administration. **AJ:** Conceptualization, Methodology, Investigation, Writing - Original Draft, Writing - Review & Editing. **JL:** Conceptualization, Methodology, Writing - Review & Editing. **SDT:** Writing - Review & Editing. **DB:** Writing - Review & Editing, Supervision. **NP:** Conceptualization, Methodology, Writing - Review & Editing, Supervision

The review protocol was registered on Prospero on May 19th, 2021 (registration number: CRD42021255078).

Underlying research materials can be obtained by contacting the corresponding author.

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Table 1: selection criteria

	Inclusion criteria	Exclusion criteria
Design	Trial-based (randomised controlled trial, prospective, cross-sectional, retrospective...) economic evaluation (cost-utility analysis, cost-effectiveness analysis, cost-minimisation analysis, cost-benefit analysis, cost-consequence, cost-of-illness, burden-of-illness)	Systematic review Meta-analysis Literature review Model-based evaluation Study protocol Editorial commentary
Population	Non-traumatic musculoskeletal shoulder disorders: subacromial pain, rotator cuff tendinopathy, rotator cuff tear, osteoarthritis, frozen shoulder, instability, superior labrum from anterior to posterior tear	Fracture History of trauma Neurologic, vascular, inflammatory causes Cadaveric study
Interventions / comparators	Surgery: acromioplasty, subacromial decompression, repair, tenodesis, tenotomy, manipulation under anaesthesia, capsular release, arthroplasty... Conservative treatment: physiotherapy, exercise therapy, manual therapy, rehabilitation combined with pharmacological treatment (corticosteroid injection, nonsteroidal anti-inflammatory drugs)	Exclusive pharmacological intervention Diagnostic intervention Prevention intervention Perioperative intervention (anaesthesia, analgesia, imaging, complication, readmission...) Postoperative rehabilitation
Outcomes	incremental cost-effectiveness ratio, cost-effectiveness ratio Costs	Absence of economic data

Table 2: Detailed data extraction from the four comparative studies

Title	Author, Date, Design type (Cost-Minimization Analysis, Cost-Effectiveness Analysis, Cost-Benefit Analysis, Cost-Utility Analysis)	Population Intervention Comparator Outcomes Risk of bias (QHEs score)	Methods: - Perspective (Pe), - Measure of costs (MOC) - Health effects (HE) - Time horizon (TH) - Discounting (Di) - Sensitivity testing (Se Te) - Data sources (Da So)	Context (geographical location, health care and broader service delivery setting including human resource availability and capacity, technology and culture)	Results	Author conclusion
Cost-effectiveness of surgical treatments compared with early structured physiotherapy in secondary care for adults with primary frozen shoulder: an economic evaluation of the UK FROST trial	Corbacho, 2021 Cost-Utility Analysis Trial based (RCT)	P: frozen shoulder, adults, N=503 I: manipulation under anaesthesia C: arthroscopic capsular release C': steroid injection and structured physiotherapy O: (OSS at one year from the original RCT), EQ5D, costs QHEs = 100	Pe = NHS perspective MOC = Gross costing (multiplying health care resource use by the associated unit costs); Total costs included the initial intervention, hospital stays, outpatient appointments (including physiotherapy), and visits to primary and community health professionals over one year. Surgical costs were based on operation times, staff, consumables, and length of stay, reported in GBP. HE = EQ-5D-5L TH = one year Di = NA Se Te = bootstrapping 10,000 replicates of incremental costs and benefits, two-way sensitivity analysis for MUA cost or QALY Da So = collected prospectively by patients' questionnaires and hospital forms; Personal Social Services Research Unit; British National Formulary; national tariffs; Office National Statistics;	UK 35 hospital sites Between April 2015 and December 2017 Thresholds applied by NICE of £20,000 to £30,000/QALY, and a threshold of £13,000/QALY.	Mean cost of <u>MUA</u> was £425 (SD 115) mean cost of <u>ACR</u> was £2,170 (SD 431) mean cost of <u>ESP</u> was £260 (SD 155) mean cost of a steroid injection was £43 (SD 32)). A total of 85 (86%) patients who had ESP received an injection as part of their treatment The longer waiting times were reflected in the actual days off work and increased productivity costs, QALYs estimates at one year, when controlling for baseline utility (for available cases), show that patients allocated to MUA accrued more QALYs than the other two groups: MUA (0.6765) > ESP (0.6492) > capsular release (0.6475) ICER for MUA was £6,984 per additional QALY when compared to ESP; at a £20,000 per QALY threshold the probability of MUA being cost-effective was high (86%) compared with ESP (13%) and capsular release (0%) MUA remains the intervention most likely to be cost-effective even if its imputed QALYs are reduced by 10% or its cost is increased by 50%	MUA is the most cost-effective option and would represent good value for money The greater costs of capsular release make this intervention difficult to justify

			imputations for missing data			
Assessment of the treatment costs of extracorporeal shock wave therapy versus surgical treatment for shoulder diseases	Haake, 2001 Cost-Effectiveness Analysis Trial based (prospective controlled)	P: Isolated chronic tendinitis of the supraspinatus muscle or with type 1 or 2 calcific deposits (minimum diameter 1 cm) as per Gaertner (N=60) I: Extracorporeal shock wave therapy (two sessions, each with 2,000 impulses at E+ 0.35 mJ/mm², administered 1 week apart) plus outpatient physiotherapy C: Acromioplasty (14 open, 16 arthroscopic) or open acromioplasty with lime deposit removal plus outpatient physiotherapy for patients with calcifying tendinitis O: Subjective Shoulder Rating System (SSRS) QHEs = 20	Pe = not stated (social) MOC = Hospital stay/ESWT Physiotherapy Unfitness for work (ESWT was costed on the basis of the median value of the actual reimbursed amounts. Direct hospitalizations costs, including the actual operation, were calculated using the Nursing Cost Tariff of Philipps-University, Marburg, as of July 1998, multiplied by the average length of stay), in EUR HE = None TH = 12 weeks after the operation Di = NA Se Te = one way: using a cost of EUR 143 per workday lost, or a higher cost of EUR 287 per workday. Da So = Nursing Cost Tariff of Philipps-University, actual reimbursed amounts	Germany Dates unclear	Average overall costs per surgical patient were EUR 13,347 using a workday loss cost of EUR 143, or EUR 22,735 with a cost of EUR 287, including EUR 3,455 for the hospital stay, EUR 504 for physiotherapy, and EUR 9,600 (EUR 19,200) for lost productivity. For ESWT, average overall costs were EUR 1,940 (EUR 3,180), comprising EUR 178 for physiotherapy, EUR 630 for ESWT, and EUR 1,100 (EUR 2,070) for lost productivity. Surgical patients had an average hospital stay of 16.6 days (min 9, max 23) versus outpatient ESWT. Post-discharge work loss averaged 66.9 days (9-84 days) for surgery patients, compared to 7.7 days (2-84 days) for ESWT patients. Confidence intervals were calculated, and a Mann-Whitney U test revealed a highly significant difference between the groups (p < .1)	The results show the high cost to society, determined predominantly by the extent of working and production hours lost by the patients
Does arthroscopic acromioplasty provide any additional value in the treatment of shoulder impingement syndrome? A two-year randomised controlled trial.	Ketola, 2009 Cost-Effectiveness Analysis, Trial based (RCT)	P: suspected shoulder impingement with chronic symptoms not relieved by conservative treatment (stage II impingement syndrome), N=140, mean age of 47.1 years (18-60 yo) I: arthroscopic decompression with acromioplasty followed by a structured exercise treatment (n=70) C: similar exercise program alone (home based) (n=70) O: Self-reported pain on a VAS of 0 to 10 at 24 months,	Pe = healthcare MOC = direct healthcare and non-healthcare costs, resource use x unit cost 2001 + imputations for missing data, in EUR HE = Pain VAS TH = 24 months Di = none Se Te = one-way (cost variables changed $\pm$ 50%) and probabilistic sensitivity analyses with 10 000 bootstrapped Da So = benchmarking data on file, National Research and Development Centre for Welfare and Health, Finland,	Finland Regional Hospitals; one surgeon between June 2001 and July 2004 willingness to pay of €8000 for an additional	Both groups showed a decrease in self-reported VAS pain scores exceeding the minimal clinically important difference from enrolment to 24 months: from 6.5 to 2.9 in the exercise group and from 6.4 to 2.5 in the combined treatment group. The difference between groups was not statistically significant (p = 0.65). The incremental cost-effectiveness ratio (ICER) for combined treatment versus exercise was €5431 per minimal clinically important difference unit for 92 patients, and €5734 for 120 patients with partially imputed costs. With a willingness to pay €8000 per unit, the probability of combined treatment being acceptable was 56%. Combined treatment was	At 24 months, arthroscopic decompression with acromioplasty plus structured exercise did not significantly differ from a supervised exercise program in self-reported pain, disability, night pain, or other secondary outcomes. The mean total cost was

		disability questionnaire QHEs = 80	Finland, Aiheta 1/2003; Healthcare unit costs in Finland in 2001, National Research and Development Centre for Welfare and Health; Expert opinion (based on unpublished cost data from Helsinki University Hospital)	minimal clinically important difference unit	more effective but also more costly 75% of the time.	€2961 for the combined treatment and €1864 for the exercise group. Acromioplasty appears ineffective as an addition to exercise for shoulder impingement over two years.
Treatment of Nontraumatic Rotator Cuff Tears: A Randomized Controlled Trial with Two Years of Clinical and Imaging Follow-up.	Kukkonen, 2015 Cost- Effectiveness Analysis Trial based (RCT)	P: >55 yo; Atraumatic, symptomatic, isolated full- thickness supraspinatus tear (N=180) I: PT = 6 months, glenohumeral motion, muscle function and strengthening. C: acromioplasty (Subacromial debridement and arthroscopic acromioplasty) + PT like group 1(2) C': RCR + acromioplasty like group 2+ PT like group 1(3) O: CMS; VAS; MRI; direct costs QHEs = 45	Pe = not stated (social perspective) MOC = direct costs: visits, surgery, hospital stay, medications, and indirect: sick leave HE = None TH = 2 years Di = None Se Te = None Da So = structured questionnaire forms at each control visit	Finland 2007-2013	Mean change in the Constant score at two years of follow-up was 18.4 points in Group 1, 20.5 points in Group 2, and 22.6 points in Group 3 no significant differences in VAS between groups There were no significant differences (p = 0.45) in the change of VAS scores for pain between the groups (21.3 in Group 1, 21.8 in Group 2, and 22.0 in Group 3) The mean direct cost of treatment was €5104 (range, €1130 to €33,081) in Group 1, €6915 (range, €3352 to €23,149) in Group 2, and €9185 (range, €4410 to €23,755) in Group 3 (p < 0.01). The mean direct cost for the patient was €2915 in Group 1, €2434 in Group 2, and €3674 in Group 3 (p = 0.47). The mean direct societal cost was €2348 in Group 1, €4691 in Group 2, and €5646 in Group 3 (p < 0.01).	We support conservative treatment as the primary initial treatment for nontraumatic, isolated, supraspinatus tears

Figure 1: Flowchart of the selection process

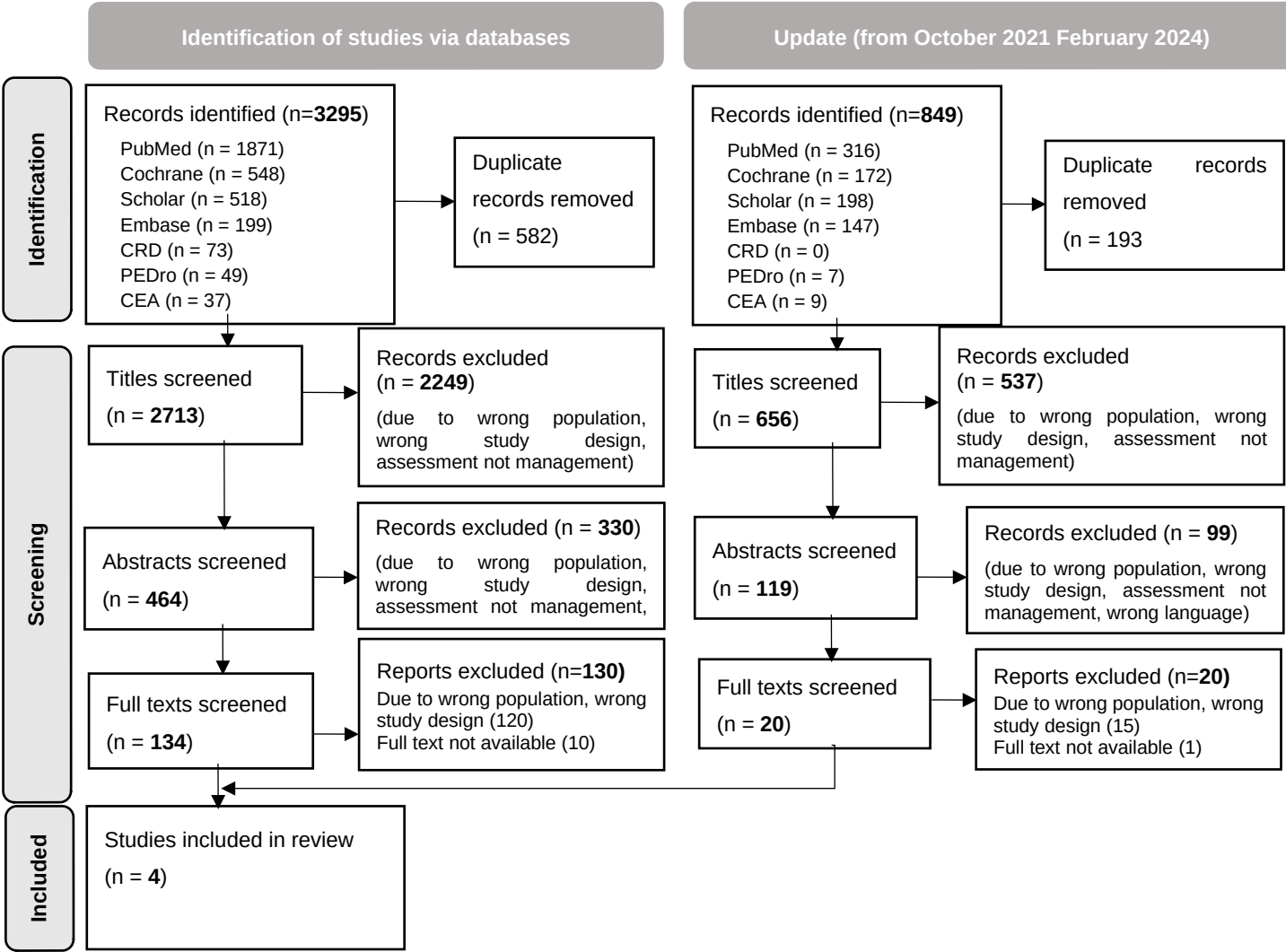


Figure 2: Flowchart of the selection process

Appendix 1: Detailed risk of bias assessment

Appendix 1 could not be added to this document because of its Excel spreadsheet format.

It will therefore be uploaded in a separate file.

Supplementary material 1: Research equations

Database	Extraction period	Research equations / Key words	Number of studies
PEDro	25/10/2021	Abstract and Title: cost* shoulder* Body part: Upper arm, shoulder, or shoulder girdle Published since: 2000 Match all search terms (AND)	49
Cost-effectiveness analysis registry	25/10/2021	Search for: Method Full search contents: shoulder	37
NSH EED	25/10/2021	Any field: shoulder* [AND] Any field: cost* Publication year: 2000 to 2021 DARE + NHS + HTA	73
PubMed	25/10/2021	(Shoulder OR "Shoulder girdle" OR "Shoulder arthr*" OR "Shoulder pain" OR "shoulder related pain" OR "shoulder pain syndrome" OR "rotator?cuff?related shoulder pain" OR "shoulder joint" OR "shoulder impingement" OR "subacromial pain syndrome" OR "Subacromial impingement syndrome*" OR "Subacromial impingement" OR "rotator cuff" OR "rotator cuff disease" OR "rotator cuff tear*" OR "massive rotator cuff tear*" OR "Supraspinatus tend*" OR "Shoulder burs*" OR "Shoulder tend*" OR "Painful arc*" OR "frozen shoulder" OR "adhesive capsul*" OR "acromio?clavicular" OR "acromio?clavicular pain" OR "acromio?clavicular dislocation" OR "acromio?clavicular joint pain" OR "acromio?clavicular arthr*" OR	1871

		"shoulder dislocat*" OR "shoulder instab*" OR "unstable shoulder" OR "Stanmore type 2" OR "Stanmore type 3" OR "Stanmore type 2 instability" OR "Stanmore type 3 instability" OR "labral tear" OR "SLAP lesion" OR "scapular dyskinesis" OR "scapulo? thoracic") AND ("Health?economic evaluation" OR "cost?effectiveness" OR "cost?effectiveness analysis" OR "cost?utility" OR "cost?utility analysis" OR "cost?benefit" OR "cost?benefit analysis" OR "median cost" OR "cost?minimi*" OR "cost?minimi* analysis" OR cost* OR QALY OR "quality?adjusted?life?year*" OR ICER OR "incremental?cost?effectiveness?ratio" OR "cost analysis") AND ((conservative OR "conservative intervention" OR rehabilit* OR "rehabilit* management" OR "rehabilit* intervention" OR physiotherapy OR "physical therapy" OR "exercise therapy" OR "manual therapy" OR "injection therapy" OR "corticosteroid injection" OR "glucocorticosteroid injection") OR ("surgical management" OR surgery OR "surgical intervention" OR surg* OR operat* OR "operative care")) 2000-2021	
Google scholar	25/10/2021	Shoulder degenerative nontraumatic cost health economic evaluation surgery conservative Période spécifique: 2000-2021	518
Cochrane	24/01/2021	Advanced search: (Shoulder OR "Shoulder girdle" OR "Shoulder arthr*" OR "Shoulder pain" OR "shoulder related pain" OR "shoulder pain syndrome" OR "rotator?cuff?related shoulder pain" OR	11 reviews

		"shoulder joint" OR "shoulder impingement" OR "subacromial pain syndrome" OR "Subacromial impingement syndrome*" OR "Subacromial impingement" OR "rotator cuff" OR "rotator cuff disease" OR "rotator cuff tear*" OR "massive rotator cuff tear*" OR "Supraspinatus tend*" OR "Shoulder burs*" OR "Shoulder tend*" OR "Painful arc*" OR "frozen shoulder" OR "adhesive capsul*" OR "acromio?clavicular" OR "acromio? clavicular pain" OR "acromio?clavicular dislocation" OR "acromio?clavicular joint pain" OR "acromio?clavicular arthr*" OR "shoulder dislocat*" OR "shoulder instab*" OR "unstable shoulder" OR "Stanmore type 2" OR "Stanmore type 3" OR "Stanmore type 2 instability" OR "Stanmore type 3 instability" OR "labral tear" OR "SLAP lesion" OR "scapular dyskinesis" OR "scapulo? thoracic") AND ("Health?economic evaluation" OR "cost?effectiveness" OR "cost?effectiveness analysis" OR "cost? utility" OR "cost?utility analysis" OR "cost? benefit" OR "cost?benefit analysis" OR "median cost" OR "cost?minimi*" OR "cost? minimi* analysis" OR cost* OR QALY OR "quality?adjusted?life?year*" OR ICER OR "incremental?cost?effectiveness?ratio" OR "cost analysis") AND ((conservative OR "conservative intervention" OR rehabilit* OR "rehabilit* management" OR "rehabilit* intervention" OR physiotherapy OR "physical therapy" OR "exercise therapy" OR "manual therapy" OR "injection therapy" OR "corticosteroid injection" OR "glucocorticosteroid injection") OR ("surgical	
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		management" OR surgery OR "surgical intervention" OR surg* OR operat* OR "operative care"))	
Cochrane	25/10/2021	(Shoulder OR "Shoulder girdle" OR "Shoulder arthr*" OR Gleno?humeral OR "gleno?humeral arthr*" OR "Shoulder pain" OR "shoulder related pain" OR "shoulder pain syndrome" OR "rotator? cuff?related shoulder pain" OR "shoulder joint" OR "shoulder impingement" OR "subacromial pain syndrome" OR "Subacromial impingement syndrome*" OR "Subacromial impingement" OR "rotator cuff" OR "rotator cuff disease" OR "rotator cuff tear*" OR "massive rotator cuff tear*" OR "Supraspinatus tend*" OR "Shoulder burs*" OR "Shoulder tend*" OR "Painful arc*" OR "frozen shoulder" OR "adhesive capsul*" OR "acromio?clavicular" OR "acromio?clavicular pain" OR "acromio?clavicular dislocation" OR "acromio?clavicular joint pain" OR "acromio?clavicular arthr*" OR "shoulder dislocat*" OR "shoulder instab*" OR "unstable shoulder" OR "Stanmore type 2" OR "Stanmore type 3" OR "Stanmore type 2 instability" OR "Stanmore type 3 instability" OR "labral tear" OR "SLAP lesion" OR "scapular dyskinesis" OR "scapulo?thoracic") AND ("Health?economic evaluation" OR "cost?effectiveness" OR "cost?effectiveness analysis" OR "cost?utility" OR "cost?	537

		utility analysis" OR "cost?benefit" OR "cost?benefit analysis" OR "median cost" OR "cost?minimi*" OR "cost?minimi* analysis" OR cost* OR QALY OR "quality? adjusted?life?year*" OR ICER OR "incremental?cost?effectiveness?ratio" OR "cost analysis") AND ((conservative OR "conservative intervention" OR rehabilit* OR "rehabilit* management" OR "rehabilit* intervention" OR physiotherapy OR "physical therapy" OR "exercise therapy" OR "manual therapy" OR "injection therapy" OR "corticosteroid injection" OR "glucocorticosteroid injection") OR ("surgical management" OR surgery OR "surgical intervention" OR surg* OR operat* OR "operative care")) in Title Abstract Keyword - (Word variations have been searched) From 2000-2021	
Embase	25/10/2021	EMTREE ('physiotherapy'/exp/mj OR 'kinesiotherapy'/exp/mj OR 'orthopedic surgery'/exp/mj) AND 'shoulder'/exp/mj AND 'health economics'/exp/mj AND ([english]/lim OR [french]/lim) AND [2000-2021]/py	EMTREE 13 results
Embase	25/10/2021	(shoulder OR 'shoulder girdle' OR 'shoulder arthr*' OR gleno?humeral OR 'gleno? humeral arthr*' OR 'shoulder pain' OR 'shoulder related pain' OR 'shoulder pain syndrome' OR 'rotator?cuff?related shoulder pain' OR 'shoulder joint' OR 'shoulder impingement' OR 'subacromial pain	Plain text equation 186 results

		syndrome' OR 'subacromial impingement syndrome*' OR 'subacromial impingement' OR 'rotator cuff' OR 'rotator cuff disease' OR 'rotator cuff tear*' OR 'massive rotator cuff tear*' OR 'supraspinatus tend*' OR 'shoulder burs*' OR 'shoulder tend*' OR 'painful arc*' OR 'frozen shoulder' OR 'adhesive capsul*' OR 'acromio?clavicular' OR 'acromio?clavicular pain' OR 'acromio?clavicular dislocation' OR 'acromio?clavicular joint pain' OR 'acromio?clavicular arthr*' OR 'shoulder dislocat*' OR 'shoulder instab*' OR 'unstable shoulder' OR 'stanmore type 2' OR 'stanmore type 3' OR 'stanmore type 2 instability' OR 'stanmore type 3 instability' OR 'labral tear' OR 'slap lesion' OR 'scapular dyskinesis' OR 'scapulo?thoracic') AND ('health?economic evaluation' OR 'cost?effectiveness' OR 'cost?effectiveness analysis' OR 'cost?utility' OR 'cost?utility analysis' OR 'cost?benefit' OR 'cost?benefit analysis' OR 'median cost' OR 'cost?minimi*' OR 'cost?minimi* analysis' OR cost* OR qaly OR 'quality?adjusted?life?year*' OR icer OR 'incremental?cost?effectiveness?ratio' OR 'cost analysis') AND (conservative OR 'conservative intervention' OR rehabilit* OR 'rehabilit* management' OR 'rehabilit* intervention' OR physiotherapy OR 'physical therapy' OR 'exercise therapy' OR 'manual therapy' OR 'injection therapy' OR 'corticosteroid injection' OR 'glucocorticosteroid injection' OR 'surgical management' OR surgery OR 'surgical intervention' OR surg* OR operat* OR 'operative care')) AND ([controlled clinical	
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		trial]/lim OR [randomized controlled trial]/lim) AND ([article]/lim OR [article in press]/lim) AND ([english]/lim OR [french]/lim) AND ([adult]/lim OR [aged]/lim OR [very elderly]/lim) AND [humans]/lim AND [clinical study]/lim AND [embase]/lim AND [2000-2021]/py	
TOTAL			3295
Update			
PEDro	25/10/21 to 9/02/2024	Abstract and Title: cost* shoulder* Body part: Upper arm, shoulder, or shoulder girdle Published since: 2021 Match all search terms (AND)	7
Pubmed	25/10/21 to 9/02/2024	(Shoulder OR "Shoulder girdle" OR "Shoulder arthr*" OR "Shoulder pain" OR "shoulder related pain" OR "shoulder pain syndrome" OR "rotator?cuff?related shoulder pain" OR "shoulder joint" OR "shoulder impingement" OR "subacromial pain syndrome" OR "Subacromial impingement syndrome*" OR "Subacromial impingement" OR "rotator cuff" OR "rotator cuff disease" OR "rotator cuff tear*" OR "massive rotator cuff tear*" OR "Supraspinatus tend*" OR "Shoulder burs*" OR "Shoulder tend*" OR "Painful arc*" OR "frozen shoulder" OR "adhesive capsul*" OR "acromio?clavicular" OR "acromio?clavicular pain" OR "acromio?clavicular dislocation" OR "acromio?clavicular joint pain" OR "acromio?clavicular arthr*" OR "shoulder dislocat*" OR "shoulder instab*" OR "unstable shoulder" OR "Stanmore type 2" OR "Stanmore type 3" OR "Stanmore type 2 instability" OR "Stanmore type 3 instability" OR "labral tear" OR "SLAP lesion"	316

		OR "scapular dyskinesis" OR "scapulo? thoracic") AND ("Health?economic evaluation" OR "cost?effectiveness" OR "cost?effectiveness analysis" OR "cost? utility" OR "cost?utility analysis" OR "cost? benefit" OR "cost?benefit analysis" OR "median cost" OR "cost?minimi*" OR "cost? minimi* analysis" OR cost* OR QALY OR "quality?adjusted?life?year*" OR ICER OR "incremental?cost?effectiveness?ratio" OR "cost analysis") AND ((conservative OR "conservative intervention" OR rehabilit* OR "rehabilit* management" OR "rehabilit* intervention" OR physiotherapy OR "physical therapy" OR "exercise therapy" OR "manual therapy" OR "injection therapy" OR "corticosteroid injection" OR "glucocorticosteroid injection") OR ("surgical management" OR surgery OR "surgical intervention" OR surg* OR operat* OR "operative care"))	
Google scholar	25/10/21 to 9/02/2024	Shoulder degenerative nontraumatic cost health economic evaluation surgery conservative Période spécifique: 2021-2024	198
Cochrane Trial	25/10/21 to 9/02/2024	V. ((Shoulder OR "Shoulder girdle" OR "Shoulder arthr*" OR "Shoulder pain" OR "shoulder related pain" OR "shoulder pain syndrome" OR "rotator?cuff?related shoulder pain" OR "shoulder joint" OR "shoulder impingement" OR "subacromial pain syndrome" OR "Subacromial impingement syndrome*" OR "Subacromial impingement" OR "rotator cuff" OR "rotator cuff	172

		disease" OR "rotator cuff tear*" OR "massive rotator cuff tear*" OR "Supraspinatus tend*" OR "Shoulder burs*" OR "Shoulder tend*" OR "Painful arc*" OR "frozen shoulder" OR "adhesive capsul*" OR "acromio?clavicular" OR "acromio?clavicular pain" OR "acromio?clavicular dislocation" OR "acromio?clavicular joint pain" OR "acromio?clavicular arthr*" OR "shoulder dislocat*" OR "shoulder instab*" OR "unstable shoulder" OR "Stanmore type 2" OR "Stanmore type 3" OR "Stanmore type 2 instability" OR "Stanmore type 3 instability" OR "labral tear" OR "SLAP lesion" OR "scapular dyskinesis" OR "scapulo?thoracic") AND ("Health?economic evaluation" OR "cost?effectiveness" OR "cost?effectiveness analysis" OR "cost?utility" OR "cost?utility analysis" OR "cost?benefit" OR "cost?benefit analysis" OR "median cost" OR "cost?minimi*" OR "cost?minimi* analysis" OR cost* OR QALY OR "quality?adjusted?life?year*" OR ICER OR "incremental?cost?effectiveness?ratio") AND (((conservative OR "conservative intervention" OR rehabilit* OR "rehabilit* management" OR "rehabilit* intervention" OR physiotherapy OR "physical therapy" OR "exercise therapy" OR "manual therapy" OR "injection therapy" OR "corticosteroid	
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		injection" OR "glucocorticosteroid injection"))OR ((("surgical management" OR surgery OR "surgical intervention" OR surg* OR operat* OR "operative care"))):ti,ab,kw (Word variations have been searched) in null - with Cochrane Library publication date Between Oct 2021 and Feb 2023, in Trials (Word variations have been searched)	
Embase	25/10/21 to 9/02/2024	EMTREE ('physiotherapy'/exp/mj OR 'kinesiotherapy'/exp/mj OR 'orthopedic surgery'/exp/mj) AND 'shoulder'/exp/mj AND 'health economics'/exp/mj AND ([english]/lim OR [french]/lim)	EMTREE 69
Embase	25/10/21 to 9/02/2024	(shoulder OR 'shoulder girdle' OR 'shoulder arthr*' OR gleno?humeral OR 'gleno? humeral arthr*' OR 'shoulder pain' OR 'shoulder related pain' OR 'shoulder pain syndrome' OR 'rotator?cuff?related shoulder pain' OR 'shoulder joint' OR 'shoulder impingement' OR 'subacromial pain syndrome' OR 'subacromial impingement syndrome*' OR 'subacromial impingement' OR 'rotator cuff' OR 'rotator cuff disease' OR 'rotator cuff tear*' OR 'massive rotator cuff tear*' OR 'supraspinatus tend*' OR 'shoulder burs*' OR 'shoulder tend*' OR 'painful arc*' OR 'frozen shoulder' OR 'adhesive capsul*' OR 'acromio?clavicular' OR 'acromio? clavicular pain' OR 'acromio?clavicular dislocation' OR 'acromio?clavicular joint pain' OR 'acromio?clavicular arthr*' OR 'shoulder dislocat*' OR 'shoulder instab*' OR 'unstable shoulder' OR 'stanmore type 2' OR	Equation 78

		'stanmore type 3' OR 'stanmore type 2 instability' OR 'stanmore type 3 instability' OR 'labral tear' OR 'slap lesion' OR 'scapular dyskinesis' OR 'scapulo?thoracic') AND ('health?economic evaluation' OR 'cost?effectiveness' OR 'cost?effectiveness analysis' OR 'cost?utility' OR 'cost?utility analysis' OR 'cost?benefit' OR 'cost?benefit analysis' OR 'median cost' OR 'cost?minimi*' OR 'cost?minimi* analysis' OR cost* OR qaly OR 'quality?adjusted?life?year*' OR icer OR 'incremental?cost?effectiveness?ratio' OR 'cost analysis') AND (conservative OR 'conservative intervention' OR rehabilit* OR 'rehabilit* management' OR 'rehabilit* intervention' OR physiotherapy OR 'physical therapy' OR 'exercise therapy' OR 'manual therapy' OR 'injection therapy' OR 'corticosteroid injection' OR 'glucocorticosteroid injection' OR 'surgical management' OR surgery OR 'surgical intervention' OR surg* OR operat* OR 'operative care')) AND ([controlled clinical trial]/lim OR [randomized controlled trial]/lim) AND ([article]/lim OR [article in press]/lim) AND ([english]/lim OR [french]/lim) AND ([adult]/lim OR [aged]/lim OR [very elderly]/lim) AND [humans]/lim AND [clinical study]/lim AND [embase]/lim	
NSH EED	25/10/21 to 9/02/2024	(shoulder) AND (cost) IN DARE, NHSEED, HTA WHERE LPD FROM 25/10/2021 TO 22/02/2023	0
cost-effectiveness analysis	25/10/21 to 9/02/2024	shoulder	9

registry			
TOTAL			849

Supplementary material 2 and 3 could not be added to this document because of their Excel spreadsheet format.
They will therefore be uploaded in separate files.