

Signal Detection Report: Acupuncture for Shoulder Pain

Signal Detection Report date

July, 2017

Key Findings

- Expert opinion: One expert stated that the conclusions of the original review are no longer valid, and was aware of new evidence
- Literature evidence: Qualitative and quantitative signals were identified

Summary Decision: the original review requires updating

Authors

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Introduction

Previous research evaluating a cohort of published systematic reviews demonstrated that 7% of reviews were out of date by the time of publication, while as many as 23% went out of date within two years of being completed.[1] The utility of systematic review-based evidence depends on their remaining up-to-date. As such, the Cochrane Complementary Medicine Field and the Knowledge Synthesis group at the Ottawa Hospital Research Institute (OHRI) have determined a set of existing reviews of interest for which signal detection work using the Ottawa Method's qualitative/quantitative signal detection approach has been performed. [1]

The Ottawa method involves identification of qualitative and quantitative signals/triggers indicating the need of updating of a systematic review. [1]. The Ottawa method has been used to assess the need for updating systematic reviews in the past. [1; 2] A graphical overview of our approach and application of the Ottawa signal detection method is provided in Appendix A of this report. This work assessed potential triggers signifying the need for updating of six past Cochrane Complementary Medicine reviews. The conclusion as to whether or not each of the reviews is in need of updating was made based on the identification of qualitative and quantitative signals.

Methods

We contacted content experts to provide input on whether conclusions from the review were still valid, and if they were aware of any new evidence that could potentially signal the need for a review update. This process included the authors from the original review, and also reached out to the lead authors on the included studies of the review. If we did not find sufficient number of experts we then reached out to those who had responded and asked whether they could suggest possible content experts.

Summaries and conclusions were collected for each key question (or possibly key endpoint) within each review; this summary was shared with consulting experts when seeking their input regarding the findings, as well as when establishing the presence of updating triggers. See Appendix B for the survey sent to content experts.

Experts were asked their perspectives on the following features of each review: a) whether the conclusion is still valid in their own opinion (to be answered as yes/no/don't know); b) whether he/she is aware of new evidence published since the publication date of the review being assessed (with details if yes); and c) any additional information or perspectives to be shared. If an expert indicated an opinion that one or more conclusions of the review was out of date and/or provided specific evidence they felt was critical to the decision regarding updating, we verified it by assessing the evidence brought forward by the expert(s).

Experts were given 10 business days to respond. Two reminders were sent, and a conflict of interest disclosure statement was also sent to all experts that participated. The survey was kept open until a minimum of two clinical experts responded.

One reviewer screened the evidence provided by the content experts, and determined whether the studies met the inclusion criteria of the original review. Data was extracted by one reviewer. The identification of qualitative signals was carried out using the Ottawa method qualitative signals. The definition and categories of qualitative signals are presented in Appendix C.

An information specialist provided modified PRESS[3] evaluations of the original review's search strategy, commenting on databases, search dates and terminology. This information is provided in Appendix D in order to inform any future updating for the original review.

Expert Opinion

Of the 7 experts contacted, only one responded to our questions on acupuncture for shoulder pain. The expert responded that the conclusions of the review are no longer valid, and that "much more can be said about risks – which are low for this condition and from treatment of other chronic pain conditions." If a placebo is an active treatment "then the tracking of adverse events represented here is also not controlled."

The expert also expressed concern that results may have been misreported for one of the included studies in the original review. Lin et al., 1994 has 150 patients (reported as 100.)

Flow

Seventeen references were put forth by the content expert. Eleven publications met the original review's inclusion criteria, and were assessed for qualitative and quantitative signals. Of the remaining studies, one publication was already included in the original review, and one was not published in English. Two publications included patients with trauma, one was not a randomized controlled trial (RCT) and one was a protocol for a RCT that has yet to be published.

Signal Detection Results:

Findings of the original review

Overall Conclusion of the Review:

"Due to a small number of clinical and methodologically diverse trials, little can be concluded from this review. There is little evidence to either support or refute the use of acupuncture for treating shoulder pain and more trials are needed. The limited evidence available indicates some short term benefit of acupuncture compared to placebo with respect to shoulder specific disability. Little is known of the potential for adverse effects." [4]

Further Details:

"There were few significant findings with regard to the use of acupuncture when compared to placebo or other interventions. Due to small sample sizes it is possible that this may be explained by Type II

error. Acupuncture was of benefit over placebo in improving the Constant Murley Score (a measure of shoulder function), however, by the four month follow-up, the difference between the acupuncture and placebo groups, whilst still statistically significant, was no longer likely to be clinically significant. Acupuncture used in combination with exercise was demonstrated to be more effective than exercise alone in one small trial. Deep acupuncture was shown to be more effective than shallow acupuncture and acupuncture using sites determined by Jing Luo was more effective than that using sites determined by traditional Chinese medicine, however, neither of these trials included placebo or other intervention comparison groups. In one of the larger trials, nerve block was found to be more effective than acupuncture on a range of outcome measures but no follow-up data were reported and the pain outcome measurement used may be inappropriate. Few trials reported adverse events associated with acupuncture when compared to placebo or other interventions." [4]

New findings:

Kibar et al., 2017 reports on a RCT including participants with subacromial impingement syndrome, and experiencing shoulder pain for at least 3 months. 73 patients were randomized to receive laser acupuncture (n = 36) or sham laser acupuncture (n = 37.) The authors report that "statistically significant improvements were observed in all parameters in the treatment group. All parameters of pain and functional status in the treatment group were significantly better than those in the control group at week 3." The authors conclude that "to the best of our knowledge, this is the first study that investigates the effect of laser acupuncture in SAIS. The positive results of the present study should lead to further laser acupuncture studies with combinations of different acupuncture points, at different wavelengths, and with long-term follow-up periods." [5]

Rueda Garrido et al., 2016 describes a RCT including participants diagnosed with impingement syndrome with symptoms more than 3 months. 68 participants were included and randomized to receive true acupuncture (TA) or acupuncture at sham points (SA) once a week for 4 weeks. Results were assessed immediately after treatment was complete, and at 3 months follow-up. The authors report that "We found significant differences in the analyzed results between the two groups, as we observed a decrease on the intensity of pain for the TA group of 44.13 mm at T1 (CI 95% 36.7; 51.5) and 87.58 mm at T2 (CI 95% 28.32; 46.81), while the decrease in the FA group was of 19.84 mm at T1 (CI95% 12.2; 27.4) and 20 mm at T2 (CI 95% 10.9; 29.09)." The authors conclude that "the use of acupuncture to treat impingement syndrome seems to be a safe and reliable technique to achieve clinically significant results and could be implemented in the therapy options offered by the health services." [6]

Zhang et al., 2016 reports on a RCT of 80 participants with chronic shoulder pain for **at least 6 weeks** and up to 2 years in duration. Participants were randomized to receive contralateral manual acupuncture (MA, n = 38) for 4 weeks or to remain on a waiting list and receive conventional orthopedic therapy (n = 42.) The authors report that "Intention-to-treat (ITT) analysis demonstrated significant pain relief with contralateral acupuncture, with mean differences in VAS scores compared to the waiting list group of -19.4 (-28.0 to -10.8) at 2 weeks, -40.4 (-49.0 to -31.8) at 4 weeks, -41.1 (-49.7 to -32.5) at 8 weeks, and -40.9 (-49.5 to -32.3) at 16 weeks. CM and DASH scores were also improved at all time points (p<0.01)." The authors conclude that "these results demonstrate beneficial effects of

contralateral acupuncture in the treatment of chronic shoulder pain, both in terms of pain and function. Future research is required to compare directly the effects of local and contralateral acupuncture and to quantify the specific and non-specific effects.”[7]

Itoh et al., 2014 describes a RCT of participants with non-radiating shoulder pain for at least 6 months. 18 patients were included and 17 were randomized to receive trigger point acupuncture (TrP, n = 8) or sham acupuncture (SH, n = 8.) The authors report that “after treatment, pain intensity between pretreatment and 5 weeks after TrP decreased significantly ($p < 0.001$). Shoulder function also increased significantly between pretreatment and 5 weeks after TrP ($p < 0.001$). A comparison using the area under the outcome curves demonstrated a significant difference between groups ($p = 0.024$).” The authors conclude that “compared with SH acupuncture therapy, TrP therapy appears more effective for chronic shoulder pain.”[8]

Johansson et al., 2011 reports on a RCT of patients with subacromial impingement syndrome and shoulder pain symptoms for more than 2 months. 123 patients were randomized to receive subacromial corticosteroid injections (n = 65) or acupuncture with home exercises (n = 58.) The authors report that “one hundred and seventeen patients with SIS were included, of which 91 complied with the study protocol. There were no significant differences between treatments with regard to pain, shoulder function and HRQL in change over time. However, both treatment groups improved significantly from baseline over time.” The authors conclude that “both subacromial corticosteroid injection and a series of acupuncture treatments combined with home exercises significantly decreased pain and improved shoulder function in patients with SIS, but neither treatment was significantly superior to the other.”[9]

Molsberger et al., 2010 describes a RCT of patients with chronic shoulder pain with symptoms longer than 6 weeks. 424 participants were included and randomized to receive acupuncture (verum, n = 154,) sham acupuncture (n = 135) or conventional conservative orthopaedic treatment (COT, n = 135) for **6 weeks**. The authors report that “in the ITT (n = 424) analysis, percentages of responders for the primary endpoint [pain relief >50% on VAS] were verum 65% (95% CI 56–74%) (n = 100), sham 24% (95% CI 9–39%) (n = 32), and COT 37% (95% CI 24–50%) (n = 50); secondary endpoint: verum 68% (95% CI 58–77%) (n = 92), sham 40% (95% CI 27–53%) (n = 53), and COT 28% (95% CI 14–42%) (n = 38). The results are significant for verum over sham and verum over COT ($p < 0.01$) for both the primary and secondary endpoints. The PPP analysis of the primary (n = 308) and secondary endpoints (n = 360) yields similar responder results for verum over sham and verum over COT ($p < 0.01$). Descriptive statistics showed greater improvement of shoulder mobility (abduction and arm-above-head test) for the verum group versus the control group immediately after treatment and **after 3 months**.”[10]

Lathia et al., 2009 reports on a RCT of patients with osteoarthritis or rotator cuff tendonitis, with shoulder pain symptoms for at least 8 weeks. 31 participants were randomized to receive acupuncture using TCM approach (n = 11,) standard acupuncture (n = 9,) and sham nonpenetrating acupuncture (n = 11.) Authors report that “after **6 weeks** of treatment, the mean total SPADI score improved in all three groups, but the change was clinically significant (≥ 10 points) only in groups 1 and 2 (-20.3 and -20.4,

respectively, versus -6.5 in group 3). The treatment effects of groups 1 and 2 compared to the sham acupuncture group were -13.8 (95% confidence interval: -2.2 to -25.4, $p < 0.015$) and -13.9 (-2.0 to -25.8, $p < 0.013$), respectively. There was no difference between the individualized acupuncture and standardized acupuncture treatments.” The authors conclude that “acupuncture may be an effective treatment for chronic shoulder pain. There may be no difference in efficacy between individualized and standardized acupuncture treatment. This suggests that the use of standard points may make treatment easier for patient care and for further research studies.”[11]

Vas et al., 2008 describes a RCT of patients with a diagnosis of unilateral subacromial syndrome, and shoulder pain symptoms for at least three months. 425 patients were included and received 15 sessions of physiotherapy, and were further randomized to acupuncture (n = 205) or mock TENS (transcutaneous electrical nerve stimulation) (n = 220) once a week for three weeks. The authors report that “the mean score (S.D.) on the CMS [Constant-Murley score] had increased by 16.6 (15.6) points among the acupuncture group, compared with 10.6 (13.5) points in the control group, and the mean difference between the two groups was statistically significant (6.0 points; 95% CI 3.2, 8.8 points; $P < 0.001$). The authors conclude that “Single-point acupuncture in association with physiotherapy improves shoulder function and alleviates pain, compared with physiotherapy as the sole treatment.”[12]

Ma et al., 2006 describes a RCT of patients with spontaneous frozen shoulder for at least 3 months. 75 patients were randomized to receive physical therapy (PT, n = 30,) acupuncture (n = 30) and a combination of PT and acupuncture (n = 15) for four weeks. The authors report that “pain was controlled better by acupuncture while range of motion (ROM) improved following physical therapy. However, patients treated by both methods had the best outcome.” The authors conclude that “the integration of acupuncture and physical therapy to treat frozen shoulder leads to a better outcome than using only one method.”[13]

Johansson et al., 2005 reports on a RCT of patients with clinical signs of impingement syndrome. 88 participants were included and randomized to receive acupuncture (n = 44) or ultrasound (n = 41) twice per week for **5 weeks**, in addition to home exercises. A combined scores from three shoulder disability measures [Constant-Murley Shoulder Assessment (CM Score), AdoUsson-Lysbolm Shoulder Score (AL Score), and the University of California at Los Angeles End-Result Score (UCLA Score) were measured over a period of **12 months**. The authors report that “both groups improved, but the acupuncture group had a larger improvement in the combined score.” The authors conclude that “the results suggest that acupuncture is more efficacious than ultrasound when applied in addition to home exercises.”[14]

Guerra et al., 2004 describes a RCT of participants with shoulder pain and diagnosis of shoulder soft tissue lesions. 130 participants were included and randomized to receive electroacupuncture (n = 65) or non-penetrating placebo acupuncture (n = 65) once per week for **8 weeks**. The authors report that “at **six month follow-up** after treatment the acupuncture group showed a significantly greater improvement in pain intensity compared with the control group [VAS mean difference 2.0 (95% CI 1.2–2.9)]. The acupuncture group had consistently better results in every secondary outcome measure [differences between groups in pain intensity measured by Lattinen index, in range of motion (goniometer), functional ability (SPADI), quality of life (COOP-WONCA charts), NSAIDS intake, credibility

(Borkoveck and Nau scale) and global satisfaction (10 points analogue scale)] than the control group.” The authors conclude that “acupuncture is an effective **long-term** treatment for patients with shoulder pain (from soft tissues lesions) in a primary care setting.”[15]

Adverse effects:

No safety alerts were identified for acupuncture in the United States, Canada or the United Kingdom. Four studies did not report on adverse effects [5, 8, 11, 13,] three studies had no significant adverse effects reports [7, 10, 12,] two studies reported minor adverse events such as pain or bruising at the site [6, 9] and one study reported no adverse events [14.] One study did not differentiate between severe or minor adverse effects, but reported side effects for both the acupuncture and placebo groups.[15]

Qualitative Signal: Signal Detected (Important changes in effectiveness short of “opposing findings.”)

1. Due to the use of varying comparators (different types of placebo and other active interventions), heterogeneous scales, and reported formats for estimates, we were unable to pool the data except for two outcomes.
2. New evidence consists of 11 studies with heterogeneous interventions and comparators that may not provide robust results. However, the included studies have larger sample size (e.g. the largest sample size in the original review is 150 compared to 425 in the new evidence), longer treatment duration (the longest treatment duration was 6 weeks in the original review versus to 8 weeks in the new studies) and longer follow-up time (the longest follow-up time was 5 months in the original review compared to 12 months in the new evidence) than the 9 studies in the original review.
3. Although the new studies do not provide conclusive findings for or against their respective interventions and comparators, the majority of them consistently demonstrated statistically significant findings favoring acupuncture compared to comparators (placebo and active comparators) for the reported outcomes of interest (see study specific details below in # 5). Consistent with the original review, there was no statistically significant difference between acupuncture and steroid injection. Additionally, no difference was observed when two different types of acupuncture were compared against each other.
4. While the first part of the original review’s conclusion (“due to a small number of clinical and methodologically diverse trials, little can be concluded from this review”) may still hold, the new evidence has likely changed the other conclusions in the original review (“There is little evidence to support or refute the use of acupuncture for shoulder pain although there may be short-term benefit with respect to pain and function.”) New evidence suggests there is likely a short and possibly longer-term benefit of the intervention due to the stated reasons in 2-3 above, and identification of two quantitative signals (see study specific details below in # 5, and quantitative signals section).
5. Study specific details:

- Kibar et al., 2017: The intervention, “laser acupuncture” was not assessed in the original review. The outcomes, pain and abduction, were assessed using different scales than what was used in the original review, so we could not pool the data. Overall, treatment demonstrated statistically significant improvement for the laser acupuncture group. [5]
- Rueda Garrido et al., 2016: Statistically significant reduction in pain measured by VAS was observed after treatment (4weeks), and also after 3 months of follow up (Mean/SD 37.57 /27.9 in the intervention group and 20/26.66 in the control arm) favoring the intervention group. This study contributed data for a meta-analysis (see quantitative signal section). [6]
- Zhang et al., 2016: The intervention and control in this study were different than in the original review, so we could not pool the data for reported outcomes such as pain and range of motion. However, it is important to note that the mean difference between the groups remained statistically (also clinically) significant for pain relief measured by VAS throughout the follow up time and was -40.9 (95% CI-49.5, -32.3) at 16 weeks favoring acupuncture.[7]
- Itoh et al., 2014: The intervention type, trigger point acupuncture, was not used in the original review, and the between groups comparison showed significant difference in pain favoring the treatment compared with sham.[8]
- Johansson et al., 2011: Similar to the original review’s findings, comparison between steroid injection and acupuncture didn’t demonstrated statistically significant difference in pain, function, and HRQOL over 12 months follow up. We could not pool the data from this study due to the use of different scales and because one group received home exercise as co-intervention.[9]
- Molsberger et al., 2010: This study reported a new comparator - conventional conservative orthopedic treatment (COT) - which was not captured in the original review. The findings demonstrated that acupuncture was significantly better than sham and COT.[10]
- Lathia et al., 2009: This study reported a new comparison - standard acupuncture versus traditional Chinese medicine (TCM) - that was included in the original review. We could not pool the data for acupuncture compared to sham comparison because the scale (SPADI) and the reported format (SE instead of SD) were different than in the original review. The study demonstrated that acupuncture performed better than sham and there was no difference between the two types of acupuncture. [11]
- Vas et al., 2008: The comparator - mock TENS - was not included in the original review. Physiotherapy as a co-intervention was used in both arms (acupuncture versus mock TENS) in this study. We could not pool data on functionality of the shoulder because a different scale, the Constant–Murley Score (CMS), was used. Acupuncture plus physiotherapy demonstrated statistically significant results compared to TENS.[12]
- Ma et al., 2006: the comparator (physical therapy) was not included in the original review. Physiotherapy was used in a co-intervention arm (acupuncture plus physiotherapy) in this study. We could not pool data on pain, as the results were not reported in a format that we could use. Pain was better controlled by acupuncture versus physiotherapy, however, better results were found for the co-intervention arm.

- Johansson et al., 2005: This study reported data on acupuncture versus ultrasound; however, we could not pool data due to the use of a combined scales estimate (scores from 3 shoulder disability measures were combined) for shoulder functionality. The study reported that acupuncture had larger improvement in the combined score.[14]
- Guerra et al., 2004: The original review included electroacupuncture; however, the comparator in this study (non-penetrating placebo acupuncture was different than the original review. As such, we could not pool the data. The study reported better results for acupuncture.[15]

Quantitative Signal: Two signals detected

Pain Post Intervention, MA# 1.1.1: New evidence from Molsberger et al., 2010[10] was pooled with the data in the original review (1 study, N=24, MD 12.10, 95% CI -10.23, 34.43). Opposite to the original review findings, the pooled estimate demonstrated a statistically significant difference in pain favoring the intervention (MD -12.56, 95% CI -17.44, -7.69, N=381, 3 studies, Figure 1). **One Signal** It is important to note that the original review does not state the duration of treatment for this outcome and it is not clear if the effect estimate was for immediate post intervention. Molsberger et al., 2010 [10,] and Rueda Garrido et al., 2016[6] reported data for both immediate post intervention (4-6 weeks), and after 3 months of follow up. As such, we conducted a separate meta-analysis for MA#1.1 considering after follow up data from new evidence. The pooled estimate was statistically significant favoring the treatment (MD -13.05, 95% CI -18.38, -7.72, Figure 2). Both MAs demonstrate opposite finding to the original review and generate a signal. Please note that the population of interest are different in the three studies (original review included patients with rotator cuff, Molsberger et al., 2010[10] included outpatients patients with shoulder pain ≥ 6 weeks, and Rueda Garrido et al., 2016[6] included patients with impingement syndrome for >3 months), this could explain the high degree of heterogeneity ($I^2 = 81%$ and $62%$ in the two MAs respectively). As a sensitivity analysis, we only pooled the data from the new evidence (Molsberger et al., 2010, and Rueda Garrido et al., 2016) to focus on post follow up data, and the pooled estimated remained statistically significant (MD -14.57, 95% CI -20.06, -9.08, Figure 5). It is important to note that the effect of treatment increased after the 3-4 months of follow up and remained statistically, and perhaps clinically, significant favoring the treatment [opposite to the composite score in the original review that post intervention WMD 17.3 (7.79, 26.81) didn't remain clinically significant after 4 months of follow up WMD 3.53 (0.74, 6.32)].

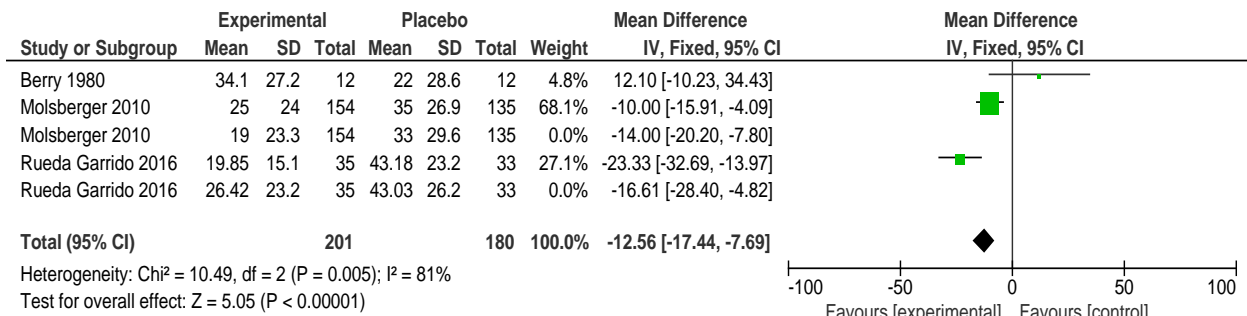


Figure 1- Pain post intervention (immediately after treatment)

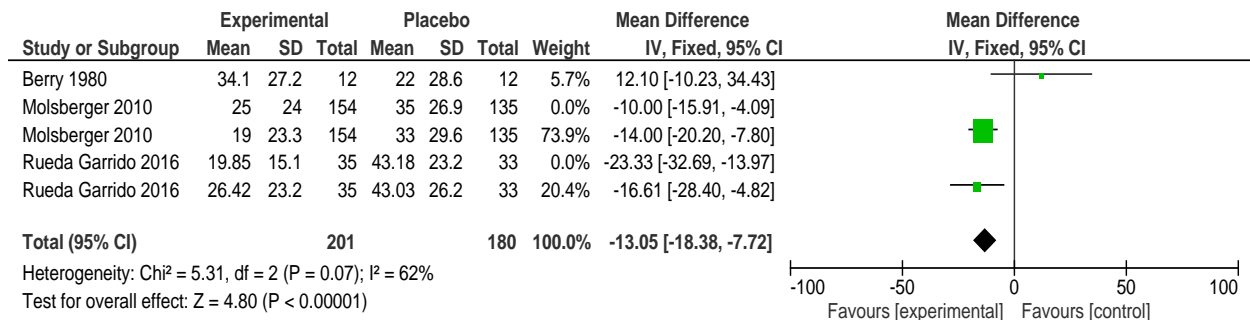


Figure 2- Pain post intervention (after 3-4 months follow up including Berry et al., 1980)

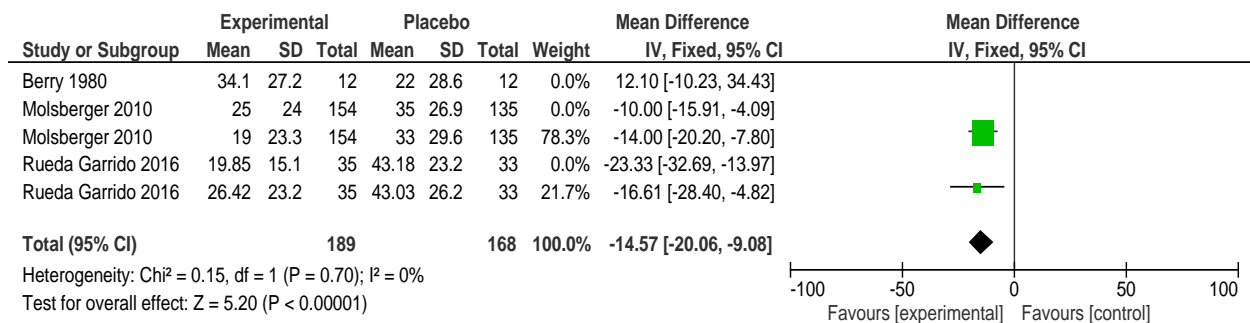


Figure 3- Pain post intervention (after 3-4 months follow up excluding Berry et al., 1980)

Range of abduction Post Intervention, MA#1.2.1: We pooled new evidence from Molsberger et al., 2010[10] with the reported data from original review (1 study, N=24, MD -17.30, 95% CI -44.11, 9.51). The pooled estimate demonstrated a statistically significant difference favoring the treatment (2 studies, N=313, MD 9.54, 95% CI 1.78, 17.31, Figure 4), conflicting with the original review’s finding. **One Signal** Given that it was not very clear if the data in the original review was immediate post intervention or if it included follow-up time, we pooled the three months follow-up data from Molsberger et al., 2010[10] with the original review estimate in a separate meta-analysis. The pooled estimated remained significant favoring the intervention (2 studies, N=313, MD 8.71, 95% CI 1.10, 16.33, Figure 5). Both MAs demonstrate opposite finding to the original review and generate a signal. It is important to note that the population of interest are different in the two studies (original review included patients with rotator cuff and Molsberger et al., 2010[10] included patients with chronic pain), and the duration of treatment is not known in the original review, this could explain the high degree of heterogeneity (I² = 76% and 75% in the two MAs respectively).

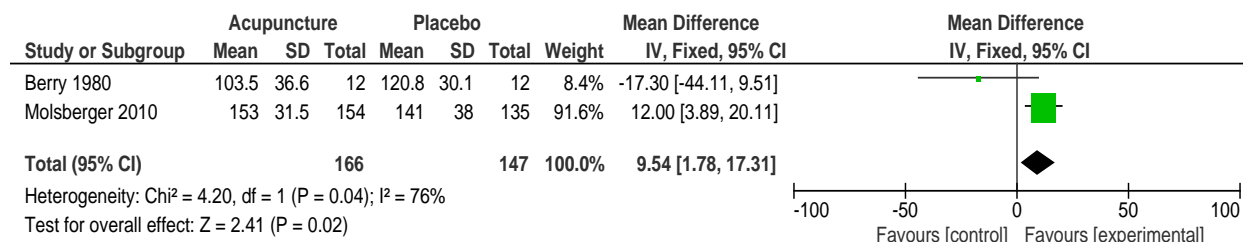


Figure 4: Range of abduction post intervention

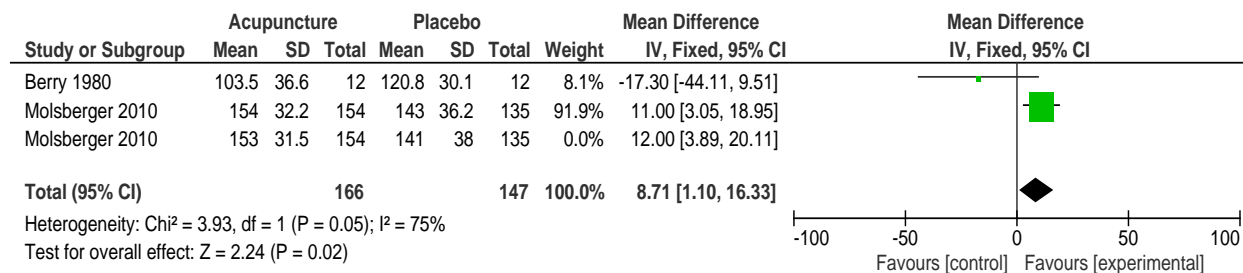


Figure 5: Range of abduction post intervention

Conclusion: Qualitative and quantitative signals were identified. These may have the potential to change the conclusions for some part of the review.

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Appendix A: Overview of the Modified Ottawa Method

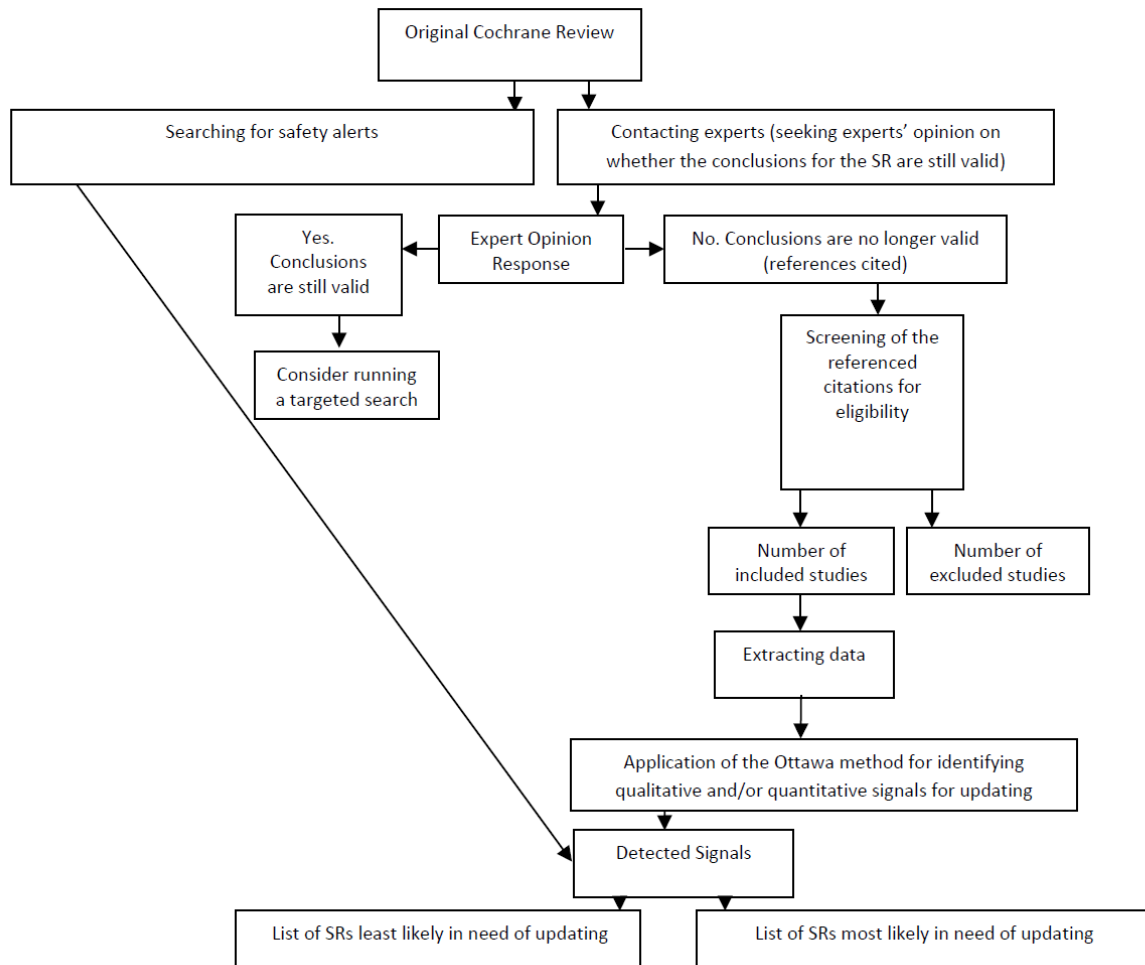


Figure 1: The process of signal detection methods for Cochrane reviews

Appendix B: Expert Opinion Survey

Conclusions from systematic review	Is the conclusion(s) in this review still valid? (Yes/No/Don't know)	Are you aware of any new evidence that is sufficient to invalidate the finding(s) in this review? (Yes/No/Don't know) If yes, please provide references	Comments
<p>Review Objective: To determine the efficacy and safety of acupuncture compared to placebo, no treatment, another intervention, or of varying types and dosages of acupuncture compared to each other in the treatment of people with shoulder pain and dysfunction (adults >16 years of age with shoulder pain or disorder for greater than 3 weeks, irrespective of diagnostic label).</p>			
<p>Overall Conclusion of the Review: Due to a small number of clinical and methodologically diverse trials, little can be concluded from this review. There is little evidence to either support or refute the use of acupuncture for treating shoulder pain and more trials are needed. The limited evidence available indicates some short term benefit of acupuncture compared to placebo with respect to shoulder specific disability. Little is known of the potential for adverse effects.</p> <p><u>Further Details:</u> There were few significant findings with regard to the use of acupuncture when compared to placebo or other interventions. Due to small sample sizes it is possible that this may be explained by Type II error. Acupuncture was of benefit over placebo in improving the Constant Murley Score (a measure of shoulder function), however, by the four month follow-up, the difference between the acupuncture and placebo groups, whilst still statistically significant, was no longer likely to be clinically significant. Acupuncture used in combination with exercise was demonstrated to be more effective than exercise alone in one small trial. Deep acupuncture was shown to be more effective than shallow acupuncture and acupuncture using sites determined by Jing Luo was more effective than that using sites determined by traditional Chinese medicine, however, neither of these trials</p>			

<p>included placebo or other intervention comparison groups. In one of the larger trials, nerve block was found to be more effective than acupuncture on a range of outcome measures but no follow-up data were reported and the pain outcome measurement used may be inappropriate. Few trials reported adverse events associated with acupuncture when compared to placebo or other interventions.</p>			
<p>Effects of Interventions by Outcome</p> <p>Acupuncture vs. Placebo: Success Rate: There was no significant difference between success rates in the acupuncture group compared to the placebo group (RR1.01 (0.69 to 1.48)). Pain: In one trial there was not a significant difference between acupuncture and placebo in reducing pain or increasing the range of abduction in the short term (Berry 1980). One small trial did demonstrate a significant difference post intervention (4 weeks) favouring the acupuncture group for improved shoulder pain, range of movement and functioning measured by a composite score of these factors (The Constant Murley Score) (WMD 17.3 (7.79, 26.81) out of a total score of 100). At four months follow-up a significant difference remained between the groups, however the difference between the change in scores in the acupuncture group and the change in scores in the placebo group was unlikely to be clinically significant (WMD 3.53(0.74 to 6.32)) (i.e.. a change of 3.53 on a scale of 100 is unlikely to represent a clinically significant improvement). A third trial, whose results could not be included in the meta-analysis due to insufficient data, failed to demonstrate a significant difference between acupuncture and placebo in a measure of subjective improvement post intervention (Moore 1976). Adverse effects: No difference was observed between groups with respect to</p>			

<p>the incidence of fainting, headache, dizziness, inflammatory reactions or leg weakness.</p>			
<p>Acupuncture vs. Steroid Injection: Pain: One trial compared acupuncture to anterior glenohumeral injection of corticosteroid for rotator cuff disease, with only 12 participants in each group (Berry 1980). There was no significant difference from placebo following treatment with respect to pain (WMD 7.5 (-12.47 to 27.47)), range of abduction (WMD 2.9 (-26.83 to 32.62) or success rate (RR 0.83 (0.35 to 2.00)).</p>			
<p>Acupuncture vs. Ultrasound Pain: The same trial (Berry 1980) with 12 participants per group compared acupuncture to ultrasound and demonstrated no significant difference between groups following treatment with respect to pain (WMD -7.10 (-32.90 to 18.70)), range of abduction (WMD 7.9 (-21.59 to 37.39) or success rate (RR 0.83 (0.35 to 2.00)).</p>			
<p>Electroacupuncture vs. Stellate Ganglion Block and Suprascapular Nerve Block Pain and time to achieve maximum pain relief: A trial of 100 participants (Lin 1994) found There was a significant difference favouring nerve block over acupuncture in reducing pain at 30 hours follow-up (WMD 1.33 (1.22 to 1.44)) (out of a total score of 4). The time to achieve maximum pain relief was significantly shorter in the nerve block group (WMD 64.96 (60.50 to 69.42 minutes)). Range of Motion: The same trial (Lin 1994) found There was a statistically significant but small difference favouring nerve block in increasing range of flexion (WMD -7.00 (-11.17 to -2.83)). This trial gives no information as to the relative effect of either intervention compared to no treatment or placebo.</p>			
<p>Acupuncture plus mobilization vs. acupuncture alone Pain: In a pilot study of participants with general shoulder pain (of no particular diagnosis) (Romoli 2000,) results revealed no significant difference between the acupuncture plus mobilization compared to mobilization alone with</p>			

<p>respect to pain at rest (WMD -0.37(-1.85 to 1.11)), pain on movement (WMD 0.25 (-1.87 to 2.37)) (out of a total of 10), or active flexion (WMD -13.13(-39.79 to 13.53) and abduction (WMD -14.37 (-49.94 to 21.20)).</p>			
<p>Acupuncture plus Exercise vs. Exercise Alone Pain: A small trial comparing acupuncture and exercise with exercise alone for adhesive capsulitis (Sun 2001) showed a significant difference favouring the acupuncture plus exercise group in a composite measure of pain, range of motion and functioning post intervention (WMD 9.20 (0.54 to 17.86)) (out of a total score of 100). The effect remained at 20 weeks follow-up (WMD 9.40 (0.52 to 18.28))</p>			
<p>Acupuncture vs. Tragar Pain: One trial compared acupuncture and Tragar for the treatment of general shoulder pain (no particular diagnosis) due to wheel chair use (Dyson-Hudson 2001). There were no significant differences in pain scores post intervention (WMD 1.70 (-21.91 to 25.31)) or at five weeks follow-up (WMD 16.00 (-9.03 to 41.03)) (out of a total of 150) between the groups.</p>			
<p>Deep vs. Shallow Acupuncture Pain: In a trial comparing deep acupuncture and shallow acupuncture in those with general shoulder pain (no particular diagnosis) there was a significant difference favouring deep acupuncture over shallow acupuncture with respect to pain post intervention (WMD -10.31 (-15.44 to -5.18)) and at three months follow-up (-8.00 (-12.20 to -3.80)).</p>			
<p>Jing Luo vs. Traditional Chinese Medicine Acupuncture Recovery: There was a significantly greater recovery rate in the group where acupuncture sites were determined according to the distribution of Jing Luo compared to sites determined according to pathogenesis in the theory of traditional Chinese medicine (RR 1.50 (1.08 to 2.09)) for periarthritis (Yuan 1995).</p>			
<p>Abbreviations: WMD = weighted mean difference</p>			

Appendix C: The Ottawa Method Qualitative Signals*

Potentially invalidating change in evidence

This refers to a situation in which it is expected that clinicians do not act upon the results of the original systematic review (SR) and the agency/organization that supported the original production of the SR would retract the SR until it is updated. Criteria for potentially invalidating change in evidence are presented below.

This category of signals (A1-A3) specifies findings from a pivotal trial**, meta-analysis (with at least one new trial), practice guideline (from major specialty organization or published in peer-reviewed journal), or recent textbook (e.g., *UpToDate*):

- Opposing findings (e.g., effective vs. ineffective) – **A1**
- Substantial harm (e.g., the risk of harm outweighs the benefits) – **A2**
- A superior new treatment (e.g., new treatment that is significantly superior to the one assessed in the original CER) – **A3**

Major change in evidence

This category of signals (A4-A7) refers to situations in which there is a clear potential for the new evidence to affect the clinical decision making. These signals, except for one (A7), specify findings from a pivotal trial, meta-analysis (with at least one new trial), practice guideline (from major specialty organization or published in peer-reviewed journal), or recent textbook (e.g., *UpToDate*):

- Important changes in effectiveness short of “opposing findings” – **A4**
- Clinically important expansion of treatment (e.g., to new subgroups of subjects) – **A5**
- Clinically important caveat – **A6**
- Opposing findings from meta-analysis (in relation to a meta-analysis in the original CER) or non-pivotal trial – **A7**

* Please, see Shojania et al. 2007 for further definitions and details

**A pivotal trial is defined as: 1) a trial published in top 5 general medical journals such as: Lancet, JAMA, Annals of Intern Med, BMJ, and NEJM. Or 2) a trial not published in the above top 5 journals but have a sample size of at least triple the size of the previous largest trial in the original CER.

Appendix D: Modified PRESS Review for Original Review's Search Strategy

The methods indicate that the strategies were executed in multiple databases from inception to December 2003. The precise dates of the searches are not provided. Although the manuscript indicates that the full strategies are available in a supplementary table, the SciSearch strategy is not included. Of those provided, all are textual representations of the search statements and set numbers and do not show the strategy exactly as run in each database, complete with full database name, version, and platform, date run, and number of hits per line.

The strategy contains some critical errors in the form of typos. The MEDLINE strategy incorrectly uses "adhesive capulitis" rather than "adhesive capsulitis". (The condition is spelled correctly in the other databases.) The CINAHL strategy contains two errors ("exp Cllinical Trials/", "doube blind") that would render the results from that database almost useless. The documentation also shows ".mp" without a closing period for one of the MEDLINE search statements (the correct syntax is ".mp.") and it is possible a system error was generated for this statement. Without the full strategies, it is impossible to confirm whether this is just an error in documentation or, if not, how it was dealt with in the actual search.

There are many synonyms missing from the strategy, both for the population and the intervention. The population terms could be expanded to multiple synonyms for shoulder impingement syndrome (e.g., outlet/posterosuperior/subacromial impingement). Tendinosis and tendinopathy are also synonyms for tendinitis. The intervention is missing electro-acupuncture, pharmacoacupuncture, pharmaco-acupuncture, acupressure, acu-pressure, Chih Ya, Shiatsu, Shiatzu, Zhi Ya, needling and possibly also terms for meridians, Ching Lo, Jing Luo, Jingluo. Other interventions such as gua sha, cupping, and tui na are typically used in conjunction with acupuncture and may also be relevant.

The strategies are generally similar across the databases but the CENTRAL search differs in that it excludes some terms (e.g., shoulder impingement, adhesive capsulitis) and the vocabulary it does use is applied more broadly than in the other searches. This would create some unevenness in the results and negate the value of the proximity searching applied in the other strategies.

In conclusion, the strategy has some significant limitations with regard to documentation and vocabulary, including spelling errors, and potentially relevant citations will almost certainly have been missed.