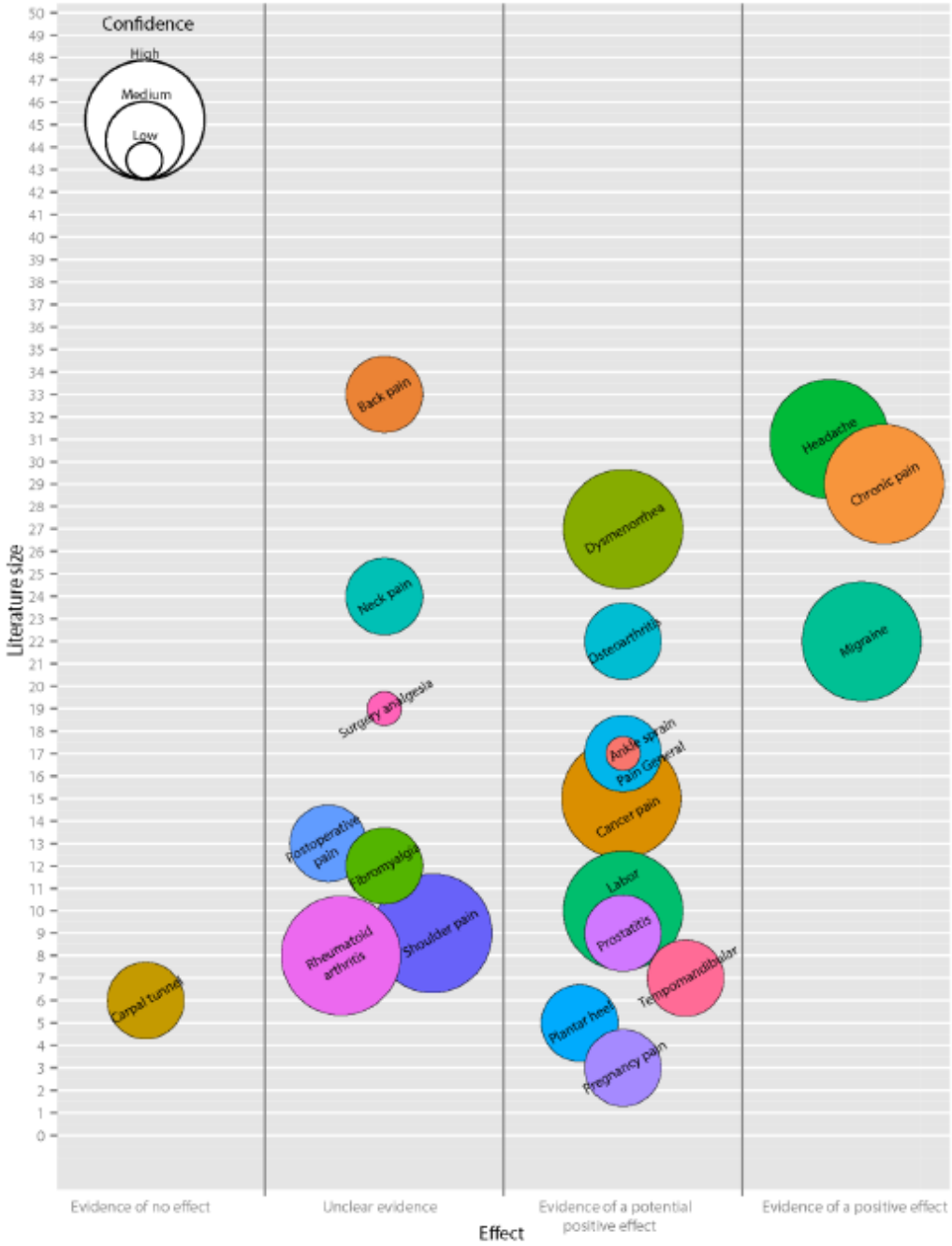
NCCAOM-ASA Figures

Figure 1. Dept. of Veterans Affairs Evidence Map of Acupuncture for Pain[1].

EVIDENCE MAP OF ACUPUNCTURE FOR PAIN

The results for the clinical indication Pain are presented in the bubble plot and a text summary below. The bubble plot summarizes the results of 59 systematic reviews for 21 distinct indications relevant to the outcome pain [search date: March 2013].



Legend: The bubble plot shows an estimate of the evidence base for pain-related indications judging from systematic reviews and recent large RCTs. The plot depicts the estimated size of the literature (y-axis, number of RCTs included in largest review), the estimated effect (x-axis), and the confidence in the estimate (bubble size).

[1] Hempel S, Taylor SL, Solloway MR, et al. Evidence Map of Acupuncture [Internet]. Washington (DC): Department of Veterans Affairs (US); 2014 Jan.

Figure 2. Distribution of Licensed Acupuncturists in U.S.[2]

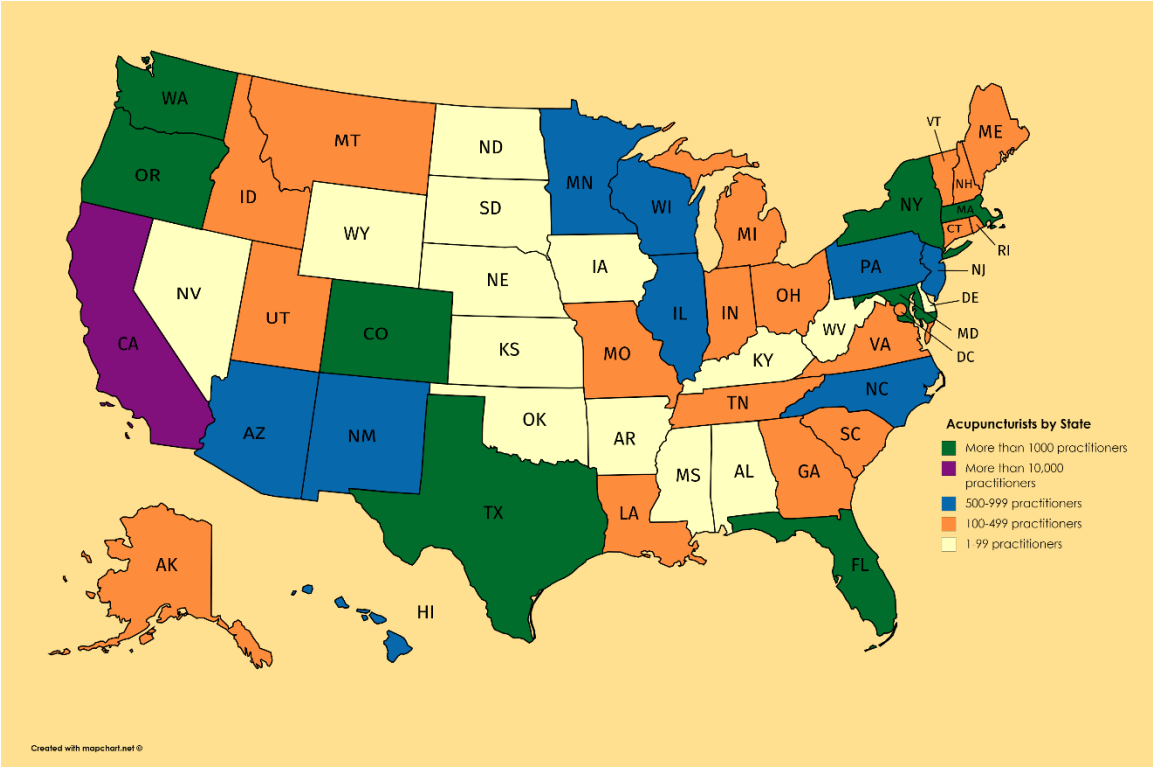
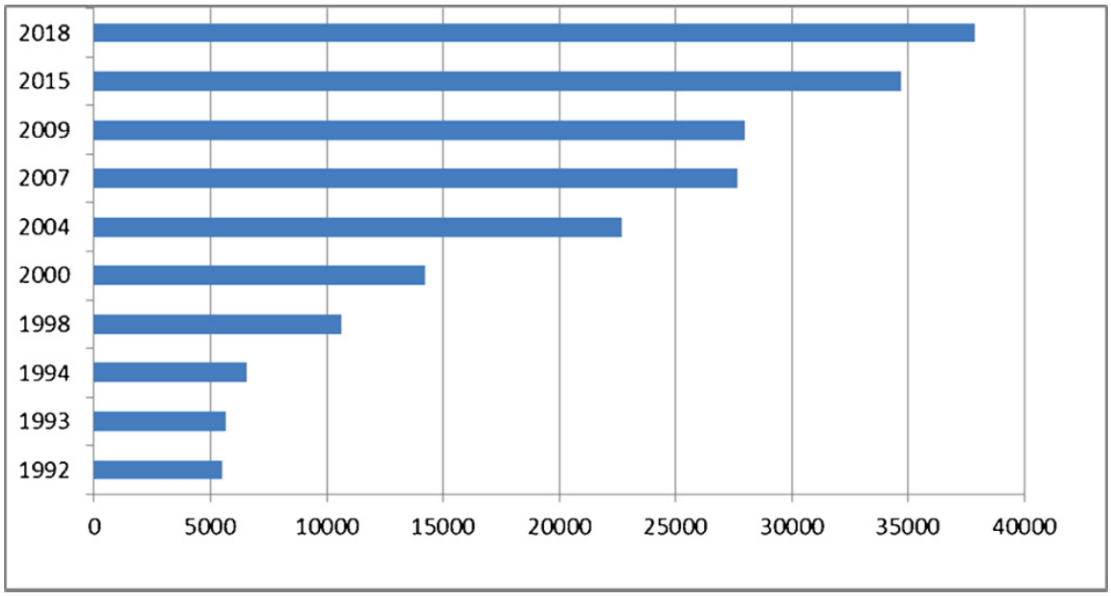


Figure 3. Growth in the Number of Licensed Acupuncturists, 1992-2018[3]



[2] Fan AY, Faggert S. Number of licensed acupuncturists and educational institutions in the United States in early of 2015. *J Integr Med*. 2018 Jan;16(1):1-5. 2017 December

[3] Fan, Arthur & Stumpf, Steven & Faggert Alemi, Sarah & Matecki, Amy. (2018). Distribution of licensed acupuncturists and educational institutions in the United States at the start of 2018. Complementary Therapies in Medicine. 41. 295-301. 10.1016/j.ctim.2018.10.015.

Figure 4. Growth Trajectory of Licensed Acupuncturists, 1992-2018[4]

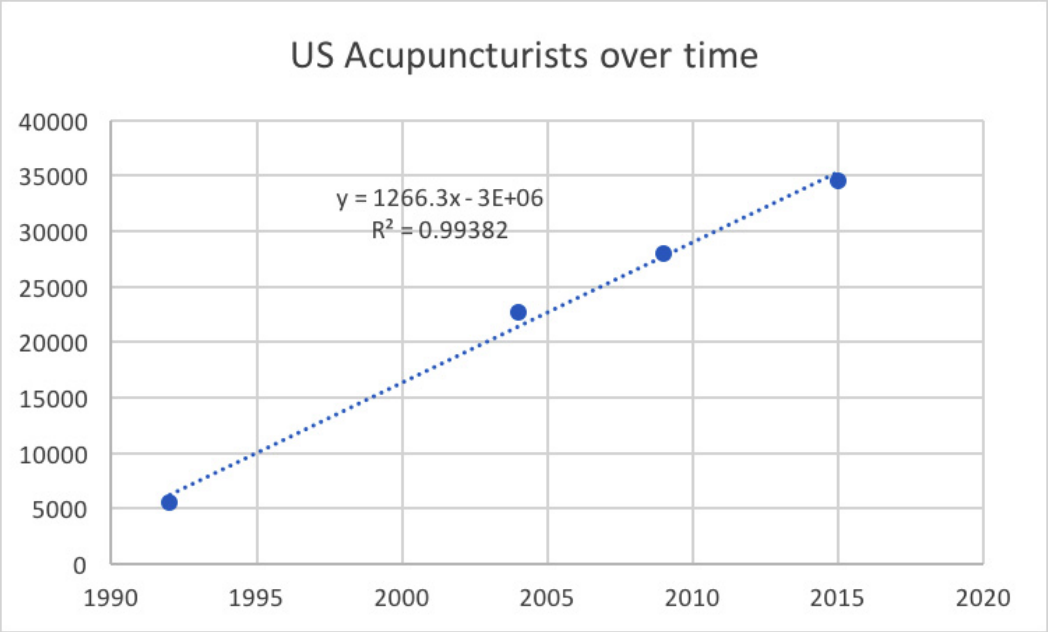
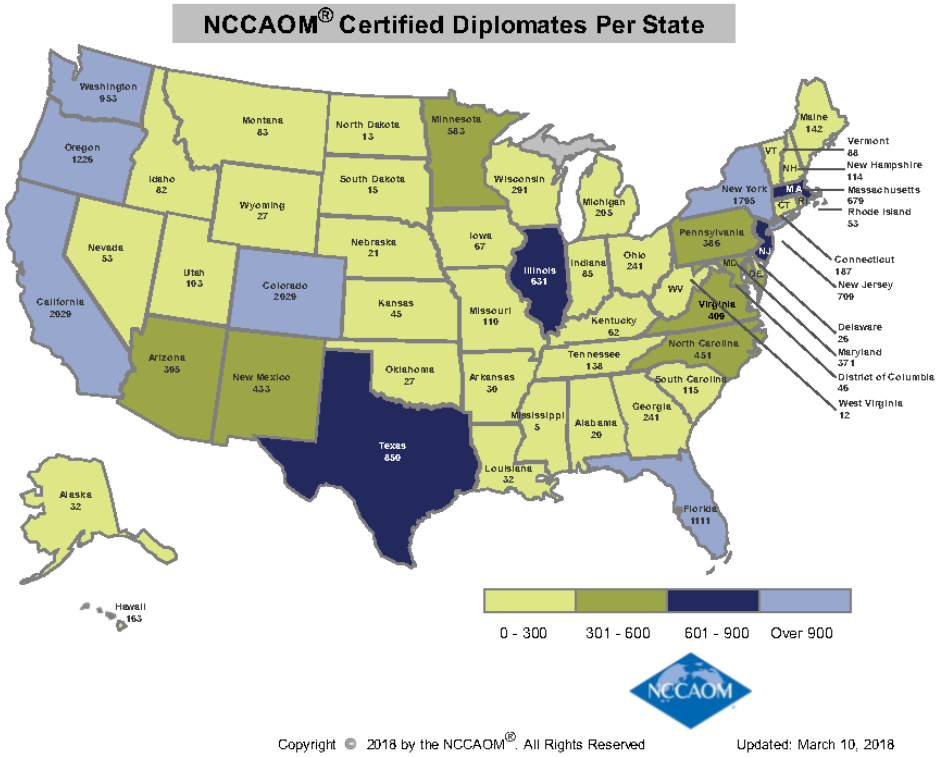


Figure 5. Distribution of NCCAOM Diplomates in U.S.[5]



[4] Ibid Fan, et al.

[5] https://www.nccaom.org/advocacy-regulatory/state-relations/

Appendix A. Additional Evidence Supporting Acupuncture for Chronic Low Back Pain

On behalf of the NCCAOM and the ASA, we respectfully submit the following studies representing the evidence base for acupuncture for CLBP. If we can provide any additional information, please contact us at the addresses listed on our main comment page.

---

1. Brinkhaus B, Witt CM, Jena S, et al. Acupuncture in patients with chronic low back pain: a randomized controlled trial. Arch Intern Med. 2006 Feb 27; 166(4):450-7. Doi: 10.1001/archinte.166.4.450. PMID: 16505266

2. Brinkhaus B, Witt CM, Jena S, et al. Interventions and physician characteristics in a randomized multicenter trial of acupuncture in patients with low-back pain. J Altern Complement Med. 2006 Sep;12(7):649-57. doi: 10.1089/acm.2006.12/649. PMID: 16970535.

3. Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, et al. AHRQ Comparative Effectiveness Reviews. Noninvasive Treatments for Low Back Pain. Rockville (MD): Agency for Healthcare Research and Quality (US); 2016.

4. Furlan AD, Yazdi F, Tsertsvadze A, et al. A systematic review and meta-analysis of efficacy, cost-effectiveness, and safety of selected complementary and alternative medicine for neck and low-back pain. *Evid Based Complement Alternat Med.* 2012;2012:953139.

5. Gao H, Wei C. Extra point acupuncture treatment of 36 cases of acute lumbar sprain [in Chinese]. Journal of Gansu College of Traditional Chinese Medicine. 2006;2006:49-50.

6. Haake M, Muller HH, Schade-Brittinger C, et al. German Acupuncture Trials (GERAC) for chronic low back pain: randomized, multicenter, blinded, parallel-group trial with 3 groups. Arch Intern Med. 2007 Sep 24;167(17):1892-8. doi: 10.1001/archinte.167.17.1892. PMID: 17893311.

7. Hasegawa TM, Baptista AS, de Souza MC, Yoshizumi AM, Natour J. Acupuncture for acute non-specific low back pain: a randomised, controlled, double-blind, placebo trial. Acupunct Med. 2014;32:109-15. [PMID: 24316509] doi:10.1136/acupmed-2013-010333.

8. Jin M, Chen J. Acupuncture treatment for 40 cases of acute lumbar sprain [in Chinese]. Journal of Gansu College of Traditional Chinese Medicine. 2008;2006:49-50.

9. Lam M, Galvin R, Curry P. Effectiveness of acupuncture for nonspecific chronic low back pain: a systematic review and meta-analysis. Spine (Phila Pa 1976). 2013 Nov 15;38(24):2124-38.

10. Lan J. Analysis of application of acupuncture analgesia in acute lumbar sprain [in Chinese]. Journal of Community Medicine. 2009:68-9.

11. Lee JH, Choi TY, Lee MS, Lee H, Shin BC, Lee H. Acupuncture for acute low back pain: a systematic review. Clin J Pain. 2013;29:172-85. [PMID: 23269281] doi:10.1097/AJP.0b013e31824909f9.

12. Liu L, Skinner M, McDonough S, Mabire L, Baxter GD. Acupuncture for low back pain: an overview of systematic reviews. Evid Based Complement Alternat Med. 2015;2015:328196.

13. Montes LA, Valenzuela MJ. Effectiveness of low back pain treatment with acupuncture [in Spanish]. Biomedica. 2017 Jun 2;38(0);54-60. Doi:10.7705/biomedical.v38i0.3546. PMID: 29809328.

14. Standaert CJ, Friedly J, Erwin MW, et al. Comparative effectiveness of exercise, acupuncture, and spinal manipulation for low back pain. *Spine (Phila Pa 1976).* Oct 1 2011;36(21 Suppl):S120-130.

15. Thomas KJ, MacPherson H, Thorpe L, et al. Randomised controlled trial of a short course of traditional acupuncture compared with usual care for persistent non-specific low back pain. BMJ. 2006 Sep 23;333(7569):623. doi: 10.1136/bmj.38878.907361.7C. PMID: 16980316.

16. Vas J, Aranda JM, Modesto M, Benitez-Parejo N, Herrera A, Martınez-Barquın DM, et al. Acupuncture in patients with acute low back pain: a multicentre randomised controlled clinical trial. Pain. 2012;153:1883-9. [PMID: 22770838] doi:10.1016/j.pain.2012.05.033

17. Wellington J. Noninvasive and alternative management of chronic low back pain (efficacy and outcomes). Neuromodulation. 2014 Oct;17 Suppl 2:24-30.

Appendix B. Systematic Review of Acupuncture of Low Back Pain.

We respectfully submit the review below analyzing 11 trials comparing acupuncture to conventional care and sham acupuncture.

Systematic Review of Acupuncture for Low Back Pain: Efficacy and Clinically-Meaningful Change

Authors: All authors are listed and all have contributed substantially to the manuscript. There are no other manuscripts in publication or in submission from this project.

Lisa Taylor-Swanson, PhD, MAcOM, EAMP[1]
College of Nursing, University of Utah

Jennifer A.M. Stone, LAc
Indiana University School of Medicine
Department of Anesthesia

Megan K. Gale, EAMP, MSAOM, EAMP/LAc
megankgale@outlook.com
The Hospital-Practice Handbook Project

Amanda Gaitaud, LAc, Dipl. OM, DAOM Cand.
amandagaitaud@gmail.com
Inner Balance Medicine

Christopher Huson, MAc, LAc, EAMP
mrhuson@mindspring.com
Ballard & Freemont Neighborhood Acupuncture

Fujio McPherson, DAOM, ARNP, LAc
fmdc82@comcast.net
Madigan Army Medical Center

Jessica Martens, MSA, CCHM, EAMP
jessicamartenslac@gmail.com
Sound Acupuncture PLLC

Jacob Godwin jacobgodwinlac@gmail.com
Godwin Acupuncture

Mercy Yule mercyyule@earthlink.net
(No affiliation)

1. Lisa J. Taylor-Swanson, lisa.taylor-swanson@nurs.utah.edu, (801)585-5486 , College of Nursing, University of Utah, USA, 10 South 2000 East, Salt Lake City, Utah, 84112

Abstract

Low back pain has a substantial effect on the quality of life for those affected and places a significant economic burden on healthcare systems. The purpose of this study is to identify, document, and appraise reports of randomized controlled trials on the treatment of low back pain with acupuncture. Relevant studies were identified through systematic searches in scientific databases. Eighteen of 948 papers retrieved met all inclusion criteria and were reviewed. Acupuncture significantly outperformed usual care in 10 of 11 trials. Sham acupuncture outperformed waitlist in 1 trial and conventional care in 2 trials. Needleless placebo acupuncture outperformed conventional care in 1 of 3 trials reviewed. No moderate or severe adverse events related to the intervention were reported. Concerns of cost and missed work were studied in some trials. Acupuncture was associated with fewer days absent from work in 1 reviewed trial. The identified evidence suggests that 1) acupuncture is a safe, effective, and possibly cost-effective treatment for low back pain; and 2) sham and needleless placebo acupuncture do not appear to be inert. Further trials investigating the cost and potential cost-saving strategies of acupuncture are merited.

Perspective

This article presents a systematic review of trials of acupuncture in the treatment of low back pain. The evidence suggests that acupuncture is a safe, effective, and possibly cost-effective treatment for low back pain and that sham and needleless placebo acupuncture do not appear to be inert.

Keywords: acupuncture, low back pain, efficacy, clinically meaningful change

Introduction

Low back pain (LBP) has a substantial effect on the quality of life of those affected by it. As well as a major health problem for these individuals, LBP also places a significant economic burden on healthcare systems. Approximately 1 in 4 people affected by LBP seek medical attention within a 6-month period.[1] Workers with acute lumbar sprain account for 42% of all occupational injuries (www.bls.gov/iif).

The magnitude of the burden from low back pain has increased in recent years. In 1990, a study ranking the most burdensome conditions in the U.S. in terms of mortality or poor health as a result of disease ranked low back pain in sixth place; in 2010, low back pain jumped to third place, with only ischemic heart disease and chronic obstructive pulmonary disease ranking higher. (http://www.ninds.nih.gov/disorders/backpain/detail_backpain.htm)

Significance

Even though low back pain has such an important impact on general health, this condition is often treated insufficiently. Poor efficiency in treatment has led to the necessary creation of guidelines that address evidence-based strategies for treatment of LBP.[2] The effectiveness of acupuncture for the management of LBP has been reviewed systematically in 1999,[3] in 2005,[4] in 2008,[5] in 2012,[6] and again in 2013.[7,8]

The largest study previously reviewed was the highly publicized German acupuncture trial including 1,162 patients from 340 practices. The results of the study revealed that the effectiveness of acupuncture, either verum or sham, was almost twice that of conventional therapy.[9] However, many of the trials reviewed in the systematic reviews, particularly by van Tulder and Furlan, were conducted 10-30 years ago and were of poor methodologic quality. Several of the systematic reviews[3] and meta-analyses[10] had inconclusive results. The present study was undertaken to summarize more recent trials of acupuncture for LBP and to analyze the findings in light of recent evidence indicating that sham acupuncture is not an inert control.

The aim of the present study is to identify and summarize findings from relevant recent trials of acupuncture for the treatment of low back pain. The identified trials were reviewed and findings were summarized regarding statistical significance, clinical relevance, as well as quality, as many older trials have been deemed to be of poor methodologic quality. Lastly, findings were analyzed with respect to type of sham comparison employed.

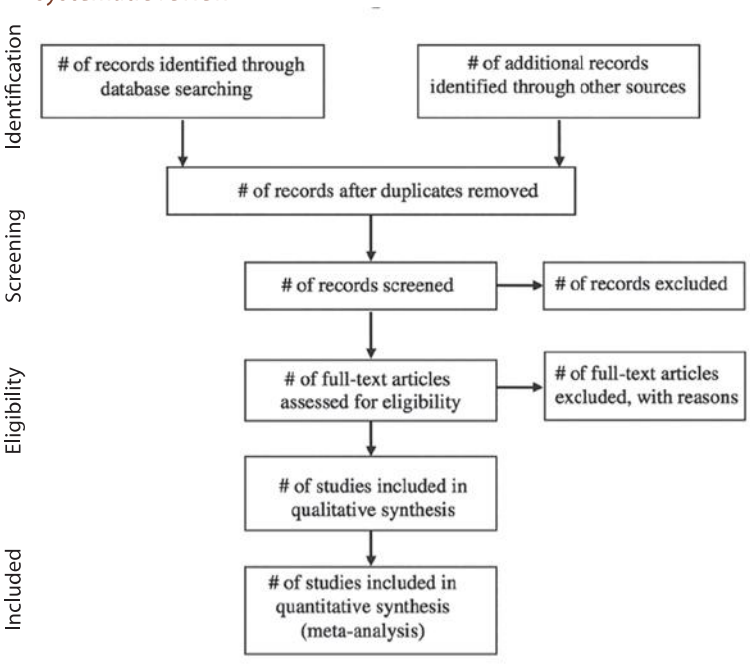
Methods

Relevant studies were identified through systematic searches in scientific databases (MEDLINE, Cochrane Library, CINAHL), "similar article" searches, and reference list scanning. Inclusion criteria were randomized controlled trial (RCT), acupuncture, electro-acupuncture, dry needling, low back pain (LBP), ages 18-65, published 2004-2014, and full text available in English. Exclusion criteria included pregnancy, pediatric, not acupuncture, not randomized controlled trial, animal studies, systematic analyses, meta-analyses, and feasibility studies. The date range of 2004-2014 was selected to capture the most recent literature because many older trials have been deemed to be of poor methodologic quality.[4] The age range of 18-65 was used to capture studies with adult working-age individuals as relevant to Labor and Industries. PRISMA guidelines were followed to design and execute the study.[11]

Search terms of "low back pain" or "lower back pain" and "acupuncture," "acupuncture therapy," "electro-acupuncture," "electro-acupuncture therapy," "electro-acupuncture" or "electro-acupuncture therapy," in [ti] title or [majr] major topic of an article and English in [language] resulted in a retrieval of 948 articles dated 2004-2014. All abstracts were independently reviewed by two assessors, and 18 papers met all inclusion criteria and none of the exclusion criteria.

Study quality was assessed using the Standards for Reporting Interventions in Controlled Trials of Acupuncture (STRICTA) Criteria checklist. STRICTA was developed with the Consolidated Standards of Reporting Trials (CONSORT) Group and is an official extension of the CONSORT statement. The CONSORT guideline is the most well-known reporting guideline and has been listed among the top health research milestones of the twentieth century, according to the Patient-Centered Outcomes Research Institute (PCORI) (Gabriel & Normand, 2012). There are six key acupuncture-related items highlighted to ensure clear and transparent reporting of trials: 1) acupuncture rationale, 2) details of needling, 3) treatment regimen, 4) other components of treatment, 5) practitioner background, and 6) control or comparator interventions (MacPherson, et al., 2010). This project gathered data on all 25 CONSORT items and all 6 acupuncture-related items. Reviews were independently carried out by six reviewers, and data were input into customized extraction forms. Data were compiled and summarized by the two Primary Investigators (LJTS & JAS).

Fig. 1. Flow of information through the different phases of systematic review



"The CONSORT guideline is the most well-known reporting guideline and has been listed among the top health research milestones of the twentieth century..."

Results

Database searches identified 986 papers, and an additional 12 papers were identified through reviewing references. After duplicates were identified and 286 records were removed, the remaining 712 records were screened. Records were excluded if they were not published in English, not relevant to the project, or if the full text was unavailable; in all, 694 records were assessed for eligibility and were excluded as they did not meet eligibility criteria. Eighteen (18) papers were identified as eligible and subsequently reviewed using the criteria set forth in the CONSORT and STRICTA checklists. A total of 7,161 subjects were randomized in the studies analyzed for this review. Studies randomized a range of 26-3,093 subjects.

Study interventions included:

(1) traditional acupuncture according to traditional Chinese medicine (TCM) differential diagnosis, Korean acupuncture, medical acupuncture;

(2) acupuncture with electric stimulation—electrical stimulation leads connected to acupuncture needles after insertion and the unit turned on to the level of patient comfort;

(3) modified acupuncture—superficial sparrow pecking method, single insertion at most tender point.

Control or comparators included:

(1) usual care consisting of physiotherapy, manipulation, and/or medication,

(2) sham needling, e.g., sham superficial needling, not in the area of the lower back,[12]

(3) needleless placebo, e.g., contact was made with the skin by touching with a toothpick.[13]

Interventions assessed within each category varied in terms of their components and delivery. (See Table 1)

Table 1. Study Characteristics

Year	First Author	Acupuncture Intervention	Control / Comparison	# Subjects Randomized
2014	Bahrami- Taghanaki	TCM	Chrono-acupuncture	60
2006	Brinkhaus	Medical Acupuncture	Sham: superficial needling not in the lower back	301
2009	Cherkin	TCM	Simulated acupuncture: toothpick + guide tube Usual care	641
2013	Cho	Korean	Non-penetrating sham needles	130
2007	Haake	TCM	Sham acupuncture, usual care	1,162
2006	Inoue	Acupuncture sparrow pecking method	Injection of 5 mg of dibucaine hydrochloride /5 ml	31
2009	Inoue	Single insertion at most tender point	Needleless placebo using guidetube	26
2010	Miao	TCM	Electro-Acupuncture	80
2013	Pach	TCM	Standardized vs. individualized treatment	150
2006	Thomas	TCM	Usual care	241
2004	Tsui	TCM	Acupuncture + electrical heat; control group	42
2012	Vas	TCM	Sham acupuncture using non-specific acu-points	275
2013	Weiss	TCM	Usual care	160
2006	Witt	NR	Waitlist 3 mos.	3,093
2011	Yeh	EA	Sham, usual care	90
2013	Yuan	TCM	Usual care	408
2012	Zaringhalam	TCM	Usual care: massage, PT, and medication	187
			Total randomized: 7,161	

Acupuncture vs. Usual Care

Of the 18 trials reviewed, 11 trials compared acupuncture to usual or conventional care; acupuncture outperformed usual care in all 11 reports (statistically significant in 10 trials). Acupuncture was compared to other types of acupuncture (sham acupuncture, placebo acupuncture, acupuncture with heat) or to other types of control groups in 15 of 19 papers; acupuncture outperformed the comparator in 10 of those 15 reports. For example, Cherkin et al.[13] found that individualized, standardized, and simulated (toothpick contact) acupuncture all outperformed usual care (all three groups $p<.001$). Three studies reported findings of both verum and sham acupuncture outperforming usual care.[9,13,14] Six studies found that acupuncture outperformed usual care without sham arms[5-20] and with sham arms.[21]

Clinically Meaningful Change

Clinically meaningful change is defined here as change of 30% or more in reported scale scores after study intervention.[22] Refer to these findings in Table 2. Of the 18 papers reviewed, 13 studies reported acupuncture (including true/verum, sham, and/or placebo) resulting in clinically meaningful change in scale scores.

Looking specifically at scales: a clinically meaningful change was reported in Visual Analogue Scale scores (7 studies), Short Form-36 scores (1 paper), and Numeric Pain Rating Scale (NPRS) (1 paper). Disability was reported with the Rowland Morris Disability Questionnaire (5 studies), the Owestry Disability Index (2 studies), and the Hanover Functional Ability Questionnaire (2 studies). One study reported that acupuncture did not result in a clinically meaningful change in scale scores. In 4 of 18 papers, clinically meaningful change could not be determined from the data provided in the published paper.

Acupuncture vs. Sham

Four of the studies reviewed used sham needling as a comparator.[9,12,14,21] Of those, 2 had an additional usual care arm.[9,21] Acupuncture outperformed usual care ($p<.001$) but there were no significant differences between acupuncture and sham except in the study by Yeh et al.,[21] which found that sham and verum acupuncture were both associated with decreased VAS-reported pain scores as reported.

Table 2. Results

Year	First Author	Did Acupuncture Outperform Usual Care?	Did It Reach Statistical Significance?	Did Acupuncture Out-Perform Comparator?	Did It Reach Statistical Significance?	Did acu group(s) meet 30% change criteria? Y/N?
2014	Bahrami- Taghanaki	NA	NA	Yes	Yes	Yes: both acu+ time points and acu
2006	Brinkhaus	NA	NA	Yes	Yes	?*
2009	Cherkin	Yes	Yes	No	No	Yes: all 3 acu groups
2013	Cho	NA	NA	Yes	Yes	Yes: real and sham acu
2007	Haake	Yes	Yes	No	No	Yes: verum acu and sham acu
2006	Inoue	NA	NA	Yes	Yes	No
2009	Inoue	NA	NA	Yes	Yes	Yes
2010	Miao	NA	NA	Yes	Yes	?*
2013	Pach	NA	NA	No	No	Yes*: both acu groups
2006	Thomas	Yes	Yes	NA	NA	Yes
2004	Tsui	Yes	Yes	Yes	Yes	Yes**: electro acu & electro heat acu
2012	Vas	Yes	Yes	No	No	Yes: true acu, sham acu, placebo acu
2013	Weiss	Yes	Yes	NA	NA	?
2006	Witt	Yes	Yes	NA	NA	Yes
2011	Yeh	Yes	Yes	Yes	Yes	?*
2013	Yuan	Yes	Yes	NA	NA	Yes
2012	Yun	Yes	Yes	Yes	Yes	Yes: Both Hegu acu & standard acu
2010	Zaringhalam	Yes	NR	Yes	Yes	Yes: acu, acu + Baclofen

NOTES:

NA Not applicable
NR Not reported
?* Insufficient data reported to determine clinically significant change

SCALES:

HVAC Hannover Functional Ability Questionnaire
ODQ Owestry Low Back Pain Disability Questionnaire
SF-36 Short Form 36
SF - MPQ McGill Pain Questionnaire Short Form
VAS Visual Analogue Scale
VRS Verbal Rating Scale

Acupuncture vs. Needleless Placebo

Three of the studies reviewed used a needleless placebo as a comparator.[13,23-25] Cherkin et al.[13] found that individualized, standardized, and simulated (with toothpicks) acupuncture all performed better than usual care ($p<.001$). However, individualized and standardized acupuncture did not perform better than simulated (toothpick) sham acupuncture. This is possibly due to minimal tissue damage initiating a local inflammatory response like true acupuncture.[26] Cho et al.[24] and Inoue et al.[25] found that real acupuncture outperformed needleless placebo acupuncture.

Acupuncture vs. Modified Acupuncture Only (No Usual Care Arm)

Three trials reviewed in this study examined two different forms of acupuncture. Bahrami-Taghanaki et al.[27] found that chrono-acupuncture (standardized acupuncture plus acupoints added that relate to time of day) outperformed acupuncture. Neither group was compared to usual care. Miao[28] found that electro-acupuncture outperformed classical acupuncture and Pach et al.[29] found that both individualized and standardized acupuncture showed clinically meaningful pain reduction after eight weeks; however, statistical significance was not demonstrated.

Acupuncture vs. Medication

Two trials investigated acupuncture compared to the medications Hydrochloride injection[23] and Baclofen.[30] Acupuncture outperformed local anesthetic injection[23] and outperformed Baclofen at the end of study and at a 10-week follow-up.[30]

Methodologic Quality of Trials

Overall, the 18 trials reviewed met many of the CONSORT methodologic quality standards listed in Table 3, with a few exceptions as noted. These instances of missing data are indicated as "NR," not reported. All 18 papers were indeed randomized controlled trials (RCTs), as indicated in the title (#1a); eligibility was specified in all 18 papers (#4a); all papers indicated primary and secondary outcomes (#6a); the rationale for the type of comparator was discussed in 16 of 18 papers (#6b); randomization method was described in 16 of 18 papers (#8a); statistical methods were discussed in all papers (#12a); baseline demographics were provided in all but one paper (#15); adverse events were reported in 11 of 18 papers (#19); and the study findings were interpreted in a way that was consistent in all papers (#22).

Table 3. Methodologic Quality

Year	First Author	RCT	Eligibility	Outcomes Defined; Primary Outcome	Randomization Method	Baseline Demographics	Adverse Events
2014	Bahrami- Taghanaki	Yes	Yes	Yes; VAS	Yes	Yes	NR
2006	Brinkhaus	Yes	Yes	Yes; VAS	Yes	Yes	Yes; mild: bleeding, hematoma
2009	Cherkin	Yes	Yes	Yes; RMDQ & sx bothersomeness	Yes	Yes	Yes. Mild: dizziness, back spasms, short-term pain, pain lasting 1 month
2013	Cho	Yes	Yes	Yes; VAS	Yes	Yes	Yes; mild: increased pain, bruising
2007	Haake	Yes	Yes	Yes; Von Korff Chronic Pain Grade Scale & HFAQ	Yes	Yes	Yes; no AEs
2006	Inoue	Yes	Yes	Yes; VAS	Yes	Yes	NR
2009	Inoue	Yes	Yes	Yes; VAS & Schober test	Yes	Yes	NR
2010	Miao	Yes	Yes	Yes; pressure point pain intensity test	Yes	No; Only age	NR
2013	Pach	Yes	Yes	Yes; VAS	Yes	Yes	Yes; no AEs
2006	Thomas	Yes	Yes	Yes; SF-36 bodily pain subscale	Yes	Yes	Yes; mild transient pain at the site of needling, temporary worsening of back pain
2004	Tsui	Yes	Yes	Yes; NPRS, SLR, RMDQ	NR	Yes	NR
2012	Vas	Yes	Yes	Yes; RMDQ	Yes	Yes	Yes; mild epigastritis, nausea, increased pain after the treatment session
2013	Weiss	Yes	Yes	Yes; all items on the SF-36	NR	Yes	Yes; mild nausea, dizziness, urgency, pain at puncture site
2006	Witt	Yes	Yes	Yes; HFAQ & Back Function Loss	Yes	Yes	Yes; mild bleeding, bruising, needle pain
2011	Yeh	Yes	Yes	Yes; BPI pain intensity subscale	Yes	Yes	Yes; mild fainting, increased pain
2013	Yuan	Yes	Yes	Yes; VAS & C-SFODI	Yes	Yes	Yes; mild worsening pain
2012	Yun	Yes	Yes	Yes; RMQ & VAS	Yes	Yes	NR
2010	Zaringhalam	Yes	Yes	Yes; VAS & RMQ	Yes	Yes	NR

Risk of Bias

Details regarding risk of bias are reported in Table 4. All but two papers provided details regarding randomization. All but two papers provided treatment allocation concealment detail, such as discussion of who generated the allocation sequence, who enrolled participants, and/or who assigned participants to interventions. Fourteen papers reported on blinding after assignment, 11 of which blinded or masked participants. Trial limitations were discussed in 15 papers and generalizability was discussed in 16 of 18 papers.

"Many studies of acupuncture conducted in 1980s-2000 were of low methodologic quality, and the field has worked to improve study quality. For this reason, the current study only reviewed trials published in 2004-2014."

Table 4. Risk of Bias

Year	Author	Randomization Method Discussed?	Treatment Allocation Concealed: Discussion of who generated the allocation sequence, who enrolled participants, and who assigned participants to interventions	Blinding After Assignment: Participants, healthcare providers, data collectors, and outcome adjudicators	Trial Limitations Discussed?	Generalizability/ Applicability Discussed?
2014	Bahrami-Taghanaki	Yes	Yes	Yes; participants, statistician	Yes	NR
2006	Brinkhaus	Yes	Yes	Yes; participants~	Yes	Yes
2009	Cherkin	Yes	Yes	Yes; outcome assessors, diagnostic acupuncturists~	Yes	Yes
2013	Cho	Yes	Yes	Yes; participants~	Yes	Yes
2007	Haake	Yes	Yes~	Yes; participants~	Yes	Yes
2006	Inoue	Yes	Yes	Yes; evaluation acupuncturists, participants	Yes	Yes
2009	Inoue	Yes	Yes	NR	Yes	Yes
2010	Miao	Yes	Yes	Yes; participants	Yes	NR
2013	Pach	Yes	Yes	Yes; participants	Yes	Yes
2006	Thomas	Yes	Yes	Yes; second statistician	Yes	Yes
2004	Tsui	NR	NR	Yes; evaluation acupuncturists, participants	NR	Yes
2012	Vas	Yes	Yes	Yes; participants	NR	Yes
2013	Weiss	NR	Yes	NR	Yes	Yes
2006	Witt	Yes	Yes	NR	Yes	Yes
2011	Yeh	Yes	Yes	Yes; participants, medical staff	Yes	Yes
2013	Yuan	Yes	Yes	NR	Yes	Yes
2012	Yun	Yes	NR	Yes; participants, outcome assessor, statistician	Yes	Yes
2010	Zaringhalam	Yes	Yes	Yes; outcome assessor	NR	Yes

KEY:

~ Details of trial published elsewhere

NR Not reported

Adverse Events

Adverse events were reported in 11 of 18 papers (see Table 3). No moderate or severe adverse events related to the intervention were reported in the papers reviewed. Minimal adverse events included minor bleeding, bruising, nausea, and temporary worsening of symptoms.

Discussion

The trials of acupuncture for LBP reviewed here indicate acupuncture is likely a safe modality of care because no severe or adverse events were reported in any of the papers reporting adverse events (11 of 18 papers). Acupuncture also appears to be an effective intervention: acupuncture significantly outperformed standard or conventional care in 10 of 11 studies and demonstrated clinically significant change in scale scores of 13 of 18 studies reported here.

This finding is in line with the American College of Physicians & Pain Society,[31] the American Family Physician,[32] and the NIH positions that all now recommend acupuncture for low back pain (https://nccih.nih.gov/news/press/pain_review). Furthermore, The Joint Commission clarified in January 2015 that acupuncture therapy is one evidence-informed, non-pharmacologic option that should be included in pain management strategies (www.jointcommission.org).

Results in Context of Current Literature

Although all 18 studies meet the methodological criteria for RCTs, many studies lack adequate blinding of subjects, study personnel, and outcome assessors. Some studies also lack adequate concealment of treatment allocation to various study staff. These are important safeguards necessary to reduce bias. Many studies of acupuncture conducted in 1980s-2000 were of low methodologic quality, and the field has worked to improve study quality. For this reason, the current study only reviewed trials published in 2004-2014.

Some prior systematic reviews of acupuncture for LBP have reached different conclusions than the present review; this is for several reasons. First, two trials reviewed much older evidence, none of which met the present study inclusion criteria. They also concluded, based only on statistical significance, that acupuncture is not effective in the management of pain[3] and not effective in the management of acute low back pain but may be effective for chronic low back pain.[4] More recent trials have reached similar conclusions, including Yuan et al.,[33] which found "there is moderate evidence that acupuncture is more effective than no treatment, and strong evidence of no significant difference between acupuncture and sham acupuncture, for short-term pain relief. There is strong evidence that acupuncture can be a useful supplement to other forms of conventional therapy for nonspecific LBP…" (p.E887). Lam, Galvin & Curry[7] state that "acupuncture had a clinically meaningful reduction in levels of self-reported pain…when compared with sham, and improved function…when compared with no treatment immediately post intervention. Levels of function also clinically improved when acupuncture in addition to usual care, or electro-acupuncture was compared with usual care alone." (p. 2124).

A second reason for differing conclusions concerns the topic of sham acupuncture. Prior trials interpreted findings of verum acupuncture not outperforming sham acupuncture as indicative of: 1) non-significance of between-group findings, and 2) that acupuncture is not an effective intervention. However, these trials are in effect comparing a full dose (complete treatment) of acupuncture (verum) to a diluted or decreased dose of acupuncture (sham). There are long-standing traditions of providing acupuncture on non-acupoints thought to be active in an individual patient—this is what has been used in clinical trials as one type of sham acupuncture. There is also a longstanding tradition of using contact needling in Japanese meridian therapy—this is used as needleless placebo acupuncture in three trials reviewed here. Both sham and needleless placebo acupuncture are therefore, in fact, types of acupuncture. It is not appropriate to compare sham and verum acupuncture and conclude that acupuncture is no better than "sham" when these trials are actually comparing various types of physiologically active and historically utilized types of acupuncture.

Sham as a Comparator

The fact that sham acupuncture is not inert must be taken into account when interpreting findings of studies comparing verum to sham acupuncture. Sham acupuncture might be thought of as a diluted or decreased dose of acupuncture, but this "diluted or decreased dose" of acupuncture is still physiologically active. Four of the studies examined used sham needling as a comparator revealed that sham acupuncture produced analgesic effects similar to verum.

Though imaging studies reveal that true acupuncture points modulate central processing mechanisms where other points do not,[34,35] the impact of needling so-called sham points stimulate additional peripheral mechanisms such as adenosine,[36] opioid peptides,[37] fibroblast cells,[38] and cytokines[39] regardless of the point location. It is for this reason that sham acupuncture does not make a worthy comparator. Given these findings, NIH's division for Integrative Health, the NCCIH, specifically states that sham-controlled studies are a low programmatic funding priority (https://nccih.nih.gov/grants/acupuncture/priorities).

continued on page 38

Cost-Effectiveness

In addition to effectiveness and safety, concerns regarding cost and missed work were studied in some of the reviewed trials. Several studies reported on costs associated with acupuncture care. Acupuncture was found to be cost-effective at 24-months follow-up in a large study conducted in the UK, compared to usual care.[40] Another large trial conducted in Germany found acupuncture to be cost-effective.[18] Furthermore, a systematic review of various non-pharmacological interventions reported that acupuncture is likely to be a cost-effective option for LBP.[41] Acupuncture was associated with fewer days absent from work in one reviewed trial.[27]

Limitations

Due to the heterogeneity of the studies, a systematic review of the best evidence available was undertaken. Areas of heterogeneity included studies of various types of low back pain and various types of measures used. Interventions included different styles of acupuncture (both standardized treatments and individualized point combinations tailored for each subject). Many different comparators were used, and usual care differed in the different countries where the trials were conducted. All these levels of heterogeneity must be taken into account when interpreting findings in the present study.

Furthermore, 7 of the studies included fewer than 100 participants. Trials included 2 to 4 arms or groups and as few as 20 people per arm. Trials having such small sample sizes call to question the validity of extending generalizability beyond the trial sample.

Although all 18 studies met the methodological criteria for RCTs under Cochrane collaboration group recommendations, some studies lacked adequate blinding of subjects, study personnel, and outcome assessors, which weakens the interpretations of the findings (Table 4). The subjective nature of reporting outcomes is especially problematic in LBP studies, as many variables can influence subjective perception of pain, anxiety, depression, and fear of returning to work. Future studies including objective measures such as quantitative sensory testing are needed to confirm these results.

Suggestions for future work are: 1) that trials of acupuncture be conducted specifically for injured workers with acute LBP; and 2) ideally, a Patient Centered Outcomes Research Institute (PCORI)-funded trial allowing the collection of data relevant to how acupuncture delivered by licensed East Asian medicine practitioners performs for the treatment of injured workers. This would provide specific and relevant evidence to inform policy and coverage of care for injured workers in the USA.

"Several studies reported on costs associated with acupuncture care. Acupuncture was found to be cost-effective at 24-months follow-up in a large study conducted in the UK, compared to usual care."

Conclusion

The evidence analyzed by previous investigators who have systematically reviewed acupuncture for low back pain, as well as the current evidence collected in the 18 studies analyzed for this review, supports the use of acupuncture as a safe and potentially effective option in the treatment of low back pain. Additional studies are needed to further validate these findings and to examine the mechanisms behind the positive effects of acupuncture for low back pain.

References

1. Kent PM, Keating JL. The epidemiology of low back pain in primary care. *Chiropr Osteopat.* 2005;13:13.
2. Hooten WM, Cohen SP. Evaluation and Treatment of Low Back Pain: A Clinically Focused Review for Primary Care Specialists. *Mayo Clin Proc.* 2015;90(12):1699-1718.
3. van Tulder MW, Cherkin DC, Berman B, Lao L, Koes BW. The effectiveness of acupuncture in the management of acute and chronic low back pain. A systematic review within the framework of the Cochrane Collaboration Back Review Group. *Spine (Phila Pa 1976).* 1999;24(11):1113-1123.
4. Furlan AD, van Tulder M, Cherkin D, et al. Acupuncture and dry-needling for low back pain: an updated systematic review within the framework of the cochrane collaboration. Spine (Phila Pa 1976). 2005;30(8):944-963.
5. Yuan J, Kerr D, Park J, Liu XH, McDonough S. Treatment regimens of acupuncture for low back pain--a systematic review. *Complement Ther Med.* 2008;16(5):295-304.
6. Hutchinson AJ, Ball S, Andrews JC, Jones GG. The effectiveness of acupuncture in treating chronic non-specific low back pain: a systematic review of the literature. *J Orthop Surg Res.* 2012;7:36.
7. Lam M, Galvin R, Curry P. Effectiveness of acupuncture for nonspecific chronic low back pain: A systematic review and meta-analysis. *Spine (Phila Pa 1976).* 2013;38(24):2124-2138.
8. Lee JH, Choi TY, Lee MS, Lee H, Shin BC. Acupuncture for acute low back pain: a systematic review. *Clin J Pain.* 2013;29(2):172-185.
9. Haake M, Müller HH, Schade-Brittinger C, et al. German Acupuncture Trials (GERAC) for chronic low back pain: randomized, multicenter, blinded, parallel-group trial with 3 groups. *Arch Intern Med.* 2007;167(17):1892-1898.
10. Ernst E, White AR. Acupuncture for back pain: a meta-analysis of randomized controlled trials. *Arch Intern Med.* 1998;158(20):2235-2241.
11. Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *J Clin Epidemiol.* 2009;62(10):e1-34.
12. Brinkhaus B, Witt CM, Jena S, et al. Acupuncture in patients with chronic low back pain: a randomized controlled trial. *Arch Intern Med.* 2006;166(4):450-457.
13. Cherkin DC, Sherman KJ, Avins AL, et al. A randomized trial comparing acupuncture, simulated acupuncture, and usual care for chronic low back pain. *Arch Intern Med.* 2009;169(9):858-866.
14. Vas J, Aranda JM, Modesto M, et al. Acupuncture in patients with acute low back pain: a multicentre randomised controlled clinical trial. *Pain.* 2012;153(9):1883-1889.
15. Thomas KJ, MacPherson H, Thorpe L, et al. Randomised controlled trial of a short course of traditional acupuncture compared with usual care for persistent non-specific low back pain. *BMJ.* 2006;333(7569):623.
16. Tsui ML, Cheing GL. The effectiveness of electroacupuncture versus electrical heat acupuncture in the management of chronic low-back pain. *J Altern Complement Med.* 2004;10(5):803-809.

17. Weiss J, Quante S, Xue F, Muche R, Reuss-Borst M. Effectiveness and acceptance of acupuncture in patients with chronic low back pain: results of a prospective, randomized, controlled trial. *J Altern Complement Med.* 2013;19(12):935-941.
18. Witt CM, Jena S, Selim D, et al. Pragmatic randomized trial evaluating the clinical and economic effectiveness of acupuncture for chronic low back pain. *Am J Epidemiol.* 2006;164(5):487-496.
19. Yuan WA, Huang SR, Guo K, et al. Integrative TCM conservative therapy for low back pain due to lumbar disc herniation: A randomized controlled clinical trial. *Evid Based Complement Alternat Med.* 2013;2013.
20. Yun M, Shao Y, Zhang Y, et al. Hegu acupuncture for chronic low-back pain: a randomized controlled trial. J Altern Complement Med. 2012;18(2):130-136.
21. Yeh ML, Chung YC, Chen KM, Chen HH. Pain reduction of acupoint electrical stimulation for patients with spinal surgery: a placebo-controlled study. *Int J Nurs Stud.* 2011;48(6):703-709.
22. Laupacis A, Sackett D, Roberts R. An assessment of clinically useful measures of the consequences of treatment. *N Engl J Med.* 1988; 318(26):1728-1733.
23. Inoue M, Hojo T, Nakajima M, Kitakoji H, Itoi M. Comparison of the effectiveness of acupuncture treatment and local anaesthetic injection for low back pain: a randomised controlled clinical trial. *Acupunct Med.* 2009;27(4):174-177.
24. Cho YJ, Song YK, Cha YY, et al. Acupuncture for chronic low back pain: a multicenter, randomized, patient-assessor blind, sham-controlled clinical trial. *Spine (Phila Pa 1976).* 2013;38(7):549-557.
25. Inoue M, Kitakoji H, Ishizaki N, et al. Relief of low back pain immediately after acupuncture treatment--a randomised, placebo controlled trial. *Acupunct Med.* 2006;24(3):103-108.
26. Reece JBC, N. A. *Campbell biology.* Boston: Benjamin Cummings / Pearson; 2011.
27. Bahrami-Taghanaki H, Liu Y, Azizi H, et al. A randomized, controlled trial of acupuncture for chronic low-back pain. *Altern Ther Health Med.* 2014;20(3):13-19.
28. Miao EY & Miao MY. Effect of electroacupuncture on the third lumbar transverse process syndrome: A randomized controlled trial. *Medical Acupuncture.* 2010;22(4);249-55.
29. Pach D, Yang-Strobel X, Lüdtke R, et al. Standardized versus Individualized Acupuncture for Chronic Low Back Pain: A Randomized Controlled Trial. *Evid Based Complement Alternat Med.* 2013;2013:125937.
30. Zaringhalam J, Manaheji H, Rastqar A, Zaringhalam M. Reduction of chronic non-specific low back pain: a randomised controlled clinical trial on acupuncture and baclofen. *Chin Med.* 2010;5:15.
31. Chou R, Qaseem A, Snow V, et al. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med.* 2007;147(7):478-491.
32. Last AR, Hulbert K. Chronic low back pain: evaluation and management. Am Fam Physician. 2009;79(12):1067-1074.
33. Yuan J, Purepong N, Kerr DP, Park J, Bradbury I, McDonough S. Effectiveness of acupuncture for low back pain: a systematic review. *Spine (Phila Pa 1976).* 2008;33(23):E887-900.
34. Zeng F, Song WZ, Liu XG, et al. Brain areas involved in acupuncture treatment on functional dyspepsia patients: a PET-CT study. *Neurosci Lett.* 2009;456(1):6-10.
35. Theysohn N, Choi KE, Gizewski ER, et al. Acupuncture-related modulation of pain-associated brain networks during electrical pain stimulation: a functional magnetic resonance imaging study. *J Altern Complement Med.* 2014;20(12):893-900.
36. Goldman N, Chen M, Fujita T, et al. Adenosine A1 receptors mediate local anti-nociceptive effects of acupuncture. *Nat Neurosci.* 2010;13(7):883-888.
37. Wang Y, Gehringer R, Mousa SA, Hackel D, Brack A, Rittner HL. CXCL10 controls inflammatory pain via opioid peptide-containing macrophages in electroacupuncture. *PLoS One.* 2014;9(4):e94696.
38. Langevin HM, Bouffard NA, Badger GJ, Churchill DL, Howe AK. Subcutaneous tissue fibroblast cytoskeletal remodeling induced by acupuncture: evidence for a mechanotransduction-based mechanism. *J Cell Physiol.* 2006;207(3):767-774.
39. da Silva MD, Bobinski F, Sato KL, Kolker SJ, Sluka KA, Santos AR. IL-10 cytokine released from M2 macrophages is crucial for analgesic and anti-inflammatory effects of acupuncture in a model of inflammatory muscle pain. *Mol Neurobiol.* 2015;51(1):19-31.
40. Thomas KJ, MacPherson H, Ratcliffe J, et al. Longer term clinical and economic benefits of offering acupuncture care to patients with chronic low back pain. *Health Technol Assess.* 2005;9(32):iii-iv, ix-x, 1-109.
41. Andronis L, Kinghorn P, Qiao S, Whitehurst DG, Durrell S, McLeod H. Cost-Effectiveness of Non-Invasive and Non-Pharmacological Interventions for Low Back Pain: a Systematic Literature Review. *Appl Health Econ Health Policy.* 2016.

Dr. Lisa Taylor-Swanson is presently Assistant Professor in the College of Nursing at University of Utah. Her research focuses on the improvement of midlife women's health, gender disparities of the opioid epidemic, and the evaluation of traditional East Asian medicine interventions (including acupuncture, Chinese herbal medicine, and moxibustion). She is a native of Salt Lake City and completed an Honors BS in Psychology with a minor in Women's Studies at University of Utah. She relocated to the Pacific Northwest and completed a Master's degree in Acupuncture & Oriental Medicine (Seattle Institute of East Asian Medicine - SIEAM) and a PhD in Nursing Science (University of Washington). Dr. Taylor-Swanson has provided acupuncture and Chinese herbal medicine in private practice for over 17 years with an emphasis on women's health and the treatment of male- and female-factor infertility. Most recently, Dr. Taylor-Swanson transitioned from full-time private practice to a full-time, tenure-line academic position at Utah. Dr. Taylor-Swanson previously taught at University of Washington and served as Academic Dean at SIEAM.

Jennifer A. M. Stone has practiced acupuncture and Chinese Medicine for over 27 years, and participated in acupuncture research for 10 years. She is assistant research faculty for the Indiana University School of Medicine, Department of Anesthesia. She has participated in NIH-funded research on both animal and human subjects. She serves as Editor in Chief of *Meridians: The Journal of Acupuncture and Oriental Medicine*, and is the owner of East West Acupuncture, in Bloomington, IN.

Disclosures:

Research Funding: This work was supported in part by NIH National Library of Medicine (NLM) Training Program in Biomedical and Health Informatics at the University of Washington, Grant Nr. T15LM007442.

Conflict of interest: The authors disclose no conflicts of interest.

Appendix C. Acupuncture's Role in Solving the Opioid Epidemic White Paper.

We respectfully submit the following white paper, originally, published by a coalition of acupuncture organizations in 2017.

Science Press

Journal homepage:
www.jcimjournal.com/jim
www.elsevier.com/locate/issn/20954964
Available also online at www.sciencedirect.com.

• Global Views

Acupuncture's Role in Solving the Opioid Epidemic: Evidence, Cost–Effectiveness, and Care Availability for Acupuncture as a Primary, Non–Pharmacologic Method for Pain Relief and Management—White Paper 2017

Arthur Yin Fan[1], David W. Miller[2,3,4], Bonnie Bolash[3], Matthew Bauer[3,5], John McDonald[3,6], Sarah Faggert[2,7], Hongjian He[2,8,9], Yong Ming Li[10], Amy Matecki[9,11], Lindy Camardella[2,3], Mel Hopper Koppelman[3,6], Jennifer A.M. Stone[2,12], Lindsay Meade[2,3], John Pang[13]

1. The American TCM Association, Vienna, VA 22182, USA
2. The American Society of Acupuncturists, Chicago, IL 60618, USA
3. The Joint Acupuncture Opioid Task Force, La Verne, CA 91750, USA
4. Pacific College of Oriental Medicine, Chicago, IL 60601, USA
5. The Acupuncture Now Foundation, La Verne, CA 91750, USA
6. The Acupuncture Evidence Project, Providence, RI 02860, USA
7. The Acupuncture Society of Virginia, Vienna, VA 22182, USA
8. The National Federation of Chinese TCM Organizations, New York, NY 11501, USA
9. The American Alliance for Professional Acupuncture Safety, Greenwich, CT 06878, USA
10. The American Traditional Chinese Medicine Society, New York, NY 11501, USA
11. Highland Hospital, Alameda Health System, Oakland, CA 94602, USA
12. Indiana University School of Medicine, Indianapolis, IN 46202, USA
13. University of California, San Diego School of Medicine, San Diego, CA 92093, USA

ABSTRACT

The United States (U.S.) is facing a national opioid epidemic, and medical systems are in need of non-pharmacologic strategies that can be employed to decrease the public's opioid dependence. Acupuncture has emerged as a powerful, evidence-based, safe, cost-effective, and available treatment modality suitable to meeting this need. Acupuncture has been shown to be effective for the management of numerous types of pain conditions, and mechanisms of action for acupuncture have been described and are understandable from biomedical, physiologic perspectives. Further, acupuncture's cost-effectiveness can dramatically decrease health care expenditures, both from the standpoint of treating acute pain and through avoiding addiction to opioids that requires costly care, destroys quality of life, and can lead to fatal overdose. Numerous federal regulatory agencies have advised or mandated that healthcare systems and providers offer non-pharmacologic treatment options for pain. Acupuncture stands out as the most evidence-based, immediately available choice to fulfil these calls. Acupuncture can safely, easily, and cost-effectively be incorporated into hospital settings as diverse as the emergency department, labor and delivery suites, and

http://dx.doi.org/10.1016/S2095-4964(17)60378-9
Received October 8, 2017; **accepted** October 17, 2017.
Correspondence: David W. Miller, MD, FAAP, LAc, Dipl OM (NCCAOM); E-mail: eastwestkiddoc@hotmail.com
This white paper was co-sponsored by the American Society of Acupuncturists (ASA), the American Alliance for Professional Acupuncture Safety (AAPAS), the Acupuncture Now Foundation (ANF), the American TCM Association (ATCMA), the American Traditional Chinese Medicine Society (ATCMS), and the National Federation of Chinese TCM Organizations (NFCTCMO). This article has been simultaneously published by *Meridians: The Journal of Acupuncture and Oriental Medicine*, Volume 5, Issue 1.

neonatal intensive care units to treat a variety of commonly seen pain conditions. Acupuncture is already being successfully and meaningfully utilized by the Veterans Administration and various branches of the U.S. Military, in some studies demonstrably decreasing the volume of opioids prescribed when included in care.

Keywords: acupuncture; opioid epidemic; pain; opiate dependency; effectiveness; safety; cost-effectiveness; mechanism; United States

Citation: Fan AY, Miller DW, Bolash B, Bauer M, McDonald J, Faggert S, He H, Li YM, Matecki A, Camardella L, Koppelman MH, Stone JA, Meade L, Pang J. Acupuncture's Role in Solving the Opioid Epidemic: Evidence, Cost-Effectiveness, and Care Availability for Acupuncture as a Primary, Non-Pharmacologic Method for Pain Relief and Management—White Paper 2017. *J Integr Med*. 2017; 15(6): 411–425.

1 Introduction

In 2015 it was estimated that 25.3 million Americans suffered from chronic pain, while an estimated 126 million American adults reported some type of pain in the prior three months.[1] As a result, more than 240 million prescriptions were written for opioid medications during that year.[2] An unfortunate consequence of this high use and availability of opioids, is a growing number of opioid-related deaths from addiction and overdose. More than 33 000 Americans died from opioid drugs in 2015, and more than 64 000 died in 2016.[3] Due to the severity of this epidemic, a White House panel urged the United States (U.S.) president to declare the opioid crisis a national emergency, and August 31, 2017 was designated as "International Overdose Awareness Day" by the Centers for Disease Control and Prevention (CDC).[4]

To cope with the opioid crisis, various federal regulatory and oversight agencies, including the U.S. Food and Drug Administration (FDA), the National Academies of Sciences, Engineering, and Medicine (NASEM), and the Joint Commission have started to advise or mandate that healthcare systems and providers offer non-pharmacologic treatment options for pain control.[5–7] Acupuncture stands as the most evidence-based, immediately available choice to fulfil these calls.

The aim of this white paper is to summarize for academic scholars, healthcare professionals, administrators, policymakers, and the general public the available evidence for acupuncture as a treatment for various pain conditions as well as for opiate dependency. This includes evidence on the safety, cost-effectiveness, mechanisms of action, and provider availability for acupuncture.

2 Acupuncture is an effective, safe, and cost–effective treatment for numerous types of acute and chronic pain; acupuncture should be recommended as a first line treatment for pain before opiates are prescribed, and may reduce opioid use

2.1 Effectiveness/Efficacy of acupuncture for different types of pain

There is growing research evidence to support the effectiveness and efficacy of acupuncture for the relief of numerous types of pain, especially chronic pain, as well as for the use of acupuncture for a diverse array of medical conditions. In an independently published work, which is the largest and most comprehensive of its kind for the period evaluated, McDonald and Janz[8] summarized the research from March 2013 to September 2016 for acupuncture, published and available in all languages on PubMed and in the Cochrane Library. They looked at systematic reviews, meta-analyses, network meta-analyses, overviews of systematic reviews (NHMRC level I evidence), and a number of narrative reviews. They performed meta-analyses on 62 of the non-Cochrane systematic reviews, representing pooled data from more than 1 000 randomized controlled trials (RCTs). They assessed and graded the quality of evidence, and noted the strength of evidence for acupuncture for numerous conditions (Box 1, Appendix 1).

Acupuncture has been found to be effective for treating various types of pain, with the strongest evidence emerging for back pain, neck pain, shoulder pain, chronic headache, and osteoarthritis. In an individual patient meta-analysis of 17 922 people from 29 RCTs, patients receiving acupuncture had less pain, with scores that were 0.23 (95% confidence interval (CI) [0.13–0.33]), 0.16 (95% CI [0.07–0.25]), and 0.15 (95% CI [0.07–0.24]) standard deviations (SDs) lower than sham controls for back and neck pain, osteoarthritis, and chronic headache, respectively; the effect sizes in comparison to non-acupuncture controls were 0.55 (95% CI [0.51–0.58]), 0.57 (95% CI [0.50–0.64]), and 0.42 (95% CI [0.37–0.46]) SDs. A variety of pain severity and disability scores were used, including Visual Analog Scale (VAS) ratings, the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), and the Roland Morris Disability Questionnaire. These results were robust to a variety of sensitivity analyses, including those related to publication bias.[9]

In the largest study of its kind to date, 454 920 patients were treated with acupuncture for headache, low-back pain, and/or osteoarthritis in an open pragmatic trial. Effectiveness was rated by the 8 727 treating physicians as marked or moderate in 76% of cases.[10]

In a network meta-analysis comparing different

physical interventions for pain from knee osteoarthritis, acupuncture was found to be superior to sham acupuncture, muscle-strengthening exercise, *Tai Chi*, weight loss, standard care, and aerobic exercise (in ranked order). Acupuncture was found to be more effective than muscle-strengthening exercises, with a statistically significant difference = 0.49, 95% CI [0.00–0.98].[11]

In early 2017, the American College of Physicians (ACP) published guidelines based on the evidence for the non-invasive treatment of low-back pain. For acute or subacute low-back pain, the ACP recommends non-pharmacologic treatment with acupuncture, along with superficial heat, massage, or spinal manipulation, and nonsteroidal anti-inflammatory drugs or skeletal muscle relaxants. For chronic low-back pain, the ACP also recommends acupuncture, in addition to exercise, multidisciplinary rehabilitation, mindfulness-based stress reduction, *Tai Chi*, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, and spinal manipulation, etc.[12]

A systematic review and meta-analysis on acupuncture for the treatment of sciatica reported that acupuncture was superior to standard pharmaceutical care (such as ibuprofen, diclofenac, and prednisone) in reducing pain intensity (mean difference (MD) = –1.25, 95% CI [–1.63 to –0.86]) and pain threshold (MD = 1.08, 95% CI [0.98–1.17]). Effectiveness, pain intensity, and pain threshold scales were used.[13]

A systematic review and network meta-analyses of 21 different interventions for sciatica found that acupuncture was second in global effect only to biological agents, and superior to all other interventions including non-opioid and opioid medications.[14]

A systematic review on acupuncture and moxibustion for lateral elbow pain found moderate-level evidence that acupuncture and moxibustion were more effective than sham, and found low-level evidence that acupuncture and moxibustion may be superior or equal to standard care.[15]

A systematic review on acupuncture for plantar heel pain found that evidence supporting the effectiveness of acupuncture was comparable to the evidence available

Box 1 Acupuncture for the Use of Numerous Conditions Including Pain Conditions: the Acupuncture Evidence Project (Mar 2013–Sept 2016)

Evidence of positive effect

- Allergic rhinitis (perennial & seasonal)
- Chemotherapy-induced nausea and vomiting (with anti-emetics)
- Chronic low-back pain
- Headache (tension-type and chronic)
- Knee osteoarthritis
- Migraine prophylaxis
- Post-operative nausea & vomiting
- Post-operative pain

Evidence of potential positive effect

- Acute low-back pain
- Acute stroke
- Ambulatory anaesthesia
- Anxiety
- Aromatase inhibitor-induced arthralgia
- Asthma in adults
- Back or pelvic pain during pregnancy
- Cancer pain
- Cancer-related fatigue
- Constipation
- Craniotomy anaesthesia
- Depression (with antidepressants)
- Dry eye
- Hypertension (with medication)
- Insomnia
- Irritable bowel syndrome
- Labor pain
- Lateral elbow pain
- Menopausal hot flashes
- Modulating sensory perception thresholds
- Neck pain (some types/non-whiplash)
- Obesity
- Peri-menopausal & post-menopausal insomnia
- Plantar heel pain
- Post-stroke insomnia
- Post-stroke shoulder pain
- Post-stroke spasticity
- Post-traumatic stress disorder
- Prostatitis pain/chronic pelvic pain syndrome
- Recovery after colorectal cancer resection
- Restless leg syndrome
- Schizophrenia (with antipsychotics)
- Sciatica
- Shoulder impingement syndrome (early stage) (with exercise)
- Shoulder pain
- Smoking cessation (up to 3 months)
- Stroke rehabilitation
- Temporomandibular joint disorder

for standard care interventions such as stretching, night splints, and dexamethasone.[16]

The use of acupuncture to relieve pain associated with surgical procedures captured the world's attention in the early 1970s. When in China, well-known *New York Times* journalist James Reston witnessed acupuncture's effectiveness on his post-operative pain. He published his personal experience with acupuncture shortly before President Richard Nixon's trip to China. Since then, reports in the scientific literature reveal that acupuncture has been used before, during, and after surgery to manage pain and to improve post-surgical recovery in a variety of contexts.[17–25] It is noteworthy to mention that acupuncture has been reported to be effective in pain relief during and after surgical procedures on children and animals as well.[19,20,26,27]

Nonetheless, over the past two decades in the U.S., post-operative pain management has come to rely increasingly on opioids, while underutilizing alternative analgesics such as acupuncture. In 2012, surgeons and dentists combined prescribed 16.2% of all opioids in the U.S., trailing only family practices as the leading source of opioid prescriptions at 18.2%.[28] Eighty to ninety-four percent of patients undergoing low-risk surgical procedures fill a prescription for opioids within 7 days.[29,30] Recent data has shown that opioid prescriptions vary widely and that the majority of surgical patients are over-prescribed opioids, as approximately 70% of pills go unused.[31] The risk of chronic opioid use after surgery in previously non-dependent patients is determined to be 5.9%–6.5%,[32] although in select populations such as head and neck cancer patients, the risk is up to 40%.[33] The increase in post-operative opioid use is somewhat paradoxical considering that known adverse effects such as sedation, pneumonia,[34,35] ileus, urinary retention, and delirium prolong patient recovery and delay the meeting of discharge goals.[36]

Acupuncture has emerged as a promising adjunctive analgesic modality to reduce the risk of post-operative opioid dependence. A meta-analysis published in late 2017 in *JAMA Surgery* focused on non-pharmacological treatments in reducing pain after total knee arthroplasty. Thirty-nine RCTs were included in the meta-analysis (2 391 patients). Moderate-certainty level evidence showed that electrotherapy reduced the use of opioids (MD = −3.50; 95% CI [−5.90 to −1.10] morphine equivalents in milligrams per kilogram per 48 hours; $P = 0.004$; $I^2 = 17\%$), and that acupuncture delayed opioid use (MD = 46.17; 95% CI [20.84–71.50] minutes to the first patient-controlled analgesia; $P < 0.001$; $I^2 = 19\%$). There was low-certainty level evidence that acupuncture improved pain (MD = 1.14; 95% CI [1.90–0.38] on a VAS at 2 days; $P = 0.003$; $I^2 = 0\%$). Evidence showed that acupuncture out-performed cryotherapy, continuous passive motion, and preoperative exercise in the studied condition.[37] Reduction in opioid use has been demonstrated across a wide range of both minor and major surgical procedures, including cardiac surgery,[38] thoracic surgery,[39] and craniotomy.[17,40] Additionally, it was reported that acupuncture may even reduce post-operative ileus and expedite bowel recovery after colorectal cancer resection.[41] Acupuncture is often combined with electric stimulation, and electro-acupuncture may have added clinical benefit in post-operative pain management.

A Cochrane systematic review on acupuncture or acupressure for primary dysmenorrhea found that both acupuncture and acupressure were more effective in reducing pain than placebo controls.[42] Five other systematic reviews and/or meta-analyses on various forms of acupoint stimulation including acupuncture, acupressure, and moxibustion for primary dysmenorrhea have reported similar outcomes.[43–47]

The effectiveness of acupuncture for labor pain is still unclear, largely due to the heterogeneity of designs and methods in studies, which have produced mixed results. While some studies reported no reduction in analgesic medications, some studies reported reduction of pain during labor, reduced use of opioid medications and epidural analgesia, and a shorter second stage of labor.[48–50]

A systematic review of acupuncture for trigeminal neuralgia suggests that acupuncture may be equal to or superior to carbamazepine, but the evidence is weakened by the low methodological quality of some included studies.[51]

A Cochrane systematic review on acupuncture for fibromyalgia found low- to moderate-certainty level evidence that acupuncture improves pain and stiffness compared with no treatment and standard therapy. Furthermore, electro-acupuncture is likely better than manual acupuncture for pain in fibromyalgia, although more studies with methodological rigor are warranted.[52]

A prospective, randomized trial of acupuncture *vs.* morphine to treat emergency department/emergency room patients with acute onset, moderate to severe pain was conducted. Acupuncture provided more effective and faster analgesia than morphine and was better tolerated. The study included 300 patients, with 150 patients in each group. Success rate was significantly different between the 2 groups (92% in the acupuncture group *vs* 78% in the morphine group, $P < 0.001$). Resolution time was (16 ± 8) minutes in

the acupuncture group *vs* (28 ± 14) minutes in the morphine group ($P < 0.005$). Overall, 89 patients (29.6%) experienced minor adverse effects; of these, 85 (56.6%) were in the morphine group and only 4 (2.6%) were in the acupuncture group ($P < 0.001$).[53]

The above mentioned meta-analysis included 29 trials and 17 922 patients with chronic pain conditions; data on longer-term follow-up (available for 20 trials, including 6 376 patients) suggests that approximately 90% of the benefit of acupuncture relative to controls would be sustained at 12 months post-treatment. Patients can generally be reassured that treatment effects persist for some duration.[54]

2.2 Safety and feasibility of acupuncture for pain management

Strong evidence for the safety of acupuncture in chronic pain management comes from an open pragmatic trial involving 454 920 patients who were treated for headache, low-back pain, and/or osteoarthritis. Minor adverse events were reported in 7.9% of patients while only 0.003% (13 patients) experienced severe adverse events. Minor adverse events included needling pain, hematoma, and bleeding, while serious adverse events included pneumothorax, acute hyper- or hypotensive crisis, erysipelas, asthma attack, and aggravation of suicidal thoughts.[10] In a prospective feasibility study, acupuncture was seen as feasible, safe, and acceptable in an intensive care unit setting by patients from diverse backgrounds.[55] A systematic review suggests that acupuncture performed by trained practitioners using clean needle technique is a generally safe procedure.[56] The medical literature also indicates that acupuncture may be used successfully on cancer patients for symptom management due to the low risks associated with its use.[57]

2.3 Cost-effectiveness of acupuncture for pain management

In a systematic review of 8 cost-utility and cost-effectiveness studies of acupuncture for chronic pain, the cost per quality-adjusted life-year gained was below the thresholds used by the UK National Institute for Health and Clinical Excellence for "willingness to pay." The chronic pain conditions discussed in the systematic review included low-back pain, neck pain, dysmenorrhoea, migraine and headache, and osteoarthritis.[58] In a cost-effectiveness analysis of non-pharmacological treatments for osteoarthritis of the knee, acupuncture was found to be the most cost-effective option when analysis was limited to high-quality studies.[59] Using acupuncture for pain management, patients and insurers can save money and successfully manage their pain and other symptoms without the adverse risks associated with prescription medications. A recent study from the Center for Health Information and Analysis in response to a piece of Massachusetts legislation seeking mandated coverage for acupuncture for some conditions, found that full insurance coverage for acupuncture would increase an average insured member's monthly health insurance premium only by $0.38 to $0.76. Acupuncture was noted to save $35 480, $32 000, $9 000, and $4 246 per patient for migraine, angina pectoris, severe osteoarthritis, and carpal tunnel syndrome respectively.[60] Compared to the large fees associated with imaging, prescription medications and surgery for pain conditions, acupuncture proved extremely cost-effective.

The Acupuncture Evidence Project also enumerates those conditions for which they found evidence of acupuncture being cost-effective (Box 2).[61]

Box 2 Conditions with Demonstrated Evidence of Cost-Effectiveness

- Allergic rhinitis
- Low-back pain
- Ambulatory anaesthesia
- Migraine
- Chronic pain: neck pain (plus usual medical care)
- Depression
- Osteoarthritis
- Dysmenorrhoea
- Post-operative nausea and vomiting
- Headache

A study by Da Silva[62] published in the journal *Headache* in 2015 showed acupuncture to be at least as effective as conventional drug preventative therapy for migraine and to be safe, long lasting, and cost-effective. A 2015 study by Liodden and Norheim[63] noted acupuncture to be potentially useful for post-operative pain and post-operative nausea and vomiting, and to be a low-cost intervention. A 2014 study by Spackman et al. [64] showed acupuncture to be cost-effective compared to counselling or usual care alone. Two studies demonstrated acupuncture's cost-effectiveness for the treatment of low-back pain. A study by Taylor et al.[65] from 2014 showed that acupuncture as a complement to standard care for the relief of chronic low-back pain was highly cost-effective, costing around $48 562 per disability-adjusted life-year (DALY) avoided. It also found that when comorbid depression was alleviated at the same rate as pain, the cost was around $18 960 per DALY avoided. A study by Andronis et al.[66] also identified acupuncture as likely to be cost-effective for low-back pain.

2.4 Can adjunctive acupuncture treatment reduce the use of opioid-like medications?

Some studies have reported reduced consumption of opioid-like medication (OLM) by more than 60% following surgery when acupuncture is used.[67,68] A pilot RCT also showed a reduction by 39% in OLM use in non-malignant pain after acupuncture, an effect which lasted fewer than 8 weeks after acupuncture treatment ceased.[69] The above mentioned meta-analysis, having moderate-certainty level evidence, showed that electro-acupuncture therapy reduced the use of opioids, and acupuncture delayed opioid use, with low-certainty level evidence indicating that acupuncture improved pain.[37] The conclusions suggest that electro-acupuncture may be effective in reducing or delaying the use of opioid medications.

In a study examining acupuncture's effectiveness in treating pain in a military cohort of 172 at a U.S. Air Force medical center, acupuncture dramatically decreased the use of opiates and other pain medications among personnel. Opioid prescriptions decreased by 45%, muscle relaxants by 34%, non-steroidal anti-inflammatory drugs by 42%, and benzodiazepines by 14%. Quality of life measures also showed impressive changes, with some measures of improvements showing statistical significance ($P < 0.001$).[70]

The Veterans Administration is increasingly looking to incorporate acupuncture into care, as is the U.S. Air Force and other military branches. Training of military physicians is increasing, and systems are being studied to further incorporate acupuncture. The military is rapidly incorporating this care into its offered services for service members.[71,72]

Studies of the effects of opioid analgesia in the elderly reveal a significant burden of disease due to falls from mental impairment. This is worsened when seniors are using multiple medications affecting cognition. In a recent study, serious falls as per Medicare Part A and B ICD/CPT codes were evaluated in 5 556 nursing home residents aged 65 or greater. Seniors taking three or more central nervous system (CNS) standardized daily doses were more likely to have a serious fall than those not taking any CNS medications (adjusted odds ratio = 1.83, 95% CI [1.35–2.48]), and the authors urge, "Clinicians should be vigilant for opportunities to discontinue or decrease the doses of individual CNS medications and/or consider non-pharmacological alternatives."[73]

A recent study in the *New Zealand Medical Journal* noted that medication-related harms were both common and created a substantial burden of disease for patients and the healthcare system. They listed opioids first among the six categories of medications causing the most significant burden.[74] In light of the findings of these studies and similar, utilization of non-pharmacologic treatment options such as acupuncture must be a priority of paramount status.

3 Acupuncture's analgesic mechanisms have been extensively researched and acupuncture can increase the production and release of endogenous opioids in animals and humans

Mechanisms underlying acupuncture's analgesic effects have been extensively researched for over 60 years. In animal models, acupuncture and/or electro-acupuncture has been shown to be effective for the alleviation of inflammatory, neuropathic, cancer-related, and visceral pain. Mechano-transduction of the needling stimulus at specific points on the body triggers the release of ATP and adenosine, which bind to local afferents.[75,76] Ascending neural pathways involving Aβ, Aδ, and C sensory fibres have been mapped (using techniques such as single fiber recordings with Evans blue dye extravasation), as have been a mesolimbic analgesic loop in the brain and brainstem, descending pathway mechanisms, dopaminergic contributors, and cytokine, glutamate, nitric oxide, and gamma-amino butyric acid (GABA) effects. Acupuncture analgesia has been shown to involve several classes of opioid neuropeptides including enkephalins, endorphins, dynorphins, endomorphins, and nociceptin (also known as orphanin FQ). Among the non-opioid neuropeptides, substance P, vasoactive intestinal peptide, and calcitonin gene-related peptide have been investigated for their roles in both the analgesic and anti-inflammatory effects of acupuncture.[77–80]

Given that acupuncture analgesia activates the production and release of endogenous opioids and activates μ and δ opioid receptors, it is feasible that acupuncture, used in conjunction with OLM, might alleviate pain with a lower OLM dose for patients already taking OLM.[81] This idea is further supported by evidence that acupuncture increases μ opioid receptor binding potential, allowing for effective analgesia at lower doses of OLM.[82] For patients not yet prescribed OLM, acupuncture should be recommended prior to OLM prescription commencing. This would be in-line with existing guidelines, such as those by the ACP[12] and the CDC,[83] which recommend that safe and effective non-opioid alternatives should first be exhausted before resorting to OLM.

It is important to note as well that opioids as a monotherapy are often not as successful as may be thought in the general public perception. A recent systematic review of opioid analgesics for low-back pain, which included 7 925 participants, found

that opioids were poorly tolerated and for those who tolerate them the effect is unlikely to be clinically important within guideline recommended doses.[84] The first ever RCT evaluating the long-term effectiveness of opioids, found that those on long-term opioid analgesia were actually in marginally more pain at 12 months than those in the non-opioid group.[85] Hence, complementary methods of pain control are critical to successful patient management.

4 Acupuncture is effective for the treatment of chronic pain involving maladaptive neuroplasticity

Adverse neuroplastic changes can present a challenge in pain management, as maladaptive neuroplasticity can be associated with severe chronic pain that is resistant to treatment. Via peripheral stimulation, acupuncture may relieve the symptoms of patients affected by problematic neuroplastic changes. There is evidence that acupuncture has the capacity to reverse adverse neuroplastic changes in the dorsal horns of the spine, as well as in the somatosensory cortex.[86–89] This suggests that acupuncture may have an important role in treating chronic pain which involves adverse neuroplastic changes.

5 Acupuncture is a very promising, already utilized adjunctive therapy in opiate dependency and rehabilitation

In 1973, Wen et al.[90] from Hong Kong published an accidental finding that ear acupuncture treatment for respiratory patients had apparently alleviated opioid withdrawal signs and symptoms. These findings were replicated by others around the world, including in New York and Sydney in the mid-1970s. In 1985, Dr. Michael Smith and colleagues in New York established the National Acupuncture Detoxification Association (NADA), which today operates in over 40 countries with an estimated 25 000 providers. There are more than 1 000 programs in the U.S. and Canada that now use acupuncture to help addicts overcome their addictions.[91]

Evidence for acupuncture's place in addiction treatment has been found in both animal and human studies. In 2009, Hu et al.[92] found that electro-acupuncture in rats appeared to affect dopamine neurons in the ventral tegmental area, meaningfully improving the deleterious effects caused to this area by opioid medication. In 2012 Lee et al.[93] demonstrated that electro-acupuncture could be used to decrease drug-seeking behaviour in rats. As far back as 1978 it was demonstrated that acupuncture decreased biochemical markers of stress in heroin addicts compared to observational controls.[94] In 2014 Chan et al.[95] demonstrated that acupuncture decreased the amount of morphine used by addicts in treatment, and simultaneously improved sleep in the treatment subjects. Acupuncture for addiction is a versatile modality that can be effortlessly integrated into many environments including prisons, in- and outpatient programs, community centers, disaster relief, and humanitarian aid efforts. Furthermore, acupuncture addiction protocols can address acute and prolonged withdrawal symptoms, stress and anxiety related to drug withdrawal, and help prevent relapse. Using drugs to treat those already drug-addicted is not a rational plan of action, and finding sound, non-pharmacologic treatment options is of paramount importance.

A meta-analysis done in 2012 concluded that "the majority [of studies] agreed on the efficacy of acupuncture as a strategy for the treatment of opiate addiction" and that "neurochemical and behavioral evidence has shown that acupuncture helps reduce the effects of positive and negative reinforcement involved in opiate addiction by modulating mesolimbic dopamine neurons. Moreover, several brain neurotransmitter systems involving opioids and GABA have been implicated in the modulation of dopamine release by acupuncture."[96] In a recent RCT involving 28 newborns with neonatal abstinence syndrome, laser acupuncture plus OLM significantly reduced the duration of oral morphine therapy when compared to OLM alone.[97] The mechanism for acupuncture in opiate withdrawal was found to be mediated by the endogenous opioid "dynorphin" binding to κ opioid receptors.[98] While considerable research on acupuncture's role in addiction is still greatly needed, long-standing and new data provide a sound foundation for that future research. Demonstration of trans-species effects with multiple, plausible mechanisms and documented clinical efficacy in humans for opioid addiction specifically, coupled with vast, existing clinical precedent of use in this realm, argues strongly for acupuncture's likely value in this domain.

6 Acupuncture has been recommended as a first line, non–pharmacologic therapy by the FDA as well as the NASEM in coping with the opioid crisis; the Joint Commission has also mandated that hospitals provide non–pharmacologic pain treatment modalities

The U.S. FDA released proposed changes to its opioid prescription guidelines in early May 2017. Entitled a "Blueprint for Prescriber Education for Extended-Release and Long-Acting Opioids," the

guidelines now recommend that doctors become informed about non-pharmacologic options for pain control to help avoid the overuse of opioids.[5] Per the FDA's request, the NASEM released a report to outline the state of the science regarding prescription opioid abuse and misuse, as well as the evolving role that opioids play in pain management. The new NASEM report on pain management and opioids recommends more public education, reimbursement models, and support for non-drug approaches to pain treatment. It systematically summarizes the evidence for acupuncture's clinical benefits in treating different pain conditions, and provides an overview of some of the basic science underlying acupuncture's mechanisms in pain management.[6] Further, effective January 1, 2018, the Joint Commission has mandated that hospitals provide non-pharmacologic pain treatment modalities.[7] Acupuncture is ideally suited to fulfil this mandate. These official, evidence-based clinical guidelines are in line with global healthcare trends. As of November 2015, acupuncture had over 870 recommendations in official clinical guidelines for over 100 conditions from institutions in over 30 countries.[99]

7 Among the most commonly recommended, non–pharmacological management options for pain relief, evidence supports acupuncture as the most specific and effective for opioid abuse and overuse

Several forms of non-pharmacological management options for acute and chronic pain have been examined, including physical therapy, spinal column manipulation, yoga, *Tai Chi*, cognitive behavioral therapy, as well as others. Among those therapies commonly recommended by medical authorities, evidence supports acupuncture as the most specific in targeting the endogenous opioid system. There is more evidence that acupuncture can induce endorphins to cope with acute and chronic pain in basic research than for any other non-pharmacological approach for pain.[12,37,53,60] Other mechanisms for acupuncture's effects have also been discussed above.

8 Acupuncture is widely available from qualified practitioners nationally

In 2013 more than 28 000 licensed acupuncturists were estimated to be practicing in the U.S., with many more in training.[100] A 2015 study found the number of professionals practicing as "Licensed Acupuncturists" (or state equivalent) to be approximately 34 400. The number of licensed acupuncturists was noted to have increased by 23.3% and 52.1% compared to the years 2009 (n = 27 965) and 2004 (n = 22 671) respectively, increasing about 1 266 per year.[101] Currently, the Council of Colleges of Acupuncture and Oriental Medicine has 57 schools in its membership,[102] with approximately ten schools offering doctoral degrees. The National Certification Council for Acupuncture and Oriental Medicine has certified more than 18 000 practitioners for minimal competency.[103] The practitioners emerging from this educational and testing infrastructure are the most highly trained in Chinese medicine as a complete system, and the training capacity is vastly underutilized. This system could produce many more practitioners were demand increased. The American Academy of Medical Acupuncture also represents more than 1 300 medical doctors trained to offer acupuncture services, and has approved nine programs for medical doctor certification in acupuncture.[104] One certification program alone has trained more than 6 000 physicians in medical acupuncture,[105] so a conservative estimate of the total number of physicians trained would be approximately 10 000, though the number actively practicing acupuncture is unknown. Most states allow physicians to practice acupuncture, with some specifying additional training.[106] Increased coverage and demand for acupuncture will lead to a greater supply of providers as well. As noted above, NADA providers are estimated at 25 000 individuals, with more than 1 000 programs in the U.S. and Canada.

9 Acknowledgements

This paper was written and revised on the basis of original work provided by the Joint Acupuncture Opioid Task Force (JAOTF). The JAOTF was chaired by Bonnie M. Abel Bolash, MAc, LAc. The current authors would like to thank the original contributors of that paper: Matthew Bauer, LAc, Bonnie Bolash, LAc, Lindy Camardella, LAc, Mel Hopper Koppelman, MSc, John McDonald, PhD, FAACMA, Lindsay Meade, LAc, and David W. Miller, MD, LAc who come from the Acupuncture Now Foundation (ANF) and the American Society of Acupuncturists (ASA). We express thanks also to Jun Xu, MD, LAc of the American Alliance for Professional Acupuncture Safety (AAPAS) for fostering valuable collaboration on this project.

10 Competing interests

The authors declare that they have no competing interests. Comments or corrections are welcomed and appreciated.

Appendix 1 Effectiveness of Acupuncture (to be continued)

Author, year	Topic/intervention	Participants/population	Primary outcomes	Key findings	Study quality
Vickers et al., 2012[9]	Acupuncture versus sham acupuncture and non-acupuncture in back, neck and shoulder pain, chronic headache, and osteoarthritis	Systematic review of 31 RCTs (17 922 subjects) and meta-analysis of individual patient data from 29 of these 31 RCTs in back, neck and shoulder pain; chronic headache; osteoarthritis	A variety of pain severity and disability scores such as VAS, WOMAC, Roland Morris Disability Questionnaire	Acupuncture was superior to sham acupuncture and non-acupuncture for each pain condition	High-quality evidence
Weidenhammer et al., 2007[10]	Acupuncture for headache, low-back pain, and osteoarthritis	Open pragmatic trial of 454 920 subjects with headache, low-back pain, and osteoarthritis	Treating physician rating of "marked, moderate, minimal or poor improvement (which included no improvement and worse)"	Physician ratings: 22% marked, 54% moderate, 16% minimal and 4% poor improvement	Low-quality evidence—open pragmatic trial with no blinding and no external assessors
Corbett et al., 2013[11]	Comparison of 22 physical therapies for knee osteoarthritis pain	Review of 152 trials and network meta-analysis of 12 RCTs with low risk of bias comparing 22 physical therapies in knee osteoarthritis pain	Knee pain	Acupuncture was equal to balneotherapy and superior to sham acupuncture, muscle-strengthening exercise, *Tai Chi*, weight loss, standard care and aerobic exercise (in ranked order)	110 of 152 studies analysed were of poor quality. Network meta-analysis included 12 RCTs with low risk of bias
Ji et al., 2015[13]	Acupuncture versus standard pharmaceutical care in sciatica	Systematic review and meta-analysis of 12 RCTs in sciatica	Effectiveness, pain intensity, and pain threshold	Acupuncture was superior to standard pharmaceutical care in effectiveness, reducing pain intensity and pain threshold	Low- to moderate-quality evidence
Lewis et al., 2015[14]	Comparison of 21 different interventions for sciatica	Systematic review and network meta-analyses of 122 studies including 90 randomized or quasi-randomized controlled trials comparing 21 different interventions for sciatica	Global effect, and pain intensity	In global effect and reduction in pain intensity, acupuncture was second only to biological agents (cytokine-modulating drugs), and superior to all other interventions tested including non-opioid and opioid medications	9% of studies had a strong overall quality rating; 7% of studies had a strong overall external validity rating; 21% of studies used both adequate randomization and adequate or partially adequate allocation concealment

Appendix 1 Effectiveness of Acupuncture (continuation 1)

Author, year	Topic/intervention	Participants/population	Primary outcomes	Key findings	Study quality
Gadau et al., 2014[15]	Acupuncture and/or moxibustion versus sham acupuncture, another form of acupuncture, or conventional treatment in lateral elbow pain	Systematic review of 19 RCTs	Pain, and grip strength	Acupuncture is more effective than sham acupuncture (moderate-quality studies); acupuncture or moxibustion is more effective than conventional treatment (low-quality studies)	Low- to moderate-quality evidence
Cho et al., 2015[20]	Real versus sham acupuncture in acute post-operative pain after back surgery	Systematic review and meta-analysis of 5 trials	24-hour post-operative pain intensity on VAS; 24-hour opiate demands	Real acupuncture was superior to sham in reducing pain intensity but not opiate demand at 24 hours	3 of 5 trials were high quality
Levett et al., 2014[48]	Acupuncture, standard care, sham acupuncture, acupressure and mixed controls in various combinations in labor pain	A critical narrative review of 4 systematic reviews in labor pain	Pain intensity, analgesic use, and length of labor	Acupuncture reduces pain intensity, analgesic use and length of labor	Conflicting evidence
Clark et al., 2012[16]	Acupuncture versus various comparators including standard care, sham acupuncture and other forms of acupuncture in plantar heel pain	Systematic review of 5 RCTs and 3 non-randomized comparative trials	Various pain and disability scales (morning pain, walking pain, and tenderness)	Acupuncture for plantar heel pain is supported by evidence which is equivalent to evidence supporting standard care (stretching, splints, and dexamethasone)	Evidence at levels I and II supporting the effectiveness of acupuncture for heel pain, leading to a recommendation at Grade B
Deare et al., 2013[52]	Manual and electro-acupuncture compared with sham acupuncture, standard therapy and no treatment in fibromyalgia	Cochrane systematic review of 9 RCTs in fibromyalgia	Pain, stiffness, sleep, fatigue and global wellbeing	Acupuncture improves pain and stiffness compared to standard therapy and no treatment, but not compared to sham acupuncture	Low- to moderate-quality evidence
Smith et al., 2011[42]	Acupuncture or acupressure versus placebo control, usual care or pharmacological treatment in primary dysmenorrhea	Cochrane systematic review of 10 RCTs (944 subjects) on acupuncture (6) or acupressure (4) for primary dysmenorrhea	Pain relief, analgesic use, quality of life, improvement in menstrual symptoms, and absenteeism	Acupuncture was superior to placebo and Chinese herbs in pain relief, and superior to medication and Chinese herbs in reducing menstrual symptoms. Acupressure was superior to placebo in pain relief and reducing menstrual symptoms	Low risk of bias in 50% of included RCTs

Appendix 1 Effectiveness of Acupuncture (continuation 2)

Author, year	Topic/intervention	Participants/population	Primary outcomes	Key findings	Study quality
Abaraogu et al., 2015[43]	Acupuncture or acupressure versus placebo control, wait list or pharmacological treatment in primary dysmenorrhea	Systematic review of 8 RCTs (> 3 000 subjects) and meta-analysis of 4 RCTs	Pain intensity (VAS, McGill scale), quality of life, and blood nitric oxide	Acupuncture and acupressure reduced pain, while acupuncture also improved quality of life	Moderate-quality evidence
Chen et al., 2013[47]	Acupuncture or acupressure at acupoint SP6 versus minimal stimulation at SP6 or stimulation of another point in primary dysmenorrhea	Meta-analysis of acupuncture (3) and acupressure (4) RCTs in primary dysmenorrhea	Pain intensity (VAS)	Acupuncture is effective and acupressure may be effective at SP 6 for pain relief	Acupuncture trials had low to moderate risk of bias; acupressure trials had high risk of bias
Cho et al., 2010[44]	Acupuncture versus sham acupuncture, pharmacological treatment or Chinese herbs in primary dysmenorrhea	Systematic review of 27 RCTs in primary dysmenorrhea	Pain intensity (VAS, Menstrual Pain Reduction Score, and other pain scores)	Acupuncture was superior to pharmacological treatment or Chinese herbs in pain relief	Only 5 out of 27 trials had low risk of bias
Chung et al., 2012[46]	Acupoint stimulation versus non-acupoint stimulation or medication in primary dysmenorrhea	Systematic review of 30 RCTs (> 3 000 subjects) and meta-analysis of 25 RCTs	Pain intensity, and plasma prostaglandin F2/ prostaglandin E2 ratio	Acupoint stimulation was superior in short-term pain relief to stimulation on non-acupoints. Non-invasive stimulation of acupoints was more effective than invasive stimulation	Some trials were of low quality
Xu et al., 2014[45]	Various forms of acupoint stimulation (including acupuncture, moxibustion and other methods) versus a variety of controls in primary dysmenorrhea	Meta-analysis of 20 RCTs (2 134 subjects) of acupoint stimulation for primary dysmenorrhea	Pain relief	Acupoint stimulation was more effective than controls for pain relief	Low- to moderate-quality evidence

RCT: randomized controlled trial; VAS: Visual Analog Scale; WOMAC: Western Ontario and McMaster Universities Osteoarthritis Index.

There is currently debate within the scientific and academic communities on how to perform high-quality studies on acupuncture. It is widely recognized that standards applied to drug trials are inappropriate for acupuncture studies, as it is impossible to effectively blind patients to treatment with acupuncture as can be done with medications. Hence, this literature review, adhering to standards for drug studies, may undervalue some existing studies, and hence the strength of acupuncture for care may also be underestimated.

REFERENCES

1 United States National Center for Complementary and Integrative Medicine, National Institutes of Health. *NIH analysis shows Americans are in pain.* (2015-08-11) [2017-10-10]. https://nccih.nih.gov/news/press/08112015.

2 United States Department of Health & Human Services. *The opioid epidemic: by the numbers.* (2016-06) [2017-10-10]. https://www.hhs.gov/sites/default/files/Factsheet-opioids-061516.pdf.

3 United States National Institute on Drug Abuse, National Institutes of Health. *Overdose death rates.* (2017-09) [2017-10-10]. https://www.drugabuse.gov/related-topics/trends-statistics/overdose-death-rates.

4 Evans G. *On overdose awareness day, ninety people could die from opioids.* (2017-08-31) [2017-10-10]. http://www.ahcmedia.com/blogs/2-hicprevent/post/141375-today-is-opioid-awareness-day-ninety-people-will-die.

5 The Food and Drug Administration. *Introduction for the FDA blueprint for prescriber education for extended-release and long-acting opioid analgesics.* (2017-05) [2017-08-19]. https://www.fda.gov/downloads/Drugs/DrugSafety/InformationbyDrugClass/UCM515636.pdf.

6 The National Academies of Sciences, Engineering, and Medicine. *National strategy to reduce the opioid epidemic, an urgent public health priority, presented in new report.* (2017-06-13) [2017-08-19]. http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=24781.

7 Official Publication of Joint Commission Requirements. New and revised standards related to pain assessment and management. *Jt Comm Perspect*. 2017; 37(7): 3–4.

8 McDonald J, Janz S. *The acupuncture evidence project: a comprehensive literature review*. Brisbane: Australian Acupuncture and Chinese Medicine Association Ltd. 2017.

9 Vickers AJ, Cronin AM, Maschino AC, Lewith G, MacPherson H, Foster NE, Sherman KJ, Witt CM, Linde K; Acupuncture Trialists' Collaboration. Acupuncture for chronic pain: individual patient data meta-analysis. *Arch Intern Med*. 2012; 22; 172(19): 1444–1453.

10 Weidenhammer W, Streng A, Linde K, Hoppe A, Melchart D. Acupuncture for chronic pain within the research program of 10 German health insurance funds—basic results from an observational study. *Complement Ther Med*. 2007; 15(4): 238–246.

11 Corbett MS, Rice SJ, Madurasinghe V, Slack R, Fayter DA, Harden M, Sutton AJ, Macpherson H, Woolacott NF. Acupuncture and other physical treatments for the relief of pain due to osteoarthritis of the knee: network meta-analysis. *Osteoarthritis Cartilage*. 2013; 21(9): 1290–1298.

12 Qaseem A, Wilt TJ, McLean RM, Forciea MA; Clinical Guidelines Committee of the American College of Physicians. Noninvasive treatments for acute, subacute, and chronic low back pain: a clinical practice guideline from the American College of Physicians. *Ann Intern Med*. 2017; 166(7): 514–530.

13 Ji M, Wang X, Chen M, Shen Y, Zhang X, Yang J. The efficacy of acupuncture for the treatment of sciatica: a systematic review and meta-analysis. *Evid Based Complement Alternat Med*. 2015; 2015: 192808.

14 Lewis RA, Williams NH, Sutton AJ, Burton K, Din NU, Matar HE, Hendry M, Phillips CJ, Nafees S, Fitzsimmons D, Rickard I, Wilkinson C. Comparative clinical effectiveness of management strategies for sciatica: systematic review and network meta-analyses. *Spine J*. 2015; 15(6): 1461–1477.

15 Gadau M, Yeung WF, Liu H, Zaslawski C, Tan YS, Wang FC, Bangrazi S, Chung KF, Bian ZX, Zhang SP. Acupuncture and moxibustion for lateral elbow pain: a systematic review of randomized controlled trials. *BMC Complement Altern Med*. 2014; 14: 136.

16 Clark RJ, Tighe M. The effectiveness of acupuncture for plantar heel pain: a systematic review. *Acupunct Med*. 2012; 30(4): 298–306.

17 An LX, Chen X, Ren XJ, Wu HF. Electro-acupuncture decreases postoperative pain and improves recovery in patients undergoing supratentorial craniotomy. *Am J Chin Med*. 2014; 42(5): 1099–1109.

18 Chen CC, Yang CC, Hu CC, Shih HN, Chang YH, Hsieh PH. Acupuncture for pain relief after total knee arthroplasty: a randomized controlled trial. *Reg Anesth Pain Med*. 2015; 40(1): 31–36.

19 Cho HK, Park IJ, Jeong YM, Lee YJ, Hwang SH. Can perioperative acupuncture reduce the pain and vomiting experienced after tonsillectomy? A meta-analysis. *Laryngoscope*. 2016; 126(3): 608–615.

20 Cho YH, Kim CK, Heo KH, Lee MS, Ha IH, Son DW, Choi BK, Song GS, Shin BC. Acupuncture for acute postoperative pain after back surgery: a systematic review and meta-analysis of randomized controlled trials. *Pain Pract*. 2015; 15(3): 279–291.

21 Crespin DJ, Griffin KH, Johnson JR, Miller C, Finch MD, Rivard RL, Anseth S, Dusek JA. Acupuncture provides short-term pain relief for patients in a total joint replacement program. *Pain Med*. 2015; 16(6): 1195–1203.

22 Gilbey P, Bretler S, Avraham Y, Sharabi-Nov A, Ibrgimov S, Luder A. Acupuncture for post tonsillectomy pain in children: a randomized, controlled study. *Paediatr Anaesth*. 2015; 25(6): 603–609.

23 Liu XL, Tan JY, Molassiotis A, Suen LK, Shi Y. Acupuncture-point stimulation for postoperative pain control: a systematic review and meta-analysis of randomized controlled trials. *Based Complement Alternat Med*. 2015; 2015: 657809.

24 Lu Z, Dong H, Wang Q, Xiong L. Perioperative acupuncture modulation: more than anaesthesia. *Br J Anaesth*. 2015; 115(2): 183–193.

25 Tsao GJ, Messner AH, Seybold J, Sayyid ZN, Cheng AG, Golianu B. Intraoperative acupuncture for post tonsillectomy pain: a randomized, double-blind, placebo-controlled trial. *Laryngoscope*. 2015; 125(8): 1972–1978.

26 Golianu B, Krane E, Seybold J, Almgren C, Anand KJS. Non-pharmacological techniques for pain management in neonates. *Semin Perinatol.* 2007; 31(5): 318–322.

27 Fry LM, Neary SM, Sharrock J, Rychel JK. Acupuncture for analgesia in veterinary medicine. *Top Companion Anim Med*. 2014; 29(2): 35–42.

28 Levy B, Paulozzi L, Mack KA, Jones CM. Trends in opioid analgesic-prescribing rates by specialty, U.S., 2007—2012. *Am J Prev Med*. 2015; 49(3): 409–413.

29 Thiels CA, Anderson SS, Ubl DS, Hanson KT, Bergquist WJ, Gray RJ, Gazelka HM, Cima RR, Habermann EB. Wide variation and overprescription of opioids after elective surgery. *Ann Surg.* 2017; 266(4): 564–573.

30 Wunsch H, Wijeysundera DN, Passarella MA, Neuman MD. Opioids prescribed after low-risk surgical procedures in the United States, 2004—2012. *JAMA*. 2016; 315(15): 1654–1657.

31 Hill MV, McMahon ML, Stucke RS, Barth RJ. Wide variation and excessive dosage of opioid prescriptions for common general surgical procedures. *Ann Surg*. 2017; 265(4): 709–714.

32 Brummett CM, Waljee JF, Goesling J, Moser S, Lin P, Englesbe MJ, Bohnert ASB, Kheterpal S, Nallamothu BK. New persistent opioid use after minor and major surgical procedures in US adults. *JAMA Surg*. 2017; 152(6): e170504.

33 Pang J, Tringale KR, Tapia VJ, Moss WJ, May ME, Furnish T, Barnachea L, Brumund KT, Sacco AG, Weisman RA, Nguyen QT, Harris JP, Coffey CS, Califano JA 3rd. Chronic opioid use following surgery for oral cavity cancer. *JAMA Otolaryngol Head Neck Surg*. 2017; Epub ahead of print.

34 Meissner W, Dohrn B, Reinhart K. Enteral naloxone reduces gastric tube reflux and frequency of pneumonia in critical care patients during opioid analgesia. *Crit Care Med*. 2003; 31(3): 776–780.

35 Dublin S, Walker RL, Jackson ML, Nelson JC, Weiss NS, Von Korff M, Jackson LA. Use of opioids or benzodiazepines and risk of pneumonia in older adults: a population-based case-control study. *J Am Geriatr Soc*. 2011; 59(10): 1899–1907.

36 Burry LD, Williamson DR, Mehta S, Perreault MM, Mantas I, Mallick R, Fergusson DA, Smith O, Fan E, Dupuis S, Herridge M, Rose L. Delirium and exposure to psychoactive medications in critically ill adults: a multi-centre observational study. *J Crit Care*. 2017; 42: 268–274.

37 Tedesco D, Gori D, Desai KR, Asch S, Carroll IR, Curtin C, McDonald KM, Fantini MP, Hernandez-Boussard T. Drug-free interventions to reduce pain or opioid consumption after total knee arthroplasty: a systematic review and meta-analysis. *JAMA Surg.* 2017: e172872.

38 Asmussen S, Przkora R, Maybauer DM, Fraser JF, Sanfilippo F, Jennings K, Maybauer MO. Meta-analysis of electroacupuncture in cardiac anesthesia and intensive care. *J Intensive Care Med*. 2017: 885066617708558.

39 Huang S, Peng W, Tian X, Liang H, Jia Z, Lo T, He M, Feng Y. Effects of transcutaneous electrical acupoint stimulation at different frequencies on perioperative anesthetic dosage, recovery, complications, and prognosis in video-assisted thoracic surgical lobectomy: a randomized, double-blinded, placebo-controlled trial. *J Anesth.* 2017; 31(1): 58–65.

40 Asmussen S, Maybauer, DM, Chen JD, Fraser JF, Toon MH, Przkora R, Maybauer MO. Effects of acupuncture in anesthesia for craniotomy: a meta-analysis. *J Neurosurg Anesthesiol.* 2017; 29(3): 219–227.

41 Yang Y, Zuo HQ, Li Z, Qin YZ, Mo XW, Huang MW, Lai H, Wu LC, Chen JS. Comparison of efficacy of simo decoction and acupuncture or chewing gum alone on postoperative ileus in colorectal cancer resection: a randomized trial. *Sci Rep*. 2017; 7: 37826.

42 Smith CA, Zhu X, He L, Song J. Acupuncture for primary dysmenorrhoea. *Cochrane Database Syst Rev*. 2011; (1): CD007854.

43 Abaraogu UO, Tabansi-Ochuogu CS. As acupressure decreases pain, acupuncture may improve some aspects of quality of life for women with primary dysmenorrhea: a systematic review with meta-analysis. *J Acupunct Meridian Stud*. 2015; 8(5): 220–228.

44 Cho SH, Hwang EW. Acupuncture for primary dysmenorrhoea: a systematic review. *BJOG*. 2010; 117(5): 509–521.

45 Xu T, Hui L, Juan YL, Min SG, Hua WT. Effects of moxibustion or acupoint therapy for the treatment of primary dysmenorrhea: a meta-analysis. *Altern Ther Health Med*. 2014; 20(4): 33–42.

46 Chung YC, Chen HH, Yeh ML. Acupoint stimulation intervention for people with primary dysmenorrhea: systematic review and meta-analysis of randomized trials. *Complement Ther Med*. 2012; 20(5): 353–363.

47 Chen MN, Chien LW, Liu CF. Acupuncture or acupressure at the Sanyinjiao (SP6) acupoint for the treatment of primary dysmenorrhea: a meta-analysis. *Evid Based Complement Alternat Med.* 2013; 2013: 493038.

48 Levett KM, Smith CA, Dahlen HG, Bensoussan A. Acupuncture and acupressure for pain management in labour and birth: a critical narrative review of current systematic review evidence. *Complement Ther Med.* 2014; 22(3): 523–340.

49 Vixner L, Schytt E, Stener-Victorin E, Waldenstrom U, Pettersson H, Martensson LB. Acupuncture with manual and electrical stimulation for labour pain: a longitudinal randomised controlled trial. *BMC Complement Altern Med.* 2014; 14: 187.

50 Dong C, Hu L, Liang F, Zhang S. Effects of electro-acupuncture on labor pain management. *Arch Gynecol Obstet.* 2015; 291(3): 531–536.

51 Liu H, Li H, Xu M, Chung KF, Zhang SP. A systematic review on acupuncture for trigeminal neuralgia. *Altern Ther Health Med.* 2010; 16(6): 30–35.

52 Deare JC, Zheng Z, Xue CC, Liu JP, Shang J, Scott SW, Littlejohn G. Acupuncture for treating fibromyalgia. *Cochrane Database Syst Rev.* 2013; (5): CD007070.

53 Grissa MH, Baccouche H, Boubaker H, Beltaief K, Bzeouich N, Fredj N, Msolli MA, Boukef R, Bouida W, Nouira S. Acupuncture vs intravenous morphine in the management of acute pain in the ED. *Am J Emerg Med.* 2016; 34(11): 2112–2116.

54 MacPherson H, Vertosick EA, Foster NE, Lewith G, Linde K, Sherman KJ, Witt CM, Vickers AJ. The persistence of the effects of acupuncture after a course of treatment: a meta-analysis of patients with chronic pain. *Pain*. 2017; 158(5): 784–793.

55 Feeney C, Bruns E, LeCompte G, Forati A, Chen T, Matecki A. Acupuncture for pain and nausea in the intensive care unit: a feasibility study in a public safety net hospital. *J*

Altern Complement Med. 2017; Epub ahead of print.
56 Lao L. Acupuncture practice, past and present: is it safe and effective? *J Soc Integr Oncol*. 2006; 4(1): 13–15.
57 Lu W, Dean-Clower E, Doherty-Gilman A, Rosenthal DS. The value of acupuncture in cancer care. *Hematol Oncol Clin North Am*. 2008; 22(4): 631–648.
58 Ambrosio EM, Bloor K, MacPherson H. Costs and consequences of acupuncture as a treatment for chronic pain: a systematic review of economic evaluations conducted alongside randomised controlled trials. *Complement Ther Med.* 2012; 20(5): 364–374.
59 MacPherson H, Vickers A, Bland M, Torgerson D, Corbett M, Spackman E, Saramago P, Woods B, Weatherly H, Sculpher M, Manca A, Richmond S, Hopton A, Eldred J, Watt I. Acupuncture for chronic pain and depression in primary care: a programme of research. *Southampton (UK): NIHR Journals Library.* 2017.
60 Center for health information and analysis. *Mandated benefit review of H.B. 3972: an act relative to the practice of acupuncture.* (2015-04) [2017-08-19]. http://www.aomsm.org/Resources/Documents/Research/BenefitReview-H3972-Acupuncture.pdf.
61 Australian Acupuncture and Chinese Medicine Association Ltd. *The acupuncture evidence project: plain English summary.* (2017) [2017-08-26]. http://www.acupuncture.org.au/Portals/0/Evidence%20study/Acupuncture%20Evidence_plain%20English%20Web%20version_17_Feb.pdf?ver=2017-02-22-171448-550.
62 Da Silva AN. Acupuncture for migraine prevention. *Headache.* 2015; 55(3): 470–473.
63 Liodden I, Norheim AJ. Acupuncture and related techniques in ambulatory anesthesia. *Curr Opin Anaesthesiol*. 2013; 26(6): 661–668.
64 Spackman E, Richmond S, Sculpher M, Bland M, Brealey S, Gabe R, Hopton A, Keding A, Lansdown H, Perren S, Torgerson D, Watt I, MacPherson H. Cost-effectiveness analysis of acupuncture, counselling and usual care in treating patients with depression: the results of the ACUDep trial. *PLoS One*. 2014; 9(11): e113726.
65 Taylor P, Pezzullo L, Grant SJ, Bensoussan A. Cost-effectiveness of acupuncture for chronic nonspecific low back pain. *Pain Pract.* 2014; 14(7): 599–606.
66 Andronis L, Kinghorn P, Qiao S, Whitehurst DG, Durrell S, McLeod H. Cost-effectiveness of non-invasive and non-pharmacological interventions for low back pain: a systematic literature review. *Appl Health Econ Health Policy.* 2017; 15(2): 173–201.
67 Lin JG, Lo MW, Wen YR, Hsieh CL, Tsai SK, Sun WZ. The effect of high and low frequency electroacupuncture in pain after lower abdominal surgery. *Pain*. 2002; 99(3): 509–514.
68 Wang B, Tang J, White PF, Naruse R, Sloninsky A, Kariger R, Gold J, Wender RH. Effect of the intensity of transcutaneous acupoint electrical stimulation on the postoperative analgesic requirement. *Anesth Analg*. 1997; 85(2): 406–413.
69 Zheng Z, Guo RJ, Helme RD, Muir A, Da Costa C, Xue CC. The effect of electroacupuncture on opioid-like medication consumption by chronic pain patients: a pilot randomized controlled clinical trial. *Eur J Pain*. 2008; 12(5): 671–676.
70 Crawford P, Penzien DB, Coeytaux R. Reduction in pain medication prescriptions and self-reported outcomes associated with acupuncture in a military patient population. *Med Acupunct*. 2017; 29(4): 229–231.
71 Kligler B. Integrative health in the veterans health administration. *Med Acupunct*. 2017; 29(4): 187–188.
72 Helms J. Medical acupuncture meets the military. *Med Acupunct.* 2017; 29(4): 189–190.
73 Hanlon JT, Zhao X, Naples JG, Aspinall SL, Perera S, Nace DA, Castle NG, Greenspan SL, Thorpe CT. Central nervous system medication burden and serious falls in older nursing home residents. *J Am Geriatr Soc*. 2017; 65(6): 1183–1189.
74 Robb G, Loe E, Maharaj A, Hamblin R, Seddon ME. Medication-related patient harm in New Zealand hospitals. *N Z Med J*. 2017; 130(1460): 21–32.
75 Goldman N, Chen M, Fujita T, Xu Q, Peng W, Liu W, Jensen TK, Pei Y, Wang F, Han X, Chen JF. Adenosine A1 receptors mediate local anti-nociceptive effects of acupuncture. *Nat Neurosci*. 2010; 13(7): 883–888.
76 Takano T, Chen X, Luo F, Fujita T, Ren Z, Goldman N, Zhao Y, Markman JD, Nedergaard M. Traditional acupuncture triggers a local increase in adenosine in human subjects. *J Pain*. 2012; 13(12): 1215–1223.
77 Zhao ZQ. Neural mechanism underlying acupuncture analgesia. *Prog Neurobiol.* 2008; 85(4): 355–375.
78 Han JS. Acupuncture analgesia: areas of consensus and controversy. *Pain.* 2011; 152(3 Suppl): S41–S48.
79 Han JS. Acupuncture and endorphins. Neurosci Lett. 2004; 361(1–3): 258–261.
80 McDonald JL, Cripps AW, Smith PK. Mediators, receptors, and signalling pathways in the anti-inflammatory and antihyperalgesic effects of acupuncture. *Evid Based Complement Alternat Med.* 2015; 2015: 975632.
81 Zhang R, Lao L, Ren K, Berman BM. Mechanisms of acupuncture-electroacupuncture on persistent pain. *Anesthesiology*. 2014; 120(2): 482–503.
82 Harris RE, Zubieta JK, Scott DJ, Napadow V, Gracely RH, Clauw DJ. Traditional Chinese acupuncture and placebo (sham) acupuncture are differentiated by their effects on μ-opioid receptors (MORs). *Neuroimage*. 2009; 47(3): 1077–1085.
83 Dowell D, Haegerich TM, Chou R. CDC Guideline for prescribing opioids for chronic pain—United States, 2016. *MMWR Recomm Rep.* 2016; 65(No. RR–1): 1–49.
84 Shaheed CA, Maher CG, Williams KA, Day R, McLachlan AJ. Efficacy, tolerability, and dose-dependent effects of opioid analgesics for low back pain: a systematic review and meta-analysis. *JAMA Intern Med.* 2016; 176(7): 958–968.
85 Krebs EE. *Effectiveness of opioid therapy vs. non-opioid medication therapy for chronic back and osteoarthritis pain over 12 months*. Annual Meeting, Society for General Internal Medicine, Washington DC. 2017.
86 Xing GG, Liu FY, Qu XX, Han JS, Wan Y. Long-term synaptic plasticity in the spinal dorsal horn and its modulation by electroacupuncture in rats with neuropathic pain. *Exp Neurol.* 2007; 208(2): 323–332.
87 Napadow V, Kettner N, Ryan A, Kwong KK, Audette J,

Hui KK. Somatosensory cortical plasticity in carpal tunnel syndrome—a cross-sectional fMRI evaluation. *Neuroimage.* 2006; 31(2): 520–530.
88 Napadow V, Liu J, Li M, Kettner N, Ryan A, Kwong KK, Hui KK, Audette JF. Somatosensory cortical plasticity in carpal tunnel syndrome treated by acupuncture. *Hum Brain Mapp.* 2007; 28(3): 159–171.
89 Liu CZ, Kong J, Wang KL. Acupuncture therapies and neuroplasticity. *Neural Plast.* 2017; 2017: 6178505.
90 Wen H, Cheung SYC. Treatment of drug addiction by acupuncture and electrical stimulation. *Asian J Med.* 1973; 9: 138–141.
91 National Acupuncture Detoxification Association. *About NADA.* (2017) [2017-10-10]. http://www.acudetox.com/about-nada/12-faqs2013.
92 Hu L, Chu NN, Sun LL, Zhang R, Han JS, Cui CL. Electroacupuncture treatment reverses morphine-induced physiological changes in dopaminergic neurons within the ventral tegmental area. *Addict Biol.* 2009; 14(4): 431–437.
93 Lee BH, Ma JH, In S, Kim HY, Yoon SS, Jang EY, Yang CH. Acupuncture at SI5 attenuates morphine seeking behavior after extinction. *Neurosci Lett.* 2012; 529(1): 23–27.
94 Wen HL, Ho WK, Wong HK, Mehal ZD, Ng YH, Ma L. Reduction of adrenocorticotropic hormone (ACTH) and cortisol in drug addicts treated by acupuncture and electrical stimulation (AES). *Comp Med East West.* 1978; 6(1): 61–66.
95 Chan YY, Lo WY, Li TC, Shen LJ, Yang SN, Chen YH, Lin JG. Clinical efficacy of acupuncture as an adjunct to methadone treatment services for heroin addicts: a randomized controlled trial. *Am J Chin Med.* 2014; 42(3): 569–586.
96 Lin JG, Chan YY, Chen YH. Acupuncture for the treatment of opiate addiction. *Evid Based Complement Alternat Med.* 2012; 2012: 739045.
97 Raith W, Schmolzer GM, Resch B, Reiterer F, Avian A, Koestenberger M, Urlesberger B. Laser acupuncture for neonatal abstinence syndrome: a randomized controlled trial. *Pediatrics*. 2015; 136(5): 876–884.
98 Wu LZ, Cui CL, Tian JB, Ji D, Han JS. Suppression of morphine withdrawal by electroacupuncture in rats: dynorphin and kappa-opioid receptor implicated. *Brain Res.* 1999; 851(1–2): 290–296.
99 Birch S, Alraek T, Lee MS. Challenges for clinical practice guidelines in traditional medicines: the example of acupuncture. *Chin J Integr Med.* 2012; 18(9): 643–651.
100 Academic Collaborative for Integrative Health. *Clinicians' & Educators' Desk Reference on the Integrative Health & Medicine Professions*. 3rd ed. Mercer Island: Academic Collaborative for Integrative Health. 2017.
101 Fan AY, Faggert S. Distribution of licensed acupuncturists and educational institutions in the United States in early 2015. *J Integr Med*. 2017 November; Epub ahead of print.
102 CCAOM. *Council of Colleges of Acupuncture and Oriental Medicine.* (2017) [2017-10-10]. http://www.ccaom.org.
103 NCCAOM. *National Certification Commission for Acupuncture and Oriental Medicine.* (2017) [2017-10-10]. http://www.nccaom.org.
104 AAMA. *American Academy of Medical Acupuncture.* (2017) [2017-10-10]. http://www.medicalacupuncture.org.
105 HMI. *About HMI.* (2017) [2017-10-10]. https://hmieducation.com/about-hmi.
106 Lin K, Tung C. The regulation of the practice of acupuncture by physicians in the United States. *Med Acupunct*. 2017; 29(3): 121–125.

Appendix D. Additional Evidence Supporting Cost-Effectiveness of Acupuncture Treatment.

We respectfully submit the following studies representing the current evidence base for the cost-effectiveness of acupuncture treatment. We believe that expanded access to and utilization of acupuncture for a variety of conditions, including CLBP, can provide significant cost savings to the Medicare program and the healthcare system at large.

---

1. Ambrosio EM, Bloor K, MacPherson H. Costs and consequences of acupuncture as a treatment for chronic pain: a systematic review of economic evaluations conducted alongside randomized controlled trails. Complementary therapies in medicine. 2012;20(5):363-74.

2. Andronis L, Kinghorn P, Qiao S, Whithurst DG, Durrell S, McLeod H. Cost-effectiveness of non-invasive and non-pharmacological interventions for low back pain: a systematic literature review. Appl Health Econ Health Policy. 2016 Aug 22.

3. Bonafede M, Dick A, Noyes K, Klein JD, Brown T. The effect of acupuncture utilization on healthcare utilization. Med Care. 2008;46(1):41-8.

4. Dagenais S, Caro J, Haldeman S. A systematic review of low back pain cost of illness studies in the United States and internationally. Spine J. 2008;8(1):8-20. Doi: 10.1016/j.spinee.2007.10.005.

5. Lindall S. Is acupuncture for pain relief in general practice cost-effective? Acupuncture in Medicine. 1999;17:97-100.

6. Ratcliffe J, Thomas KJ, MacPherson H, Brazier J. A randomized controlled trial of acupuncture care for persistent low back pain: cost effectiveness analysis. BMJ. 2006;333(7569):626.

7. Taylor P, Pezzullo L, Grant SJ, Bensoussan A. Cost-effectiveness of acupuncture for chronic nonspecific low back pain. Pain Pract. 2014 Sep;14(7):599-606.

Appendix E. Summary of Findings of the Acupuncture Evidence Project.

We respectfully submit the following plain English summary of the findings of the Acupuncture Evidence Project, completed in 2017. The full study is attached in Appendix F.

The Acupuncture Evidence Project: Plain English Summary

The following is a plain English summary of the findings of the Acupuncture Evidence Project (McDonald J, and Janz S, 2017). The full document (81 pages) is available from the Australian Acupuncture and Chinese Medicine Association Ltd (AACMA) http://www.acupuncture.org.au.

Bottom Line

Our study found evidence for the effectiveness of acupuncture for 117 conditions, with stronger evidence for acupuncture's effectiveness for some conditions than others. Acupuncture is considered safe in the hands of a well-trained practitioner and has been found to be cost effective for some conditions. The quality and quantity of research into acupuncture's effectiveness is increasing.

Background

Acupuncture originated in China and is now practised throughout the world. Although acupuncture has been practised for thousands of years, evidence of its effectiveness is still controversial. The Australian
Acupuncture and Chinese Medicine Association Ltd (AACMA) identified the need for an updated review of the evidence with greater rigour than was possible in the past and commissioned The Acupuncture Evidence Project.

We searched the literature with a focus on systematic reviews and meta analyses (the highest form of evidence available). We sorted the evidence to identify which conditions acupuncture has been found to be most effective for. We also looked for evidence of acupuncture's safety and cost-effectiveness, and we reported how the evidence for acupuncture's effectiveness has changed over an eleven-year time-frame.

Key results

Of the 122 conditions identified, strong evidence supported the effectiveness of acupuncture for 8 conditions,
moderate evidence supported the use of acupuncture for a further 38 conditions, weak positive/unclear evidence supported the use of acupuncture for 71 conditions, and little or no evidence was found for the effectiveness of acupuncture for five conditions (meaning that further research is needed to clarify the effectiveness of acupuncture in these last two categories).

It is no longer possible to say that the effectiveness of acupuncture is because of the placebo effect, or that it is useful only for musculoskeletal pain.

In addition, research showed that acupuncture was cost effective for 10 conditions, and is safe in the hands of a well-trained practitioner. The level of evidence has increased over the 11-year period of this study for 24 conditions. Placebo-controlled clinical trials consistently underestimate the true effect size of acupuncture (which means that type of trials used in this review show), yet they have still demonstrated Council (NHMRC) Level I evidence for the effectiveness of acupuncture for 117 conditions.

Summary of Findings

Summary of Findings 1: The following tables summarise the effectiveness of acupuncture for various conditions.

Table 1. Conditions with strong evidence supporting the effectiveness of acupuncture	
Reviews with consistent statistically significant positive effects and where authors have recommended the intervention. The quality of evidence is rated as moderate or high quality.	
- Allergic rhinitis (perennial & seasonal)	- Knee osteoarthritis
- Chemotherapy-induced nausea and vomiting (with anti-emetics)	- Migraine prophylaxis
- Chronic low back pain	- Postoperative nausea & vomiting
- Headache (tension-type and chronic)	- Postoperative pain

Table 2. Conditions with moderate evidence supporting the effectiveness of acupuncture	
Reviews reporting all individual RCTs or pooled effects across RCTs as positive, but the reviewers deeming the evidence insufficient to draw firm conclusions. The quality of evidence is rated as moderate or high quality.	
- Acute low back pain	- Modulating sensory perception thresholds
- Acute stroke	- Neck pain
- Ambulatory anaesthesia	- Obesity
- Anxiety	- Perimenopausal & postmenopausal insomnia
- Aromatase-inhibitor-induced arthralgia	- Plantar heel pain
- Asthma in adults	- Post-stroke insomnia
- Back or pelvic pain during pregnancy	- Post-stroke shoulder pain
- Cancer pain	- Post-stroke spasticity
- Cancer-related fatigue	- Post-traumatic stress disorder
- Constipation	- Prostatitis pain/chronic pelvic pain syndrome
- Craniotomy anaesthesia	- Recovery after colorectal cancer resection
- Depression (with antidepressants)	- Restless leg syndrome
- Dry eye	- Schizophrenia (with antipsychotics)
- Hypertension (with medication)	- Sciatica
- Insomnia	- Shoulder impingement syndrome (early stage) (with exercise)
- Irritable bowel syndrome	- Shoulder pain
- Labour pain	- Smoking cessation (up to 3 months)
- Lateral elbow pain	- Stroke rehabilitation
- Menopausal hot flushes	- Temporomandibular pain

Summary of Findings 1 (continued): The following tables summarise the effectiveness of acupuncture for various conditions

Table 3. Conditions with weak positive/unclear evidence supporting the effectiveness of acupuncture	
Reviews consisted mostly of weak positive evidence or conflicting evidence between reviews or between authors within a review, with reviewers summarising the evidence as inconclusive. Reviews are of low or very low quality; or there is conflicting levels of evidence within or between reviews.	
- Acupuncture in Emergency Department	- Itch
- Acute ankle sprain in adults	- Lumbar spinal stenosis
- Alzheimer's disease	- Melasma
- Angina pectoris	- Meniere's disease/syndrome
- Assisted conception in ART	- Menopausal syndrome
- Asthma in children	- Multiple sclerosis
- Atopic dermatitis	- Mumps in children
- Attention Deficit Hyperactivity Disorder (ADHD)	- Myelosuppression after chemotherapy
- Autism spectrum disorder (ASD)	- Oocyte retrieval pain relief
- Bell's palsy	- Opiate addiction
- Bladder pain syndrome	- Opioid detoxification
- Cancer-related insomnia	- Parkinson's disease
- Cancer-related psychological symptoms	- Polycystic ovarian syndrome
- Carpal tunnel syndrome	- Poor sperm quality
- Chemotherapy-induced peripheral neuropathy	- Postnatal depression
- Chronic fatigue syndrome	- Postoperative gastroparesis syndrome (PGS)
- Chronic kidney disease	- Postoperative ileus
- Chronic obstructive pulmonary disease (COPD)	- Post-stroke hiccoughs
- Chronic urinary retention due to spinal cord injury	- Premenstrual syndrome
- Chronic urticaria	- Primary ovarian insufficiency
- Dysmenorrhoea	- Primary Sjogren's syndrome
- Dyspepsia in diabetic gastroparesis (DGP)	- Psoriasis vulgaris
- Erectile dysfunction	- Rheumatoid arthritis Slowing progression of myopia
- Exercise performance & post-exercise recovery	- Spinal cord injury
- Fatigue in systemic lupus erythematosus	- Stress urinary incontinence in adults
- Fibromyalgia	- Sudden sensorineural hearing loss
- Functional dyspepsia	- Surgery analgesia
- Gag reflex in dentistry	- Tinnitus
- Glaucoma	- Traumatic brain injury
- Heart failure	- Urinary incontinence
- Hot flushes in breast cancer	- Uterine fibroids
- Hyperemesis gravidarum	- Vascular cognitive impairment without dementia
- Hypoxic ischemic encephalopathy in neonates	- Vascular dementia
- Induction of labour	- Whiplash associated disorder (WAD)
- Inflammatory bowel disease	- Xerostomia in cancer

Table 4. Conditions with little or no evidence supporting the effectiveness of acupuncture	
Reviews have consistently found little support for acupuncture. The quality of the evidence is consistently low or very low. Further research required.	
- Alcohol dependence	- Nausea in pregnancy
- Cocaine addiction	- Smoking cessation (more than 6 months)
- Epilepsy	

Summary of Findings 2: Conditions with evidence of cost-effectiveness.

Table 5. Conditions with evidence of cost effectiveness	
- Allergic Rhinitis	- Low back pain
- Ambulatory Anaesthesia	- Migraine
- Chronic Pain	- Neck Pain (plus usual medical care)
- Depression	- Osteoarthritis
- Dysmenorrhoea	- Post-operative nausea and vomiting
- Headache	

Summary of Findings 3: Conditions with evidence of safety.

Table 6. Conditions with evidence of safety	
Condition	Comments
Acupuncture generally prior to this review	Acupuncture can be considered inherently safe in the hands of well-trained practitioners.
Allergic Rhinitis	**Safe** and cost-effective
Ambulatory Anaesthesia	Acupuncture **safe**, cost-effective and effective as an adjunctive therapy.
Alzheimers disease	Acupuncture is **Safe.**
Cancer-related psychological symptoms	Strong evidence for **safety.**
Depression	Strong evidence for **safety.** Effective and **safe** for major depressive disorder.
Low back pain	**Safe** and well tolerated.
Migraine	Moderate to high quality evidence Cost effective. Promise in **safety** and effectiveness. Serious adverse events were not reported in any trial.
Osteoarthritis of the Knee	Promise in **safety** and effectiveness.
Prostatitis pain/chronic pelvic pain syndrome	Acupuncture superior to both sham and to usual care and **safe.**

Summary of Findings 4: Changes in evidence levels over the eleven-year period covered by this review

Table 7. Statistical summary of findings of this review			
Evidence Level	**Number of Conditions**	**Changes in Level of Evidence**	**Number of Conditions**
Strong Evidence of effect	8	Increase to strong evidence	5
Moderate Evidence effect	38	Increase to moderate evidence	18
Unclear/mixed evidence	71	Increase to weak positive/unclear evidence	1
Little of no evidence of effect	5	Decreased evidence level	2
Total conditions with some evidence of effect (any level)	117	_____	____
Total conditions reviewed	122	Total increases in evidence level since prior reviews	24

Appendix F. Full Results of the Acupuncture Evidence Project.

We respectfully submit the full study entitled "The Acupuncture Evidence Project." A summary of the findings enclosed can be found in Appendix E.

The Acupuncture Evidence Project

A Comparative Literature Review

John McDonald

Stephen Janz

January 2017

(Revised Edition)

Commissioned by

Australian Acupuncture and Chinese Medicine Association Ltd

AACMA

AUSTRALIAN ACUPUNCTURE & CHINESE MEDICINE ASSOCIATION LTD

ACN 010 020 390

Acknowledgments
The Acupuncture Evidence Project: A Comparative Literature Review was funded by the Australian Acupuncture and Chinese Medicine Association Ltd (AACMA).

Research and analysis was undertaken by John McDonald PhD. The Project was initiated and managed by Stephen Janz.

Tables 3, 4, 5, and 6, and Sections 2 and 3 were written by John McDonald. Stephen Janz wrote the preface and the authors collaborated on Section 1, Tables 7 and 8, and the Appendix. Research design by Stephen Janz and John McDonald.

The authors thank Professor Caroline Smith, National Institute of Complementary Medicine, Western Sydney University, for providing advice regarding evidence levels for assisted reproduction trials; Associate Professor Zhen Zheng, RMIT University, for identifying the evidence levels for post-operative nausea and vomiting and post-operative pain; Judy James for technical and editorial assistance; and the AACMA board for funding and supporting this project. The authors also thank Dr Suzanne Cochrane, Western Sydney University; Associate Professor Chris Zaslawski, University of Technology Sydney; and Associate Professor Zhen Zheng, RMIT University, for providing pre-publication commentary and advice.

Conflicts of interest
Dr John McDonald was a co-author of three of the research papers referenced in this review. Professor Caroline Smith was a co-author of six of the research papers referenced in this review, and Associate Professor Zhen Zheng was co-author of one of the research papers in this review. There were no other conflicts of interest.

The Acupuncture Evidence Project is a publication of the Australian Acupuncture and Chinese Medicine Association Ltd.

This document should be cited as: McDonald J, Janz S. The Acupuncture Evidence Project: A Comparative Literature Review (Revised edition). Brisbane: Australian Acupuncture and Chinese Medicine Association Ltd; 2017. http://www.acupuncture.org.au.

ISBN 978-0-9954289-3-5

ISBN 978-0-9954289-2-8

Disclaimer
This document aims to review the best available evidence to assist in decision-making. The authors and the Australian Acupuncture and Chinese Medicine Association Ltd give no warranty that the information contained in this document and any online updates available on the AACMA website is correct or complete.

Neither the authors nor the AACMA shall be liable for any loss whatsoever whether due to negligence or otherwise arising from the use of or reliance on this document. This document can be downloaded from the AACMA website. http://www.acupuncture.org.au.

ABSTRACT

Background
The acupuncture evidence project investigated the state of the evidence regarding acupuncture, with the focus on systematic reviews and meta-analyses. The Australian Department of Veterans' Affairs 2010 Alternative Therapies Review and United States Department of Veterans Affairs Acupuncture Evidence Map 2014 were used as baselines, then evidence levels were updated to reflect subsequent research.

Methods
A search of PubMed and Cochrane Library for systematic reviews and meta-analyses from March 2013 to September 2016 was conducted. Three reviews from October 2016 to January 2017 were also included. Evidence levels were graded using NHMRC levels. Risk of bias was assessed using the Cochrane GRADE system where possible. All results were displayed in tables to demonstrate changes in evidence level over time, as well as the current state of evidence by clinical area.

Results
Of the 122 conditions reviewed, evidence of effect was found at various levels for 117 conditions. Five conditions were assessed as 'no evidence of effect'. The level of evidence had increased for 24 conditions since the previous reviews. The findings of this review are limited by the mounting evidence that sham/placebo controls used in acupuncture trials are not inert, which is likely to lead to a consistent underestimation of the true effect size of acupuncture interventions.

Conclusions
Systematic reviews published up to January 2017 indicate that acupuncture has a 'positive effect' on eight conditions (migraine prophylaxis, headache, chronic low back pain, allergic rhinitis, knee osteoarthritis, chemotherapy-induced nausea and vomiting, post-operative nausea and vomiting and post-operative pain), 'potential positive effect' on a further 38 conditions, 'unclear/insufficient evidence' for 71 conditions and 'no evidence of effect' for five conditions. Evidence of cost-effectiveness was identified for 10 conditions, and evidence for safety was identified for nine conditions.

ADDENDUM TO REVISED EDITION

The Acupuncture Evidence Project: A Comparative Literature Review was released in limited circulation in December 2016. New research is regularly being reported and there is always a risk that a significant paper might be published just after a review is completed. Just prior to general publication, the authors became aware of three new studies with findings that were relevant to the review's results. As the objective of the review was to identify the state of acupuncture research, the authors decided to incorporate these late papers and amend the results accordingly, even though the new papers fell outside the initial search dates. These papers concerned chronic pain and assisted reproduction.

The authors have decided to leave the table headers and narrative to reflect evidence levels to 2016. This is a more accurate reflection of the study's results, as only one study has been included from 2017. The additional studies are clearly indicated in the tables. A plain English summary has been added to the Appendix in this revised edition.

17 January 2017

PREFACE

Background

Evidence of effectiveness underpins the validity of all health care interventions. Acupuncture has been practised for thousands of years; however, research into its effectiveness and cost effectiveness is in its relative infancy. The first significant attempt to identify the evidence validating the role of acupuncture was undertaken by the World Health Organization (WHO) in 1979 (1). WHO conducted a Delphi-like symposium in Beijing in 1979 where physicians from around the world identified 43 diseases which they believed acupuncture may benefit (1). The 1979 report was criticised because it was not based on clinical trials, rather the clinical experience of the participants (2).

The US Department of Health and Human Services National Institutes of Health (NIH) released a consensus statement on acupuncture in 1997 (3). The statement identified the efficacy of acupuncture for adult postoperative and chemotherapy nausea and vomiting, and for postoperative dental pain. In addition, the statement found support for the use of acupuncture for a range other conditions and identified the need for further research (3).

In 1996, WHO held a consultation on acupuncture in Cervia, Italy. At this meeting it was decided to review acupuncture again, this time focusing on the now-numerous controlled clinical trials. The result was a review of clinical trials up until early 1999 and culminated in 'Acupuncture: review and analysis of controlled clinical trials' published by WHO in 2002 (4). The report identified 28 conditions for which acupuncture was found to be effective, and nearly 100 others where there was a therapeutic effect (4). It was acknowledged at the time that there were problems with the methodology in some of the trials included in the review (4). Notwithstanding these limitations, the WHO report indicated a growing and convincing body of evidence indicating that there was more to acupuncture than the placebo effect (4).

The Acupuncture Evidence Project

Fourteen years after the WHO publication on acupuncture evidence there has been further refinement in the conduct of clinical trials, not just for acupuncture, but in health-care generally, with clearer guidelines on how to rate the quality of the evidence. The Australian Acupuncture and Chinese Medicine Association Ltd (AACMA) identified the need for an updated review of the literature with greater rigour than was possible in the past, and commissioned the acupuncture evidence project. AACMA engaged experienced clinician and researcher, Dr John McDonald PhD, to conduct the research and analysis for the project.

This review draws on two prior comprehensive literature reviews, one conducted for the Australian Department of Veterans' Affairs (DVA) in 2010 and another conducted for the United States Department of Veterans Affairs (USVA) in 2013 (5, 6). The research identified by these reviews was pooled, then a search of further literature from 2013 to 2016 was conducted. Trials were assessed using the National Health and Medical Research Council (NHMRC) levels of evidence, with risk of bias assessed using the Cochrane GRADE system (7, 8). Results have been tabulated to indicate not just the current state of the evidence, but to indicate how the quality and quantity of evidence has changed from 2005 to 2016. In this review, 122 conditions across 14 broad clinical areas were identified and, of these, only five conditions found 'no evidence of effect' for acupuncture. The level of evidence was found by this review to have increased for 24 conditions.

How to use this review

This project sets a new benchmark to inform acupuncturists, the public, researchers, health departments, governments, and other health providers that acupuncture has a valuable contribution to make to global healthcare and to assist in reducing the global burden of disease.

Acupuncturists should also take confidence from this report that their clinical expertise has been validated, and to confidently offer their services alongside other health professionals. Students and clinicians can use this report to identify areas of clinical interest which they may have overlooked. Researchers can find inspiration for areas of future investigation where the evidence is currently unclear. This review should also encourage educational institutions to maintain robust programs of study in acupuncture to continue to produce graduates capable of the broad scope of practice that this report indicates. It is no longer possible to say that the effectiveness of acupuncture can be attributed to the placebo effect or that it is useful only for musculoskeletal pain.

It is no longer possible to say that the effectiveness of acupuncture can be attributed to the placebo effect or that it is useful only for musculoskeletal pain.

The realisation that pharmacological and surgical interventions are not without their limitations has increased interest in drug-free treatments such as acupuncture (9-13). This review found eight conditions where acupuncture may be used to reduce reliance on pharmacological or surgical options. **Migraine** and **tension headaches** lead to loss of productivity and quality of life; a drug-free therapy has a major health impact and potential cost savings as well as maintaining participation in the workforce (14). Medication is not always an effective or acceptable therapy for **allergic rhinitis** and acupuncture improves the range of interventions available to improve quality of life (15). **Post-operative nausea and vomiting** and **post-operative pain** complicate post-operative management, with acupuncture offering another avenue to enhance care in the post-operative period and reduce reliance on medication alone (16, 17).

Knee osteoarthritis is on the increase globally and contributes not just to disability adjusted life years (DALYs), but is an increasing burden on health budgets (18, 19). The option of a safe, drug-free treatment that may improve quality of life and potentially delay surgical intervention has significant potential to control these spiralling costs and DALYs. **Low back pain** is a WHO priority disease, and is the single largest contributor to disability worldwide (20). The finding that acupuncture benefits chronic low back pain is arguably the most important finding from this report. Finally, **chemotherapy induced nausea and vomiting** is an unwanted complication of cancer treatment and is often not fully controlled even with state-of-the-art antiemetics. Acupuncture can assist in improving quality of life for these cancer patients (21).

It has been estimated that there is a 17-year time lag in translating clinical research into clinical practice (22). During this time patients are being deprived of the benefit of a proven therapy. Health policy makers now have eight clear conditions associated with a significant burden of disease where acupuncture should be integrated into current clinical guidelines without further delay. Placebo controlled clinical trials consistently underestimate the true effect size of acupuncture (as discussed in section 1.4), yet they have still demonstrated NHMRC Level 1 evidence for the effectiveness of acupuncture for a further 109 conditions. This review has found a significant improvement in both the quality of studies and the levels of evidence supporting acupuncture since the most recent reviews conducted by the Australian and US Departments of Veterans Affairs.

Stephen Janz MPH
Project Director
The AACMA Acupuncture Evidence Project
Brisbane, Australia

TABLE OF CONTENTS

GLOSSARY OF TERMS

AACMA	Australian Acupuncture and Chinese Medicine Association Ltd
ART	Assisted reproduction technology
CGRP	calcitonin gene-related peptide
DALYs	disability adjusted life years
DVA	Department of Veterans' Affairs
EA	electroacupuncture
ECP	eosinophilic cationic protein
FEV1	forced expiratory volume in one second
FEV1/FVC	ratio of FEV1 to forced ventilation capacity
GABA	gamma-amino-butyric-acid
GRADE	Grades of Recommendation, Assessment, Development and Evaluation
IgE	immunoglobulin E
IL	interleukin
MA	meta-analysis
MMSE	Mini Mental State Examination
NAD	neck pain and associated disorders
NHMRC	National Health and Medical Research Council
NIH	National Institutes of Health
NSAIDS	non-steroidal anti-inflammatory drugs
OHNSF	Otolaryngology Head Neck Surgery Foundation
PAR	persistent (perennial) allergic rhinitis
PCOS	Polycystic ovarian syndrome
QoL	quality of life
RCT	randomised controlled trial
RQLQ	rhinoconjunctivitis quality of life questionnaire (Juniper)
SAR	seasonal (intermittent) allergic rhinitis
SP	substance P
SR	systematic review
TEAS	transcutaneous electrical acupoint stimulation
TRPV1	transient receptor potential vanilloid 1
USVA	United States Department of Veterans Affairs
VIP	vasoactive intestinal peptide
WAD	whiplash associated disorders

1 INTRODUCTION

Increasing interest in acupuncture has led to the need for an updated review of its efficacy, effectiveness and cost effectiveness. Rather than starting from scratch, this review draws on two prior comprehensive literature reviews into acupuncture. The first was undertaken for the Australian Department of Veterans' Affairs (DVA) in 2010, the second for the United States Department of Veterans Affairs (USVA) in 2013 (5, 6). These reviews did not limit themselves to veteran-specific health issues but considered the evidence regarding acupuncture in the broadest health terms. A search was then conducted for studies after the USVA 2013 review and the evidence analysed, graded and tabulated. The advantage of this comparative approach is not only a pragmatic way of avoiding duplication of work; it also demonstrates the increasing quality and quantity of evidence supporting the effectiveness of acupuncture over the eleven-year period (2005 to 2016) from which studies were drawn.

Table 3 categorises the research literature by evidence levels. This table clearly demonstrates the increase in the volume and scope of research on acupuncture since the prior reviews. Table 4 summarises the changes in evidence levels among the reviews. Of note is the finding that eight conditions are now rated as 'evidence of positive effect'. Two of these had been listed as 'unclear' evidence and three as 'evidence of potential positive effect' prior to this review. Table 5 provides brief notes for each condition and the references justifying the change in evidence levels found by this review. Table 6 organises conditions by clinical areas, allowing the reader to get a snapshot of the state of the evidence for any particular clinical area, and identifies areas where further research needs to be undertaken.

Numerous clinical guidelines now recommend acupuncture for a range of conditions. Of the 122 conditions examined in this review, levels of evidence have increased for 24 conditions. There is now 'evidence of positive effect' for eight conditions and 'evidence of potential positive effect' for a further 38 conditions. Seventy-one conditions are rated as 'unclear/insufficient evidence' and only five conditions are currently rated at 'no evidence of effect'. Further statistics can be found at Table 2. The comparative approach used in this study serves as a reminder that a finding of 'no evidence of effect' or 'unclear' does not mean 'ineffective'. Many of the conditions currently rated as 'unclear' have consistently positive findings in systematic reviews, but because they represent new clinical areas for acupuncture research, the evidence is not yet sufficient to allow firm conclusions to be drawn on effectiveness or efficacy. Section 1.6 provides further assistance in interpreting the findings of this review. There are methodological challenges in investigating acupuncture such as the problems with placebo controlled trials (outlined in section 1.4) which are slowly being overcome.

1.1 Methods

A review of alternative therapies was published by the Australian Government Department of Veterans' Affairs in 2010 (5). In 2014, the US Department of Veterans Affairs published an Evidence Map of Acupuncture reviewing acupuncture research published in or before March 2013 (6). This review focuses on new evidence between March 2013 and September 2016. Like the two previous reviews, this review concentrates on systematic reviews (SR) and meta-analyses (MA), using Cochrane Systematic Reviews where available. The primary focus of this review is to examine evidence supporting the effectiveness and efficacy of acupuncture (see section 1.3 Efficacy versus effectiveness). Where available, evidence on cost-effectiveness and safety has been included (see Tables 7 and 8).

A search was undertaken on PubMed and the Cochrane Library using the search term 'acupuncture' with limits set for dates between March 2013 and September 2016, and restricted to reviews. All languages were included. Systematic reviews, meta-analyses, network meta-analyses, overviews of systematic reviews (NHMRC level I evidence) and some narrative reviews were included, but protocols for systematic reviews were excluded. Systematic reviews of non-invasive or nonpharmacological interventions or of complementary and/or alternative medicine (CAM) interventions were included if they included acupuncture studies. One systematic review from the Australian Journal of Acupuncture and Chinese Medicine was included although this journal is not included in PubMed listings. A check in January 2017 identified three more relevant SRs and MAs (one from October 2016, one from December 2016, and one from January 2017) which were included. A total of 136 systematic reviews, including 27 Cochrane systematic reviews were included in this review, along with three network meta-analyses, nine reviews of reviews and 20 other reviews. Meta-analyses were conducted for 62 of the non-Cochrane systematic reviews. This review includes pooled data from more than 1,000 randomised controlled trials. Some of the included systematic reviews included studies which were not randomised controlled trials.

1.2 Assessment of the quality of evidence

The Australian DVA review (2010) used the National Health and Medical Research Council (NHMRC) levels of evidence (I-IV) which define the source of the evidence, with Level I being 'evidence obtained from a systematic review of all relevant randomised controlled trials', and Level II being 'evidence obtained from at least one properly designed randomised controlled trial' (7). By this definition, this review examined mainly Level I evidence as systematic reviews and meta-analyses were prioritised. Level II evidence from individual randomised controlled trials has been included occasionally where new high quality randomised trials may have changed the conclusions from the most recent systematic review.

Risk of bias in randomised controlled trials has mainly been assessed by the included systematic reviews using the Cochrane GRADE system of low, unclear or high risk of bias across a number of domains (8). The quality of evidence has also been assessed principally using the GRADE system with randomised controlled trials being assessed as high, moderate, low or very low quality evidence. See the Appendix, Table 10 for an outline of GRADE levels. Where systematic reviews have used other systems of quality assessment (such as PRISMA or Jadad) an attempt has been made to convert these scores to an equivalent within the GRADE system. Some systematic reviews have not reported an assessment of quality of evidence of included trials, and due to time constraints, this review has not attempted to make such an assessment.

In the US Veterans Affairs evidence map, evidence has been assessed at four levels: evidence of positive effect, evidence of potential positive effect, unclear evidence and evidence of no effect. In this review this terminology has largely been adopted with the exception that 'evidence of no effect' has been replaced with 'no evidence of effect' which seems to be more strictly accurate. 'Unclear evidence' was described as conflicting evidence between reviews or between authors within a review, with reviewers summarising the evidence as inconclusive. 'Evidence of potential positive effect' refers to reviews reporting all individual RCTs or pooled effects across RCTs as positive, however the reviewers deeming the evidence insufficient to draw firm conclusions. 'Evidence of positive effect' refers to reviews with consistent statistically significant positive effects and where authors have recommended the intervention (6).

Table 1. Summary of levels of evidence used in this review		
Level	**Description**	**GRADE level** (8)
Evidence of positive effect	Reviews with consistent statistically significant positive effects and where authors have recommended the intervention. Strong positive evidence.	Moderate or high quality
Evidence of potential positive effect	Reviews reporting all individual RCTs or pooled effects across RCTs as positive, but the reviewers deeming the evidence insufficient to draw firm conclusions. Moderate positive evidence.	Moderate or high quality
Unclear/insufficient evidence	Reviews consisted mostly of weak positive evidence or conflicting evidence between reviews or between authors within a review, with reviewers summarising the evidence as inconclusive.	Low or very low quality; or conflicting levels of evidence within or between reviews
No evidence of effect	Reviews have consistently found little support for acupuncture.	Consistently low or very low quality

There is not necessarily an exact equivalence between the 'insufficient evidence' category used in the Australian DVA review and 'unclear' in the USVA evidence map, as some conditions rated as 'insufficient evidence' in the former may appear in the 'evidence of potential positive effect' category in the latter. Generally speaking, conditions rated as positive or potential positive in this review are conditions for which evidence levels were either moderate or high quality evidence according to the GRADE definitions, and conditions with low or very low quality evidence were rated as unclear even when all included RCTs reported positive outcomes. Conditions previously rated as 'potential positive' have been down-graded to 'no evidence of effect' where subsequent Cochrane reviews have found little support for acupuncture.

1.3 Efficacy versus effectiveness

Efficacy refers to the ability of an intervention to achieve its intended effect in ideal conditions, i.e. a clinical trial, usually with a placebo control. Effectiveness refers to the result of an intervention in real world clinical practice.

The most common method used to assess efficacy is the randomised sham/placebo controlled blinded clinical trial. This methodology is derived from pharmaceutical research where an inert tablet ('a sugar pill') is compared to a medication. 'Efficacy' in this example is the measure of the effects of the medication on one group of test subjects minus the effects from the sugar pill on the other group of test subjects. The validity of this method of measuring efficacy rests heavily on the assumption that the sham protocol comparator intervention is inert. If the comparator intervention is not inert, this creates difficulties in measuring efficacy accurately, as discussed in the next section.

1.4 Problems with placebo controls in acupuncture trials

It has been observed from the over 8,000 randomised controlled trials which appear in the Cochrane Database of Controlled Clinical Trials that, in studies where acupuncture is compared with no treatment, waitlist or usual care, there is a significantly larger treatment effect than when acupuncture is compared with some form of sham, placebo or minimal acupuncture (23-27). The Society for Acupuncture Research has dubbed this phenomenon a paradox in acupuncture

research (25). There is evidence that many, if not all, the forms of sham/placebo acupuncture treatment protocols used in acupuncture trials to date are not inert, and exert physiological, and possibly also placebo effects, making it extremely difficult (if not impossible) to accurately measure how much of the observed non-specific effects may be attributable to placebo and/or nocebo effects, and how much is due to the placebo not being inert (23, 26-29). Hence a comparison of the effect size of acupuncture when compared to that of placebo acupuncture may result in consistent underestimation of the true effect size (23, 28).

Some acupuncture researchers are now suggesting that clinical decisions regarding whether or not acupuncture should be recommended as a treatment option would be more accurately based on comparisons of acupuncture with usual care or acupuncture with other interventions (head-to-head studies and network meta-analyses) (25, 29). This trend of increased focus on pragmatic trials over explanatory trials is not limited to research into acupuncture, but has been identified as an issue in health research more generally (30). Further research on acupuncture mechanisms has also been recommended by both the Society for Acupuncture Research and the National Institutes for Health (NIH) in the USA which, at the Society for Acupuncture Research's biannual conference in Boston in October 2015, announced a new funding pool dedicated to acupuncture mechanism research (25). NIH have identified limited value in true versus sham acupuncture trials when investigating pain and have consigned such trials to a low programmatic priority (31). NIH has given high priority instead to pragmatic studies investigating acupuncture and pain management along with further research into the mechanisms of acupuncture (31).

The use of exit-debrief questionnaires in published sham/placebo-controlled acupuncture trials, which show no significant differences between the real and sham acupuncture groups in belief about which treatment they had received, suggests that in these trials placebo/nocebo effects are not an adequate explanation for any effects produced in the sham acupuncture group (32).

1.5 Acupuncture recommendations in clinical practice guidelines

In Australia, acupuncture has been included in clinical practice guidelines for various types of acute pain including post-operative pain, and for rotator cuff syndrome (33, 34). In 'Acute Pain Management: Scientific Evidence' published by the Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine in 2015, NHMRC Level I evidence was identified from Cochrane reviews for acupuncture for labour pain, oocyte retrieval pain, primary dysmenorrhoea, tension-type headaches and migraine, and from PRISMA reviews for postoperative pain, back pain and acute burns pain (33).

The development of guidelines requires quality levels of evidence adequate to support a given recommendation, even though they may fall below the highest level in some cases, and requires consideration of other factors including cost, clinical judgement, and patient preference.

In 'Clinical Practice Guidelines for the Management of Rotator Cuff Syndrome in the Workplace', published by The University of New South Wales in 2013, Recommendation 23 states that 'Clinicians may consider acupuncture in conjunction with exercise; both modalities should be provided by suitably qualified health care providers' (Grade C: 'Body of evidence provides some support for recommendation but care should be taken in its application to individual clinical and organisational circumstances') (34).

In 'Consensus Guidelines for the Management of Postoperative Nausea and Vomiting' published in USA by the Society for Ambulatory Anesthesia in 2014, acupuncture and point stimulation of

PC6 were recommended as both prophylactic and treatment strategies [Category A recommendation: based on supportive literature which contains multiple randomised controlled trials which report statistically significant ($P < 0.01$) differences between clinical interventions for a clinical outcome, and aggregated findings are supported by meta-analysis] (35).

Between 2012 and 2015 four International Symposia of Evidence-Based Clinical Practice Guideline in Traditional Medicine have been held in Daejon, South Korea hosted by the Korean Institute of Oriental Medicine (KIOM), bringing together participants from Korea, China, Japan, UK, Norway, Holland and Australia (36). By November 2015, over 870 recommendations for acupuncture were identified for over 100 conditions from multiple international groups and over 30 countries (36). Examples include: the Otolaryngology Head Neck Surgery Foundation's clinical practice guidelines for allergic rhinitis in 2015 (37); the National Institute for Health and Care Excellence (NICE), UK inclusion of migraine and tension type headache in 2012 (38); the Scottish Intercollegiate Guidelines Network guideline for the Management of Chronic Pain, inclusion of acupuncture (Grade A recommendation) for chronic low back pain and osteoarthritis (39); and the National German Gynaecologic Oncology Association's (Arbeitsgemeinschaft Gynakologische Onkologie) inclusion of acupuncture for 12 symptoms associated with breast cancer treatment in 2015 (36, 37).

Table 2. Statistical summary of findings of this review

Evidence Level	Number of Conditions	Changes in Level of Evidence	Number of Conditions
Evidence of Positive effect	8	Increase to positive effect	5
Evidence of Potential positive effect	38	Increase to potential positive effect	18
Unclear/insufficient evidence	71	Increase to unclear/insufficient evidence	1
No evidence of effect	5	Decreased evidence level	2
Total conditions with some evidence of effect (any level)	117	_____	____
Total conditions reviewed	122	Total increases in evidence level since prior reviews	24

1.6 Interpreting the findings

This review set out to identify the current state of evidence regarding acupuncture, and has done so principally by examining systematic reviews and meta-analyses. Most of these systematic reviews were restricted to only randomised controlled clinical trials which examine efficacy, not effectiveness (NHMRC level I evidence); however, some systematic reviews did include pragmatic trials and other uncontrolled studies. Consequently, studies which focused on effectiveness rather than efficacy such as cohort studies, case-control studies, or case series (NHMRC level III-IV evidence) were generally excluded from this review.

Placebo controlled clinical trials consistently underestimate the true effect size of acupuncture, yet over 1000 trials have still demonstrated NHMRC Level I evidence for the effectiveness of acupuncture for 117 conditions.

Earlier discussion has demonstrated the limitations of using placebo controlled clinical trials to assess acupuncture's efficacy, with the NIH's acknowledgement of this reflected in its current programmatic priorities which encourage

pragmatic trials at the expense of RCTs (31). Regardless of the limitations of acupuncture RCTs that under-report the true effect size of acupuncture (23, 28), for eight conditions across four clinical areas there is no longer any doubt of acupuncture's efficacy.

For the reasons outlined above, it is not correct to infer that acupuncture is ineffective for conditions which fall outside of the 'evidence of positive effect' category. For a further 109 conditions examined, positive results have been achieved from some trials in every case, with varying levels in the quality of the evidence.

Acupuncture has already been incorporated into clinical guidelines for over 100 conditions even though its current evidence level is rated below 'evidence of positive effect' in most of these cases. This reflects the weighting of other factors in guideline development, and recognition that the quality of levels of evidence are adequate to support a given recommendation, even though they may fall below the highest level in some cases (8). As recommended by both the Society for Acupuncture Research and the NIH, future acupuncture research to inform clinical practice guidelines should be focused on pragmatic trials, head-to-head comparison studies with other interventions (especially currently-recommended usual care interventions) to compare effectiveness, safety and cost-effectiveness, underpinned by further mechanism studies (25, 31). It is accurate to state from this report that there is NHMRC Level 1 evidence for acupuncture's effectiveness for 117 conditions.

The number of conditions included in this review is significantly larger than in previous reviews for two reasons. Firstly, acupuncture researchers have just begun to research the effectiveness of acupuncture for conditions not previously studied. Secondly research has become more nuanced and targeted. For example, what was previously reviewed as 'cancer adverse effects' is now separated into 12 different cancer-related conditions such as pain, fatigue, insomnia and xerostomia.

1.7 Limitations

This review has several limitations. Literature before March 2013 was obtained by pooling results from the DVA 2010 and USVA 2013 reviews. Any MA or SR overlooked by those reviews were not identified in this review. MAs and SRs from March 2013 to September 2016 were identified via a PubMed search. MAs and SRs which were not indexed by PubMed were not identified in this review with one exception. Three additional SRs and MAs published between October 2016 and January 2017 were included in the final revision.

The findings of this review are limited by the mounting evidence that sham/placebo controls used in acupuncture trials are not inert, which is likely to lead to a consistent underestimation of the true effect size of acupuncture interventions (see sections 1.3 and 1.4 above).

By design this review aimed to update previous reviews, and focused on MAs and SRs. Studies which focus solely on effectiveness rather than efficacy such as cohort studies, case-control studies and case series were excluded by most of the SRs. This results in under-reporting studies on the effectiveness of acupuncture. For example, a PubMed search on 3 November 2016 for the following key words returned the following results:

- cohort AND acupuncture (208)
- case control AND acupuncture (377)
- case series AND acupuncture (150).

2 CONDITIONS NOW RATED AS 'EVIDENCE OF POSITIVE EFFECT' IN THIS REVIEW

2.1 Migraine prophylaxis [Positive effect]

For migraine prophylaxis, acupuncture was rated as 'effective' in the Australian DVA review (2010) and 'evidence of positive effect' in the USVA Evidence map of acupuncture (2014) (5, 6). Since March 2013 a narrative review of high quality randomised controlled trials and two systematic reviews including a Cochrane systematic review update, have confirmed that acupuncture is superior to sham acupuncture and seems to be at least as effective as conventional preventative medication in reducing migraine frequency (40-42). Moreover, acupuncture is described as 'safe, long-lasting and cost effective' (40). Subgroup analysis in the Cochrane systematic review found that 16 or more treatment sessions showed a larger effect size (Z=4.06) than 12 treatments or fewer (Z=2.32). Evidence levels in these three reviews was moderate to high quality.

2.2 Headache (chronic tension-type and chronic episodic) [Positive effect]

Chronic tension-type headaches and chronic episodic headaches were not reviewed in the Australian DVA review (2010) and rated as 'evidence of positive effect' in the USVA Evidence map of acupuncture (2014) (5, 6). The most recent Cochrane systematic review update confirmed that acupuncture is effective for frequent episodic and chronic tension-type headaches with moderate to low quality evidence (43). A brief review of systematic reviews and meta-analyses described acupuncture as having a 'potentially important role as part of a treatment plan for migraine, tension-type headache, and several different types of chronic headache disorders' (44). Studies in Germany and the UK found acupuncture for chronic headaches to be cost-effective (44).

2.3 Low back pain [Chronic – positive effect; acute – potential positive effect]

For low back pain, acupuncture was rated as 'effective (possibly)' in the Australian DVA review (2010) and 'unclear' in the USVA Evidence map of acupuncture (2014) (5, 6). The main reason given for the 'unclear' rating in the USVA Evidence map was that 'sham acupuncture controlled trials tended towards statistically nonsignificant results' and a Cochrane systematic review in 2005 which drew no firm conclusions on the effectiveness of acupuncture for acute low back pain (6). The problems associated with the interpretation of the effects of sham acupuncture have already been discussed. When reviews separate the evidence on chronic low back pain from acute low back pain, as was done in the recent review by the US Agency for Healthcare Research and Quality, it was found that there is moderate quality evidence for the effectiveness of acupuncture in chronic low back pain for both pain intensity and function, but only low quality evidence for pain intensity and function in acute low back pain (45).

In a systematic review of 32 randomised controlled trials for acupuncture treatment of chronic non-specific low back pain, acupuncture was superior (both statistically and clinically significant) to sham acupuncture in pain reduction and improved function immediately after treatment (46). Acupuncture was equivalent but not superior to usual care in pain and function, but acupuncture plus usual care was superior to usual care alone (46). The reviewers rated the evidence level of their review as Level of Evidence I (46). A systematic review of 11 randomised controlled trials on acute low back pain, acupuncture was superior to NSAIDS for improving symptoms (small effect), and superior to sham for pain but not function (47). A narrative review of non-invasive and alternative treatments for chronic low back pain rated the evidence for the effectiveness of acupuncture as high and for acupressure as moderate (48).

A review of 16 systematic reviews found that acupuncture alone, or when added to usual care, provided short-term improvement in pain and function for chronic low back pain (medium to large clinical effects) and hence 'should be advocated in routine clinical practice' (49). For acute low back pain, the reviewers could not make firm conclusions about the effectiveness of acupuncture due the inclusion of only two systematic reviews (49). Two studies found that acupuncture is likely to be cost-effective for low back pain or chronic non-specific low back pain, respectively (50, 51).

2.4 Knee osteoarthritis pain [Positive effect]

Knee osteoarthritis pain was not reviewed in the Australian DVA review (2010) and rated as 'evidence of potential positive effect' in the USVA Evidence map of acupuncture (2014) (5, 6). In a network meta-analysis comparing 22 interventions in 152 studies, acupuncture was found to be equal to balneotherapy and superior to sham acupuncture, muscle-strengthening exercise, Tai Chi, weight loss, standard care and aerobic exercise (in ranked order) (52). Acupuncture was also superior to standard care and muscle-strengthening exercises in a sub-analysis of moderate to high quality studies (52). In a systematic review of 12 randomised controlled trials, acupuncture was found to significantly reduce pain intensity, to improve functional mobility and quality of life (53). Subgroup analysis showed greater reduction in pain intensity when treatment lasted for more than four weeks (53). The reviewers concluded that 'current evidence supports the use of acupuncture as an alternative for traditional analgesics in patients with osteoarthritis' (53).

2.5 Allergic rhinitis (seasonal and perennial/persistent) [Positive effect]

For allergic rhinitis, acupuncture was rated as 'effective' in the Australian DVA review (2010) and 'unclear' in the USVA Evidence map of acupuncture (2014) (5, 6). A systematic review of 13 randomised controlled trials concluded that 'acupuncture could be a safe and valid treatment option for allergic rhinitis' (moderate quality evidence) (54). Another systematic review (which included two large multi-centre randomised controlled trials, three comparisons of acupuncture versus medication and one cost-effectiveness study) concluded that there is high quality evidence of the efficacy and effectiveness of acupuncture and that it appears to be safe and cost-effective (15). Clinical practice guidelines for allergic rhinitis published by the Otolaryngology Head Neck Surgery Foundation in 2015 included acupuncture as Option five: 'Clinicians may offer acupuncture, or refer to a clinician who can offer acupuncture, for patients with AR who are interested in nonpharmacological therapy' (Aggregate evidence quality - Grade B) (37).

2.6 Chemotherapy-induced nausea and vomiting (CINV) [Positive effect]

For chemotherapy-induced nausea and vomiting, acupuncture was rated as 'effective' in the Australian DVA review (2010) and was not reviewed separately to 'cancer adverse effects' in the USVA Evidence map of acupuncture (2014) (5, 6). In 2013, a systematic review of seven acupuncture and six acupressure RCTs found that acupuncture reduced the frequency of acute vomiting and the dose of rescue medication but did not reduce acute nausea severity or frequency compared to control. Acupressure showed a decrease in frequency of nausea but not acute vomiting or delayed symptoms. All studies used state-of-the-art combination anti-emetics in addition to acupuncture/acupressure. The reviewers rated the quality of evidence in the acupuncture studies as low to moderate while the acupressure studies were moderate to high quality. There was insufficient evidence to draw firm conclusions due to underpowered studies

(21). However, an updated systematic review by Garcia et al in 2014 (using 18 new RCTs) found that acupuncture is an appropriate referral option for chemotherapy-induced nausea and vomiting (55). On this basis, CINV has been rated as positive rather than potential positive in this review.

2.7 Post-operative nausea and vomiting (PONV) [Positive effect]

For post-operative nausea and vomiting (PONV), acupuncture was rated as 'insufficient evidence' in the Australian DVA review (2010) and 'potential positive effect' in the USVA Evidence map of acupuncture (2014) (5, 6). In a systematic review and meta-analysis of 30 RCTs on acupuncture and acupressure in 2013, both acupuncture and acupressure reduced the number of cases of early nausea and vomiting (up to 24 hours post-surgery) (56). In 2015, a Cochrane update of 59 RCTs on PC6 stimulation found that PC6 stimulation was superior to sham, and equivalent to modern anti-emetics (16).

2.8 Post-operative pain [Positive effect]

For post-operative pain, acupuncture was not reviewed in the Australian DVA review (2010) and rated as 'unclear' in the USVA Evidence map of acupuncture (2014) (5, 6). A systematic review and meta-analysis of 13 RCTs in 2016, found that acupuncture, electroacupuncture (EA) and transcutaneous electrical acupoint stimulation (TEAS) improved pain on day one after surgery and reduced opioid use (17). Subgroup analysis showed that acupuncture and TEAS were superior to EA (17). A systematic review specifically on acute pain after back surgery reviewed five RCTs (three of which were high quality) and found encouraging but limited evidence for the efficacy of acupuncture (57). A systematic review on complementary therapies for pain after knee surgery included three RCTs on acupuncture and one on acupressure (58). The review found that acupressure reduced pain, and while acupuncture did not reduce pain it did reduce ibuprofen use (58). An RCT on acupuncture for pain after total knee arthroplasty found that acupuncture was superior to sham in post-operative fentanyl use, time to first request for fentanyl and pain intensity (59).

3 RESEARCH INTO THE MECHANISMS OF ACUPUNCTURE

Mechanisms underlying acupuncture analgesia have been extensively researched for over 60 years. In animal models, acupuncture and/or electroacupuncture have been shown to be effective for the alleviation of inflammatory, neuropathic, cancer, and visceral pain (60). Ascending neural pathways involving Aδ, Aβ and C sensory fibres have been mapped, the mesolimbic loop of analgesia in the brain and brain stem has been identified and descending pathways have also been mapped (61). Numerous mediators have been identified including opioid and non-opioid neuropeptides, serotonin, norepinephrine, dopamine, cytokines, glutamate, nitric oxide and gamma-amino-butyric-acid (GABA) (60, 61). Acupuncture analgesia has been shown to involve several classes of opioid neuropeptides including enkephalins, endorphins, dynorphins, endomorphins and nociceptin (also known as Orphanin FQ) (61-63). Among the non-opioid neuropeptides, substance P (SP), vasoactive intestinal peptide (VIP) and calcitonin gene-related peptide (CGRP) have been investigated for their roles in both the analgesic and anti-inflammatory effects of acupuncture (60, 64). Two recent reviews of acupuncture analgesia research further demonstrate the complexity of this area of study (61, 62).

The anti-inflammatory effects of acupuncture involve numerous mediators, receptors and signalling pathways, as outlined in two recent reviews (64, 65). The anti-inflammatory effects of acupuncture have particular relevance to allergic rhinitis, irritable bowel syndrome, post-surgical recovery, migraine, osteoarthritis and inflammatory aspects of a range of musculoskeletal conditions. In allergic rhinitis, acupuncture has been shown to down-regulate total and specific IgE, as well as SP and VIP (32, 66). Acupuncture has been shown to down-regulate transient receptor potential vanilloid 1 (TRPV1) in inflammatory pain and there is indirect evidence to suggest that acupuncture may down-regulate TRPV1 expression and sensitivity in allergic rhinitis (32, 64, 67). In irritable bowel syndrome, acupuncture has been shown to down-regulate SP, VIP and CGRP (68, 69). In migraine, acupuncture has been reported to down-regulate CGRP and SP which are also powerful vasodilators (70, 71).

In addition to the extensive research literature on acupuncture's efficacy, effectiveness and safety there is a body of research (largely using animal models) which has investigated physiological changes underpinning the effects of acupuncture in a broad range of clinical areas apart from pain and inflammation. To canvas this research in detail is beyond the scope of this review, however numerous reviews of this mechanism research have been published. A PubMed search on 18 September 2016, using the search terms 'acupuncture AND mechanism', yielded 1,943 hits.

For example:

- Acupuncture regulation of female reproductive function (72)
- Acupuncture regulation of gastrointestinal function (73)
- Acupuncture regulation of bladder function (73)
- Acupuncture regulation of circulation (74).

Table 3. Summary of effectiveness/efficacy in acupuncture research literature sorted by evidence levels			
Australian DVA (Sept 2005 - Sept 2010)	**USVA Evidence map (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**	
Effective	**Evidence of positive effect**	**Evidence of positive effect**	
- Allergic rhinitis (for up to 3 months) - Back or pelvic pain during pregnancy - Migraine prophylaxis (when used with routine care) - Vomiting after chemotherapy (with superseded anti-emetic drugs)	- Chronic pain* - Headache - Migraine * *Chronic pain has been separated into different chronic pain conditions since USVA*	- Allergic rhinitis (perennial & seasonal) - Chemotherapy-induced nausea and vomiting (CINV) (with anti-emetics) - Chronic low back pain - Headache (tension-type and chronic) - Knee osteoarthritis - Migraine prophylaxis - Postoperative nausea & vomiting - Postoperative pain	
Effective (possibly)	**Evidence of potential positive effect**		
- Lower back pain	- Ankle sprain - Anxiety - Cancer pain - Constipation - Depression - Dysmenorrhoea - General pain - Insomnia - Labour pain - Obesity - Osteoarthritic pain - Plantar heel pain - Postoperative nausea and vomiting - Post-traumatic Stress Disorder - Pregnancy pain - Prostatitis pain - Restless leg syndrome - Schizophrenia - Smoking cessation - Temporomandibular pain	- Acute low back pain - Acute stroke - Ambulatory anaesthesia - Anxiety - Aromatase-inhibitor-induced arthralgia - Asthma in adults - Back or pelvic pain during pregnancy - Cancer pain - Cancer-related fatigue - Constipation - Craniotomy anaesthesia - Depression (with antidepressants) - Dry eye - Hypertension (with medication) - Insomnia - Irritable bowel syndrome - Labour pain - Lateral elbow pain - Menopausal hot flushes - Modulating sensory perception thresholds - Neck pain (NAD, not WAD)	- Obesity - Perimenopausal & postmenopausal insomnia - Plantar heel pain - Post-stroke insomnia - Post-stroke shoulder pain - Post-stroke spasticity - Post-traumatic stress disorder - Prostatitis pain/chronic pelvic pain syndrome - Recovery after colorectal cancer resection - Restless leg syndrome - Schizophrenia (with antipsychotics) - Sciatica - Shoulder impingement syndrome (early stage) (with exercise) - Shoulder pain - Smoking cessation (up to 3 months) - Stroke rehabilitation - Temporomandibular pain

Table 3. Summary of effectiveness/efficacy in acupuncture research literature sorted by evidence levels (contd)		
Australian DVA (Sept 2005 - Sept 2010)	**USVA Evidence map (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Insufficient evidence	**Unclear evidence**	**Unclear/insufficient evidence**
- Assisted conception (when used on the day of embryo transfer) - Asthma - Bell's palsy - Breathlessness - Chronic neck pain - Cocaine addiction - Depression - Glaucoma - Induction of labour - Insomnia - Irritable bowel syndrome - Labour pain - Lateral elbow pain - Postnatal depression - Postoperative nausea and vomiting - Restless leg syndrome - Rheumatoid arthritis - Schizophrenia - Shoulder pain - Smoking cessation (up to 3 months) - Stroke - Uterine fibroids - Vascular dementia	- Back pain - Cancer adverse effects - Chronic fatigue syndrome - Drug addiction - Dry eye - Erectile dysfunction - Exercise - Fibromyalgia pain - Gastrointestinal disease - High blood pressure - Irritable bowel syndrome - Menopausal symptoms - Neck pain - Opiate addiction - Postoperative pain - Premenstrual syndrome - Quality of life - Rheumatoid arthritis pain - Rhinitis - Shoulder pain - Surgical analgesia - Tinnitus - Xerostomia	- Acupuncture in Emergency Department - Acute ankle sprain in adults - Alzheimer's disease - Angina pectoris - Assisted conception in ART (includes SR and MA from Dec 2016 and Jan 2017) - Asthma in children - Atopic dermatitis - Attention Deficit Hyperactivity Disorder (ADHD) - Autism spectrum disorder (ASD) - Bell's palsy - Bladder pain syndrome - Cancer-related insomnia - Cancer-related psychological symptoms - Carpal tunnel syndrome - Chemotherapy-induced peripheral neuropathy - Chronic fatigue syndrome - Chronic kidney disease - Chronic obstructive pulmonary disease (COPD) - Chronic urinary retention due to spinal cord injury - Chronic urticaria - Dysmenorrhoea - Dyspepsia in diabetic gastroparesis (DGP) - Erectile dysfunction - Exercise performance & post-exercise recovery - Fatigue in systemic lupus erythematosus - Fibromyalgia - Functional dyspepsia - Gag reflex in dentistry - Glaucoma - Heart failure - Hot flushes in breast cancer - Hyperemesis gravidarum - Hypoxic ischemic encephalopathy in neonates - Induction of labour - Inflammatory bowel disease - Itch - Lumbar spinal stenosis - Melasma - Meniere's disease/syndrome - Menopausal syndrome - Multiple sclerosis - Mumps in children - Myelosuppression after chemotherapy - Oocyte retrieval pain relief

Table 3. Summary of effectiveness/efficacy in acupuncture research literature sorted by evidence levels (contd)		
Australian DVA (Sept 2005 - Sept 2010)	**USVA Evidence map (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Insufficient evidence	**Unclear evidence**	**Unclear/insufficient evidence**
		- Opiate addiction - Opioid detoxification - Parkinson's disease - Polycystic ovarian syndrome - Poor sperm quality - Postnatal depression - Postoperative gastroparesis syndrome (PGS) - Postoperative ileus - Post-stroke hiccoughs - Premenstrual syndrome - Primary ovarian insufficiency - Primary Sjogren's syndrome - Psoriasis vulgaris - Rheumatoid arthritis - Slowing progression of myopia - Spinal cord injury - Stress urinary incontinence in adults - Sudden sensorineural hearing loss - Surgery analgesia - Tinnitus - Traumatic brain injury - Urinary incontinence - Uterine fibroids - Vascular cognitive impairment without dementia - Vascular dementia - Whiplash associated disorder (WAD) - Xerostomia in cancer
Not effective	**Evidence of no effect**	**No evidence of effect**
- Assisted conception (if used around time of oocyte retrieval) - Epilepsy - Smoking cessation (more than 3 months)	- Alcohol dependence - Carpal tunnel syndrome pain - Cocaine addiction - Nausea in pregnancy	- Alcohol dependence - Cocaine addiction - Epilepsy - Nausea in pregnancy - Smoking cessation (more than 6 months)

Table 4. Summary of changes in evidence levels from 2005 to 2016			
Conditions which have not changed in evidence level	**Australian DVA (Sept 2005 - Sept 2010)**	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
	Baseline evidence in bold		
Migraine prophylaxis	Effective	**Positive effect**	**Positive effect**
Headache (tension-type and chronic)	Not reviewed	**Positive effect**	**Positive effect**
Chemotherapy-induced nausea and vomiting	**Effective**	Not reviewed	**Positive effect**
Allergic rhinitis	**Effective**	Unclear	**Positive effect**
Anxiety	Not reviewed	**Potential positive effect**	**Potential positive effect**
Post-traumatic Stress Disorder	Not reviewed	**Potential positive effect**	**Potential positive effect**
Schizophrenia	Insufficient evidence	**Potential positive effect**	**Potential positive effect**
Smoking cessation		**Potential positive effect**	
Up to 3 months post-treatment	Insufficient evidence		**Potential positive effect**
More than 3 months post-treatment	Not effective		**No evidence of effect (more than 6 months)**
Temporomandibular pain		**Potential positive effect**	**Potential positive effect**
Plantar heel pain		**Potential positive effect**	**Potential positive effect**
Cancer pain	Not reviewed	**Potential positive effect**	**Potential positive effect**
Depression	Insufficient evidence	**Potential positive effect**	**Potential positive effect**
Insomnia	Insufficient evidence	**Potential positive effect**	**Potential positive effect**
Labour pain	Insufficient evidence	**Potential positive effect**	**Potential positive effect**
Back or pelvic pain during pregnancy	Effective	**Potential positive effect**	**Potential positive effect**
Prostatitis pain/chronic pelvic pain syndrome	Not reviewed	**Potential positive effect**	**Potential positive effect**
Constipation	Not reviewed	**Potential positive effect**	**Potential positive effect**
Obesity	Not reviewed	**Potential positive effect**	**Potential positive effect**
Restless leg syndrome	Insufficient evidence	**Potential positive effect**	**Potential positive effect**
Induction of labour	**Insufficient evidence**	Not reviewed	**Unclear**
Bell's palsy	**Insufficient evidence**	Not reviewed	**Unclear**
Glaucoma	**Insufficient evidence**	Not reviewed	**Unclear**
Uterine fibroids	**Insufficient evidence**	Not reviewed	**Unclear**
Vascular dementia	**Insufficient evidence**	Not reviewed	**Unclear**
Erectile dysfunction	Not reviewed	**Unclear**	**Unclear**
Tinnitus	Not reviewed	**Unclear**	**Unclear**
Improving exercise performance/recovery	Not reviewed	**Unclear**	**Unclear**
Opiate addiction	Not reviewed	**Unclear**	**Unclear**
Chronic fatigue syndrome	Not reviewed	**Unclear**	**Unclear**

Table 4. Summary of changes in evidence levels from 2005 to 2016 (contd)			
Conditions which have not changed in evidence level	**Australian DVA (Sept 2005 - Sept 2010)**	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
	Baseline evidence in bold		
Fibromyalgia	Not reviewed	**Unclear**	**Unclear**
Premenstrual syndrome	Not reviewed	**Unclear**	**Unclear**
Rheumatoid arthritis	Insufficient evidence	**Unclear**	**Unclear**
Assisted conception in ART	**Insufficient evidence** at embryo transfer; **Ineffective** at oocyte retrieval	Not reviewed	**Unclear**
Nausea in pregnancy	Not reviewed	**Evidence of no effect**	**No evidence of effect**
Alcohol dependence	Not reviewed	**Evidence of no effect**	**No evidence of effect**
Cocaine addiction	Insufficient evidence	**Evidence of no effect**	**No evidence of effect**
Epilepsy	**Not effective**	Not reviewed	**No evidence of effect**
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)**	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
	Baseline evidence in bold		
Low back pain	Possibly effective	Unclear	*Research has shown better outcomes for chronic low back pain than for acute low back pain*
Chronic low back pain			**Positive effect**
Acute low back pain			**Potential positive effect**
Knee osteoarthritis	Not reviewed	**Potential positive effect**	**Positive effect**
Postoperative nausea and vomiting	Insufficient evidence	**Potential positive effect**	**Positive effect**
Postoperative pain	Not reviewed	**Unclear**	**Positive effect**
Postoperative nausea and vomiting and pain after tonsillectomy			**Positive effect**
Postoperative pain – back surgery			**Positive effect**
Postoperative pain – knee surgery			**Positive effect**
Stroke	**Insufficient evidence**	Not reviewed	*Stroke research has now separated into several new topics*
Acute stroke			**Potential positive effect**
Stroke rehabilitation			**Potential positive effect**
Post-stroke spasticity			**Potential positive effect**
Post-stroke insomnia			**Potential positive effect**
Post-stoke shoulder pain			**Potential positive effect**
Post-stroke hiccoughs			**Unclear**

Table 4. Summary of changes in evidence levels from 2005 to 2016 (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)**	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
	Baseline evidence in bold		
Menopausal symptoms	Not reviewed	**Unclear**	*Menopausual symptom research has now separated into two new topics*
Menopausal hot flushes			**Potential positive effect**
Perimenopausal and postmenopausal sleep disturbance			**Potential positive effect**
Cancer adverse effects (not including cancer pain and chemotherapy-induced nausea and vomiting)	Not reviewed	**Unclear**	*Cancer adverse effects research has now separated into several new topics*
Cancer-related fatigue			**Potential positive effect**
Cancer-related insomnia			**Unclear**
Cancer-related peripheral neuropathy			**Unclear**
Hot flushes/flashes in breast cancer			**Unclear**
Xerostomia in cancer	Not reviewed	**Unclear**	**Unclear**
Recovery after colorectal cancer resection			**Potential positive effect**
Aromatase-inhibitor-induced arthralgia			**Potential positive effect**
Chemotherapy-induced peripheral neuropathy			**Unclear**
Myelosuppression after chemotherapy			**Unclear**
Cancer-related psychological symptoms			**Unclear**
Surgical analgesia	Not reviewed	**Unclear**	*Surgical analgesia research has now separated into several new topics*
Craniotomy anaesthesia			**Potential positive effect**
Ambulatory anaesthesia			**Potential positive effect**
Dry eye	Not reviewed	**Unclear**	**Potential positive effect**
Irritable bowel syndrome	Insufficient evidence	**Unclear**	**Potential positive effect**
Hypertension	Not reviewed	**Unclear**	**Potential positive effect**
Lateral elbow pain	**Insufficient evidence**	Not reviewed	**Potential positive effect**

Table 4. Summary of changes in evidence levels from 2005 to 2016 (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)**	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
	Baseline evidence in bold		
Neck pain	Insufficient evidence	**Unclear**	
Neck pain and associated disorders (NAD)			**Potential positive effect**
Whiplash associated disorders (WAD)			**Unclear**
Shoulder pain	Insufficient evidence	**Unclear**	**Potential positive effect**
Asthma	**Insufficient evidence**	Not reviewed	**Potential positive effect (in adults)**
Carpal tunnel syndrome	Not reviewed	**Evidence of no effect**	**Unclear**
Conditions which have decreased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)**	**USVA (Jan 2005 - Mar 2013) (to Mar 2013)**	**The Acupuncture Evidence Project (to September 2016)**
	Baseline evidence in bold		
Dysmenorrhoea	Not reviewed	**Potential positive effect**	**Unclear**
Ankle sprain	Not reviewed	**Potential positive effect**	**Unclear**

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references			
Conditions which remain unchanged	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Migraine prophylaxis	Effective	**Positive effect**	Acupuncture seems to be at least as effective as conventional preventative medication for migraine and is safe, long lasting, and cost-effective (citing Witt et al 2008) (Da Silva 2015 - Narrative review of large high quality RCTs)(40) Acupuncture reduces migraine frequency. Acupuncture superior to sham and may be as effective as prophylactic drugs; subgroup analysis showed larger effect size when 16 or more treatments given (Z = 4.06) compared to 12 treatments or less (Z = 2.32); Moderate quality evidence (Linde 2016 - Cochrane SR of 22 RCTs of at least 8 weeks duration)(41) Acupuncture superior to sham in effectiveness and reduced risk of recurrence; Moderate to high quality evidence (Yang 2016 - SR of 10 RCTs)(42)
Chemotherapy-induced nausea and vomiting	**Effective**	Not reviewed	Acupuncture reduced the frequency of acute vomiting and the dose of rescue medication but did not reduce acute nausea severity or frequency compared to control. Acupressure showed a decrease in frequency of nausea but not acute vomiting or delayed symptoms. All studies used state-of-the-art combination anti-emetics. Insufficient evidence due to underpowered studies; acupuncture low to moderate quality evidence; acupressure moderate to high quality evidence (McKeon 2013 - SR of 7 acupuncture and 6 acupressure RCTs)(21) Acupuncture is an appropriate referral option for chemotherapy-induced nausea and vomiting (Garcia 2014 - SR update: 18 new RCTs)(55)
Allergic rhinitis	**Effective**	Unclear	Acupuncture could be a safe and valid treatment for allergic rhinitis; Moderate quality evidence (Feng 2015 - SR of 13 RCTs)(54) High quality evidence of efficacy and effectiveness (Taw 2015 - SR of 2 large multi-centre RCTs, 3 acupuncture vs medication RCTs and 1 cost-effectiveness study)(15) OHNSF clinical practice guideline: Option 5: Clinicians may offer acupuncture, or refer to a clinician who can offer acupuncture, for patients with AR who are interested in nonpharmacologic therapy; Aggregate evidence quality - Grade B (Seidman 2015)(37) Acupuncture is cost-effective for allergic rhinitis (Kim 2012, Witt 2010)(75, 76) SAR - Acupuncture significantly superior to rescue medication in QALY gained, but may cost more short term (Reinhold 2013)(77, 78)

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which remain unchanged	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Anxiety	Not reviewed	**Potential positive effect**	Acupuncture has 'potential use' (Bazzan 2014 - Narrative review)(79) Positive and statistically significant effects; Moderate to high quality evidence (Goyata 2016 - Integrative review of 19 studies including 6 RCTs; 11 high quality studies; 5 moderate)(80)
Post-traumatic Stress Disorder	Not reviewed	**Potential positive effect**	One new RCT - Acupuncture plus usual care superior to usual care in PTSD severity, depression, pain and physical and mental functioning (Engel 2015 - RCT acupuncture plus usual care vs usual care, n = 55)(81)
Schizophrenia	Insufficient evidence	**Potential positive effect**	Acupuncture effective for schizophrenia, especially in improving sleep, mood and QoL by modulating and normalizing the limbic–paralimbic–neocortical network (LPNN), including the default mode network (DMN); limited evidence (Bosch 2015 - Review of SRs & MAs)(82) Acupuncture plus antipsychotic medication superior to antipsychotic medication alone, in terms of mental state and length of hospitalisation (moderate quality evidence) with fewer adverse effects (low quality evidence) (Shen 2014 – Cochrane update of 30 RCTs)(83)
Smoking cessation	Insufficient evidence (up to 3 months); Not effective (more than 3 months)	**Potential positive effect (short term)**	Potential short-term effects (low quality evidence), Insufficient evidence (more than 6 months) (White 2014 – Cochrane update)(84)
Temperomandibular pain		**Potential positive effect**	One new RCT: Acupuncture was equivalent to occlusal splint in pain intensity and range of mouth opening (Grillo 2015 - RCT acupuncture vs occlusal splint, n = 40)(85)
Plantar heel pain		**Potential positive effect**	No updates
Cancer pain	Not reviewed	**Potential positive effect**	Conflicting SRs Insufficient evidence; low to very low quality evidence (Paley 2015 - Cochrane SR of 5 RCTs) (86) Acupuncture relieved malignancy-related and surgery-induced pain but not pain induced by chemotherapy, radiotherapy or hormone therapy; Reviewers recommend acupuncture be included in multimodal treatment regimens (Chiu 2016 - SR of 29 RCTs)(87)

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which remain unchanged	**Australian DVA (Sept 2005 - Sept 2010)**	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
	Baseline evidence in bold		
Depression	Insufficient evidence	**Potential positive effect**	Acupuncture plus SSRIs superior to SSRIs alone, with an early onset of action and was safe and well-tolerated; EA had greater effect than manual acupuncture (Chan 2015 – SR of 13 RCTs: 1 high quality trial, 5 moderate, 7 low) (88) Effective and safe for major depressive disorder, especially in improving sleep, mood and QoL by modulating and normalizing the limbic–paralimbic–neocortical network (LPNN), including the default mode network (DMN); 'promising evidence' (Bosch 2015 - Review of SRs & MAs)(82) Acupuncture is cost-effective compared with counselling or usual care alone, although the ranking of counselling and acupuncture depends on the relative cost of delivering these interventions (Spackman 2014 –cost-effectiveness in one RCT)(89)
Insomnia	Insufficient evidence	**Potential positive effect**	Acupuncture may be superior to medication. Acupuncture for insomnia is potentially mediated by norepinephrine, melatonin, gamma-aminobutyric acid, and beta-endorphin; insufficient evidence (Zhao 2013 - book chapter)(90) Acupuncture statistically superior to sham (3 studies) and medication (27 studies); low quality evidence (Shergis 2016 - SR)(91)
Labour pain	Insufficient evidence	**Potential positive effect**	Acupuncture & acupressure 'promising' – Conflicting results due to heterogeneity in study designs, research questions, treatment protocols and outcomes measures (Levett 2014 - Review of SRs)(92)
Back or pelvic pain during pregnancy	Effective	**Potential positive effect**	Promising results; low quality evidence (Selva Olid 2013)(93) Clinically important and statistically significant changes (Close 2014 - SR of CAM; 2 high quality studies)(94) Moderate quality evidence that acupuncture or exercise, tailored to the stage of pregnancy, significantly reduced evening pelvic or lumbo-pelvic pain. Acupuncture superior to exercise for reducing evening pelvic pain; Both acupuncture and exercise superior to usual care; Insufficient evidence (Liddle 2015 - Cochrane SR: Comparison of interventions)(95)

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which remain unchanged	**Australian DVA (Sept 2005 - Sept 2010)**	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
	Baseline evidence in bold		
Prostatitis pain/chronic pelvic pain syndrome	Not reviewed	**Potential positive effect**	Acupuncture superior to both sham and to usual care and safe, thus it should be offered when available (Chang 2016 - SR of 7 RCTs: 3 high quality studies, 1 moderate and 3 low)(96) Acupuncture superior to sham in pain, voiding and QoL; acupuncture superior to medication in pain relief but no different in voiding and QoL; acupuncture as an adjunctive treatment for symptom control should be considered (Qin 2016 - SR of 7 RCTs: 3 high quality studies, 1 moderate and 3 low)(97)
Constipation	Not reviewed	**Potential positive effect**	No updates
Obesity	Not reviewed	**Potential positive effect**	Acupuncture superior to medication, sham and lifestyle modification; low to very low quality evidence (Esteghamati 2015 - Critical review of 3 SRs)(98)
Restless leg syndrome	Insufficient evidence	**Potential positive effect**	Insufficient evidence (Bega 2016 – Overview of alternative treatment of restless leg syndrome)(99)
Induction of labour	**Insufficient evidence**	Not reviewed	Insufficient evidence; included studies ranged from high to low quality evidence (Smith 2013 - Cochrane update with 14 RCTs)(100) Acupressure may reduce the duration of labour especially the first stage; insufficient evidence (Mollart 2015 – SR of 7 RCTs)(101)
Bell's palsy	**Insufficient evidence**	Not reviewed	Seems to be effective; insufficient evidence of efficacy and safety; low quality evidence (Li 2015 – SR & MA of 14 RCTs)(102) Acupuncture superior to waitlist in physical and social function (Kwon 2015 - RCT acupuncture (n=36) vs waitlist (n=13))(103)
Glaucoma	**Insufficient evidence**	Not reviewed	Insufficient evidence; low quality evidence (Law 2013 - Cochrane SR; I RCT on auricular acupressure)(104)
Uterine fibroids	**Insufficient evidence**	Not reviewed	Acupuncture may be a treatment option as part of a CAM treatment approach (Dalton-Brewer 2016 - Narrative review of CAM)(105)
Vascular dementia	**Insufficient evidence**	Not reviewed	Acupuncture plus other therapies significantly improved Mini Mental State scores; low quality evidence (Cao 2013 – SR of 12 RCTs)(106)
Erectile dysfunction	Not reviewed	**Unclear**	Insufficient evidence; low quality evidence (Cui 2016 - SR of 3 RCTs)(107)
Tinnitus	Not reviewed	**Unclear**	EA - Insufficient evidence; low quality evidence (He 2016 - SR of 5 RCTs)(108)

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which remain unchanged	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)** ***Baseline evidence in bold***	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Opiate addiction	Not reviewed	**Unclear**	Acupuncture is effective in opiate detoxification (and associated depression and anxiety) which is mediated by endogenous dynorphin; no effect on opioid cravings; low quality evidence (Wu 2016 – Narrative review)(109) Acupuncture superior to controls for withdrawal/craving and anxiety post-treatment but not long term; low quality evidence (Grant 2016 - SR & MA of 41 RCTs on substance use disorders)(110)
Chronic fatigue syndrome	Not reviewed	**Unclear**	Acupuncture plus usual care may improve fatigue in chronic fatigue syndrome and idiopathic chronic fatigue (Kim 2015 - Multi-centre nonblinded RCT, n = 150)(111)
Fibromyalgia	Not reviewed	**Unclear**	Acupuncture superior to no treatment or standard care in reducing pain and stiffness; low to moderate quality evidence Acupuncture not different from sham in reducing pain, fatigue or improving sleep and global wellbeing; moderate quality evidence EA is probably better than manual acupuncture in reducing pain and stiffness and improving global well-being, sleep and fatigue. (Deare 2013 – Cochrane SR of 9 RCTs)(112) Insufficient evidence; low quality evidence (Yang 2014 – SR of RCTs)(113) Inconsistent evidence (Lauche 2015 – SR of reviews; 2 high and 2 low quality reviews)(114)
Premenstrual syndrome	Not reviewed	**Unclear**	A SR in 2014 included no new evidence (115) Insufficient evidence (Hofmeister 2016 - Narrative review) (116)
Assisted conception in ART	**Insufficient evidence** when used around embryo transfer; **Not effective** when used around oocyte retrieval	Not reviewed	No evidence that acupuncture improves live birth or pregnancy rates in ART regardless of whether performed around the time of oocyte retrieval or embryo transfer (Cheong 2013 - Cochrane update with 20 RCTs)(117). Acupuncture ineffective when used only on the day of oocyte retrieval but effective when used on the day of embryo transfer (Shen 2015 - SR & MA) (118). Acupuncture improves clinical pregnancy rates in women undergoing IVF. Optimal positive effects were seen when acupuncture was used during controlled ovarian hyperstimulation. (Qian 2016 – SR of 30 RCTs & MA)(119) Acupuncture may increase the clinical pregnancy rate and ongoing pregnancy rate and decrease the risk of ovarian hyperstimulation syndrome in women with PCOS undergoing IVF or intracytoplasmic sperm injection (Jo 2017 – SR of 4 RCTs & MA)(120)

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which remain unchanged	**Australian DVA (Sept 2005 - Sept 2010)**	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
	Baseline evidence in bold		
Improving exercise performance and post-exercise recovery	Not reviewed	**Unclear**	No updates
Rheumatoid arthritis	Insufficient evidence	**Unclear**	A SR in 2016 included no new evidence (Fernandez-Llanio Camella 2016 -SR of CAM)(121)
Nausea in pregnancy	Not reviewed	**Evidence of no effect**	No significant difference between real and sham acupuncture; low quality evidence (Matthews 2015 - Cochrane SR of interventions for nausea in pregnancy; 2 RCTs on acupuncture)(122)
Alcohol dependence	Not reviewed	**Evidence of no effect**	Low to very low quality evidence (Grant 2016 - SR & MA of 41 RCTs: 12 opioids, 9 cocaine, 11 alcohol, 9 mixed/not reported/other)(110)
Cocaine addiction	Insufficient evidence	**Evidence of no effect**	Low to very low quality evidence (Grant 2016 - SR & MA of 41 RCTs: 12 opioids, 9 cocaine, 11 alcohol, 9 mixed/not reported/other)(110)
Epilepsy	**Not effective**	Not reviewed	No evidence of effect (Cheuk 2014 – Cochrane update)(123)

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Low back pain	Possibly effective	Unclear	***Research has shown better outcomes for chronic low back pain than for acute low back pain***
Chronic low back pain			High quality evidence for acupuncture; moderate quality evidence for acupressure (Wellington 2014 – SR of noninvasive interventions)(48) Acupuncture alone or as an adjunct to usual care provided short-term improvement in pain and function; low to high quality evidence; 'should be advocated in routine clinical practice' (Liu 2015 - Overview of 16 SRs)(49) Moderate quality evidence for pain and function (Chou 2016 [AHRQ Comparative Effectiveness review])(45) ***Upgrade to positive***
Acute low back pain			Acupuncture superior to NSAIDS for improving symptoms; acupuncture superior to sham for pain but not function (Lee 2013 - SR of 11 RCTs)(47) Low quality evidence for pain and function (Chou 2016 - AHRQ Comparative Effectiveness review)(45) ***Upgrade to potential positive***
Headache (frequent episodic or chronic tension-type)	Not reviewed	**Potential positive effect**	Acupuncture is cost effective for headache (Kim 2012)(76) A potentially important role for acupuncture as part of a treatment plan for migraine, tension-type headache, and several different types of chronic headache disorders. Cost-effective in Germany and UK (Coeytaux 2016 - Brief review of selected SRs and MAs)(44) Acupuncture can reduce workplace headache pain intensity, frequency and related disability; low quality evidence (Lardon 2016 - SR of 15 RCTs)(124) Effective for frequent episodic or chronic tension-type headaches; Moderate or low quality evidence (Linde 2016 - Cochrane SR of 12 RCTs)(43) Acupuncture has been included in the NICE guidelines for headache since 2012(38) ***Upgrade to positive***
Knee osteoarthritis	Not reviewed	**Potential positive effect**	Acupuncture was equal to balneotherapy and superior to sham acupuncture, muscle-strengthening exercise, Tai Chi, weight loss, standard care and aerobic exercise (in ranked order). Acupuncture superior to standard care and muscle-strengthening exercises in sub-analysis of moderate to high quality studies (Corbett 2013: Network meta-analysis (152 studies on 22 interventions: 12 RCTs included in network MA) (52) ***Upgrade to positive***

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Postoperative nausea and vomiting	Insufficient evidence	**Potential positive effect**	Acupuncture and acupressure reduced number of cases of early nausea and vomiting (up to 24 hours); low quality evidence (Cheong 2013 - SR of 30 RCTs)(56) PC 6 stimulation was superior to sham; low quality evidence; no difference between PC 6 stimulation and anti-emetics (moderate quality evidence); insufficient evidence that PC 6 plus anti-emetics is superior to anti-emetics alone (Lee 2015 - Cochrane update with 59 RCTs of PC 6 stimulation)(16) ***Upgrade to positive***
Postoperative nausea and vomiting and pain after tonsillectomy			Pain scores, analgesic need and nausea and vomiting were reduced (acupuncture vs control); no significant adverse events; insufficient evidence (Cho 2016 - MA of 12 RCTs; 7 high quality)(125) Acupuncture superior to controls and cost-effective; insufficient evidence (Shin 2016 - SR & MA - 4 RCTs [3 high quality]; 3 randomised prospective studies and 1 pilot)(126) ***Upgrade to positive***
Postoperative pain	Not reviewed	**Unclear**	Some forms of acupuncture (acupuncture, EA and TEAS) improved pain on day 1 after surgery and reduced opioid use; subgroup analysis showed acupuncture and TEAS superior to EA; moderate quality evidence (Wu 2016 - SR & MA of 13 RCTs)(17) ***Upgrade to positive***
Postoperative pain – back surgery			Encouraging but limited evidence (Cho 2015 - SR of 5 RCTs; 3 high quality)(57) ***Upgrade to positive***
Postoperative pain – knee surgery			Acupressure reduced pain; acupuncture did not reduce pain but resulted in reduced use of ibuprofen; low quality evidence (Barlow 2013 - SR of CAM – 3 acupuncture & 1 acupressure RCTs)(58) Acupuncture superior to sham in post-operative fentanyl use, time to first request for fentanyl and pain intensity (Chen 2015 - RCT acupuncture vs sham, n=60)(59) ***Upgrade to positive***

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)**	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
	Baseline evidence in bold		
Stroke	**Insufficient evidence**	Not reviewed	***Stroke research has now become nuanced into several new topics*** Acupuncture may be effective for treating post-stroke neurological impairment and dysfunction such as dysphagia, but does not prevent post-stroke death; (Zhang 2014 - Review of SRs: 8 reviews high quality, 6 moderate, 10 low)(127) ***Upgrade to potential positive***
Acute stroke			Acupuncture plus rehabilitation superior to rehabilitation alone for acute and subacute stroke sequelae (Vados 2015 – SR of 17 RCTs; 5 high quality)(128) Acute ischaemic stroke: EA superior to usual care in Barthel Index, Fugl-Meyer Assessment, National Institutes of Health Stroke Scale, and Revised Scandinavian Stroke Scale; Moderate to high quality evidence (Liu 2015 - MA of 18 RCTs)(129) ***Upgrade to potential positive***
Stroke rehabilitation			May have beneficial effects on improving dependency, global neurological deficiency, and some specific neurological impairments; insufficient evidence; low to very low quality evidence (Yang 2016 – Cochrane update)(130) ***Upgrade to potential positive***
Post-stroke spasticity			Acupuncture or EA significantly decreased spasticity after stroke; low quality evidence (Lim 2015 – SR & MA of 5 RCTs)(131) Acupuncture improved passive resistance to stretching, degree of personal dependence and motor function; insufficient evidence; 6 high quality studies; 3 moderate quality (Rodriguez-Mansilla 2016 – SR of 9 RCTs or controlled studies)(132) ***Upgrade to potential positive***
Post-stroke insomnia			Acupuncture superior to sham acupuncture and to medication; insufficient evidence; low to moderate evidence (Lee 2016 – SR & MA of 13 RCTs)(133) ***Upgrade to potential positive***
Post-stoke shoulder pain			Acupuncture plus rehabilitation superior to rehabilitation alone; insufficient evidence; low to moderate evidence (Lee 2016 – SR of 12 RCTs)(134) ***Upgrade to potential positive***
Post-stroke hiccoughs			Acupuncture may be effective as an adjunctive but not as a stand-alone treatment; low quality evidence (Yue 2016 – SR & MA of 5 RCTs)(135) ***Unclear***

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Menopausal symptoms	Not reviewed	**Unclear**	***Menopausual symptom research has now separated into two new topics***
Menopausal hot flushes			Acupuncture improves hot flash frequency and severity, menopause-related symptoms, and QoL (vasomotor domain) in natural menopause (Chiu 2015 - MA of 12 studies; 2 high quality studies, 8 moderate and 2 low)(136) Promising results; low quality evidence (Selva Ovid 2013 (Review of 8 SRs and 9 RCTs))(93) Acupuncture superior to wait-list or no treatment; low quality evidence Acupuncture superior to sham in reducing severity but not frequency; very low quality evidence Acupuncture inferior to hormone therapy in QoL and frequency; no difference in severity; low quality evidence (Dodin 2013 - Cochrane SR of 16 RCTs)(137) ***Upgrade to potential positive***
Perimenopausal and postmenopausal sleep disturbance			Significant reduction in sleep disturbance which appears to be associated with changes in serum estradiol, FSH and LH; acupuncture recommended as adjunctive therapy in improving sleep disturbances in perimenopausal and postmenopausal women (Chiu 2016 - SR of 34 studies; 4 high quality)(138) Improved sleep quality; limited evidence; moderate to high quality evidence (Bezarra 2015 - SR of 7 RCTs; 4 high quality; no studies with high risk of bias)(139) ***Upgrade to potential positive***
Cancer adverse effects (not including cancer pain and chemotherapy-induced nausea and vomiting)	Not reviewed	**Unclear**	***Cancer adverse effects research has now become nuanced into several new topics*** Acupuncture plus usual care superior to usual care alone in reducing pain, fatigue, and in improving QoL. Acupuncture's effectiveness for managing anorexia, reducing constipation, paraesthesia and dysaesthesia, insomnia, and limb oedema is unclear; low to very low quality evidence (Lau 2016 - SR & MA of 13 RCTS)(140) Acupuncture may be effective for cancer pain, post-operative pain, aromatase inhibitor related joint pain and neck dissection pain and dysfunction, as well as opioid related constipation and pruritus and chemotherapy-induced nausea and vomiting and neuropathy; no assessment of quality of evidence (Lu 2013 - Narrative review)(141) Acupuncture effective for treatment-related nausea and vomiting, cancer pain, fatigue, hot flushes, xerostomia, dyspnoea and anxiety; low quality evidence (Towler 2013 - Review of 17 reviews)(142) Acupuncture may be appropriate adjunctive therapy for a range of cancer-related symptoms including adverse effects of chemotherapy and radiotherapy and cancer pain (Lian 2014 - SR of 33 RCTs)(143)

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Cancer-related fatigue			Acupuncture and moxibustion appear to be efficacious adjunctive therapy; Insufficient evidence; low quality evidence (He 2013 - SR of 7 RCTs)(144) Acupuncture and acupressure tend to be effective, acupuncture more than acupressure; low quality evidence (Ling 2013 - SR)(145) Conflicting evidence: 4 studies showed acupuncture or acupuncture plus usual care superior to sham, usual care, enhanced usual care or no treatment; 3 studies showed no difference between acupuncture and sham; very low quality evidence (Posadzki 2013 - SR of 7 RCTs)(146) Acupuncture may reduce fatigue after cancer treatment; low quality evidence (Finnegan-John 2013 - SR of CAM 20 studies; 3 acupuncture/acupressure RCTs)(147) Acupuncture plus education superior to usual care; low quality evidence (Zeng 2014 (SR of 7 RCTs)(148) ***Upgrade to potential positive***
Cancer-related insomnia			Acupuncture may be superior to sham acupuncture, drugs or hormones therapy. Number of studies and effect size are small for clinical significance; low quality evidence (Choi 2016 - SR of 6 RCTs)(149) ***Unclear***
Hot flushes/flashes in breast cancer			Acupuncture superior to sham in some studies and superior to baseline in all studies; low quality evidence (Garcia 2015 - SR of 8 RCTs)(150) Acupuncture had similar efficacy to venlafaxine and gabapentin but may have longer durability after completing treatment and fewer side effects (Johns 2016 - SR of interventions; 2 acupuncture vs medication studies)(151) Acupuncture superior to sham in 3 studies; no different from sham in 6 studies; inferior to hormone therapy in 2 studies; low quality evidence (Chen 2016 - SR of 12 RCTs)(152) Conflicting evidence; low quality evidence (Salehi 2016 - SR of 12 studies)(153) Acupuncture yielded small-size effects on reducing hot-flash frequency and the severity of menopause-related symptoms; Insufficient or conflicting evidence; Low to high quality studies (Chiu 2016 - SR of 7 studies; 4 high quality studies)(87) ***Unclear***

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Xerostomia in cancer	Not reviewed	**Unclear**	Insufficient evidence (Zhuang 2013 - SR of 4 studies)(154) Small increase in saliva production; low quality evidence (Furness 2013 - Cochrane SR of non-pharmacological interventions - 9 RCTs; 5 acupuncture)(155) Acupuncture was superior to sham; low quality evidence (Hanchanale 2015 - SR of 6 RCTs)(156) ***Unclear***
Recovery after colorectal cancer resection			Acupuncture efficacious and effective; Low to moderate quality evidence (Kim 2016 - SR of 7 RCTs)(157) ***Upgrade to potential positive***
Aromatase-inhibitor-induced arthralgia			Acupuncture superior to sham in 2 high quality studies; no different from sham in 2 low-quality studies (Bae 2015 - SR of 4 RCTs)(158) Acupuncture reduces joint pain and stiffness but not superior to sham; moderate to high quality evidence (Chien 2015 - SR of 5 RCTs)(159) ***Upgrade to potential positive***
Chemotherapy-induced peripheral neuropathy			Acupuncture superior to sham in one RCT; very low quality evidence (Franconi 2013 - SR of 3 RCTs, 3 case series, 1 rat study)(160) ***Unclear***
Myelosuppression after chemotherapy			Insufficient evidence; low to very low quality evidence (Fu 2015 - Narrative review includes 7 RCTs)(161) ***Unclear***
Cancer-related psychological symptoms			All included studies suggest benefits in depression, anxiety, sleep disturbance, and for improving QoL; strong evidence for safety; no assessment of quality of evidence (Haddad 2014 - SR of 12 studies; 8 RCTs)(162) ***Unclear***
Surgical analgesia	Not reviewed	**Unclear**	***Surgical analgesia has now become nuanced into several new topics*** Conflicting evidence; insufficient evidence; no assessment of quality of evidence (Lee 2014 - Overview of 12 SRs on postsurgical nausea and vomiting and postsurgical pain)(163)

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Craniotomy anaesthesia			Acupuncture significantly reduced the amount of volatile anaesthetics and led to faster extubation time and postoperative patient recovery and reduced postoperative nausea and vomiting. In addition, significantly reduced blood levels of the brain tissue injury marker S100beta 48 hours after operation; low quality studies excluded from MA, hence moderate to high quality evidence (Asmussen 2016 - MA of 10 RCTs)(164) ***Upgrade to potential positive***
Ambulatory anaesthesia			Acupuncture may reduce preoperative anxiety, and postoperative pain, nausea, vomiting, shivering and emergence delirium. Acupuncture is safe and cost-effective. Acupuncture may be a beneficial adjunctive therapy for ambulatory anaesthesia; insufficient evidence; high quality studies favour acupuncture (Liodden 2013 - Narrative review)(165) ***Upgrade to potential positive***
Postoperative nausea and vomiting and pain after tonsillectomy			Pain scores, analgesic need and nausea and vomiting were reduced (acupuncture vs control); no significant adverse events; insufficient evidence (Cho 2016 - MA of 12 RCTs; 7 high quality)(125) Acupuncture superior to controls and cost-effective; insufficient evidence (Shin 2016 - SR & MA - 4 RCTs [3 high quality]; 3 randomised prospective studies and 1 pilot)(126) ***Upgrade to potential positive***
Dry eye	Not reviewed	**Unclear**	Acupuncture was significantly superior to artificial tears in tear break-up time, Schirmer I test, and cornea fluorescein staining; Low to moderate quality evidence (Yang 2015 - SR & MA of 7 RCTs)(166) ***Upgrade to potential positive***

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Carpal tunnel syndrome	Not reviewed	**Evidence of no effect**	Acupuncture superior to ibuprofen in function and symptoms (Hadianfard et al 2015 - RCT comparing acupuncture plus night wrist splints with ibuprofen plus night wrist splints, n=50)(167) ***Upgrade to unclear***
Irritable bowel syndrome	Insufficient evidence	**Unclear**	Insufficient evidence; low to moderate quality evidence (Manheimer 2012 - Cochrane SR of 17 RCTs)(168) Acupuncture superior to usual care on IBS symptom severity score at 6, 9 and 12 months but not at 24 months (MacPherson 2016 - high quality RCT)(169) ***Upgrade to potential positive***
Hypertension	Not reviewed	**Unclear**	Acupuncture plus medication superior to sham plus medication; low quality evidence (Wang 2013 - SR of 35 RCTs)(170) Acupuncture plus medication superior to medication, but acupuncture not superior to medication; high quality evidence (Li 2014 - SR of 4 RCTs) (171) Acupuncture plus medication superior to medication, but acupuncture not superior to medication; risk of bias unclear for most domains (Zhao 2015 – 23 RCTs)(172) ***Upgrade to potential positive***
Lateral elbow pain	**Insufficient evidence**	Not reviewed	Acupuncture superior to sham; moderate quality evidence (Gadau 2014 - SR of 19 RCTs)(173) Insufficient evidence: low to very low quality evidence (Tang 2015 - SR of 4 RCTs)(174) ***Upgrade to potential positive***
Neck pain	Insufficient evidence	**Unclear**	Acupuncture plus usual medical care is cost-effective for neck pain and its associated disorders (NAD) (Van der Velde 2015 – SR of 6 studies)(175) Acupuncture superior to sham acupuncture or inactive treatment (at completion of treatment and short-term follow-up) for pain relief; Moderate quality evidence (Trinh 2016 - Cochrane update with 27 RCTS)(176) Limited evidence of effectiveness; low quality evidence (Moon 2014 – 6 RCTs on whiplash associated disorder [WAD])(177) ***Moderate quality evidence for NAD, but low quality evidence for WAD*** ***Upgrade to potential positive for NAD, but leave WAD as unclear***

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which have increased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Shoulder pain	Insufficient evidence	**Unclear**	For non-operative treatment options at an early stage of Shoulder Impingement Syndrome (SIS), exercise combined with therapies such as kinesio taping, specific exercises, and acupuncture should be considered as the first line choices (2 included high quality acupuncture studies) (Dong 2015 - SR and network MA)(178) ***Upgrade to potential positive***
Asthma	**Insufficient evidence**	Not reviewed	Acupuncture may improve peak expiratory flow or peak expiratory flow variability in children; low quality evidence (Liu 2015 – SR of 7 RCTs)(179) Acupoint herbal patches superior to sham in improving FEV1 and asthma symptoms; low quality evidence (Lee 2016 – SR & MA of 16 RCTs)(180) Acupuncture improved FEV1, FEV1/FVC, IL and IgE (moderate quality evidence), but not ECP (Su 2016 - SR & MA of 8 RCTs)(181) ***Upgrade to potential positive***

Table 5. Evidence levels from 2005 to 2016: explanatory notes with references (contd)			
Conditions which have decreased in evidence level	**Australian DVA (Sept 2005 - Sept 2010)** ***Baseline evidence in bold***	**USVA (Jan 2005 - Mar 2013)**	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**
Dysmenorrhoea	Not reviewed	**Potential positive effect**	**Conflicting SRs (3 positive SRs; Cochrane SR insufficient evidence)** Acupuncture is effective and acupressure may be effective for pain relief; acupuncture trials had low to moderate risk of bias; acupressure trials high risk of bias (Chen et al, 2013 – MA of 3 acupuncture and 4 acupressure RCTs(182) Acupoint stimulation superior to controls for pain relief; low to moderate quality evidence (Xu et al, 2014 MA of 20 RCTs of acupoint stimulation)(183) Acupuncture and acupressure (vs placebo, waitlist or medication) reduced pain intensity, while acupuncture also improved quality of life; moderate quality evidence (Abaraogu 2015 – SR of 8 RCTs and MA of 4 RCTs)(184) Insufficient evidence; low to very low quality evidence (Smith 2016 - Cochrane update)(185) ***Downgrade to unclear***
Ankle sprain	Not reviewed	**Potential positive effect**	Insufficient evidence; low to very low quality evidence (Kim 2014 – Cochrane SR of 15 RCTs, 5 quasi-randomised trials)(186) ***Downgrade to unclear***

Table 6. All conditions reviewed sorted by clinical areas		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT (updates from March 2013 to August 2016) systematic reviews, meta-analyses, network meta-analyses, narrative reviews, cost effectiveness reviews *Cochrane reviews highlighted in bold***	**Comments**
Cardiovascular/respiratory conditions		
Angina pectoris	Xu 2013 (Narrative review)(187): Acupuncture shows effectiveness rates of 80% to 92.6% without adverse effects of medication; no assessment of quality of evidence Yu 2015 (SR of 25 RCTs)(188): Improvement in symptoms and ECG; very low quality evidence Zhang 2015 (SR & MA of 15 RCTs)(189): Acupuncture plus medication superior to medication alone in improving symptoms and ECG; insufficient evidence; no assessment of quality of evidence	***Unclear***
Asthma	Liu 2015 [Childhood asthma] (SR of 7 RCTs)(179): Acupuncture may improve peak expiratory flow or peak expiratory flow variability; insufficient evidence; low quality evidence Lee 2016 [Acupoint herbal patches] (SR & MA of 16 RCTs)(180): Superior to sham in improving FEV1 and asthma symptoms; low quality evidence Su 2016 [Acupoint application in adults] (SR & MA of 8 RCTs)(181): Acupuncture improved FEV1, FEV1/FVC, IL and IgE (moderate quality evidence) but not ECP	Moderate quality evidence of lung function improvements in adults -***Potential positive*** (adults) ***Unclear*** (children)
Chronic obstructive pulmonary disease (COPD)	Coyle 2014 (SR of 16 RCTs)(190): Clinically significant improvements in QoL and dyspnoea, but not lung function; moderate quality evidence	***Unclear***
Heart failure	Lee 2016 (SR of 7 RCTs)(191): Acupuncture improved exercise capacity, quality of life, hemodynamic parameters, and time domain heart rate variability parameters; low quality evidence	***Unclear***
Hypertension	Wang 2013 (SR of 35 RCTs)(170): Acupuncture plus medication superior to sham plus medication; low quality evidence Li 2014 (SR of 4 RCTs)(171): Acupuncture plus medication superior to medication, but acupuncture not superior to medication; high quality evidence Zhao 2015 (SR & MA of 23 RCTs)(172): Acupuncture plus medication superior to medication, but acupuncture not superior to medication; risk of bias unclear for most domains	Low to high quality evidence for acupuncture plus medication ***Potential positive*** *(with medication)*
Vascular cognitive impairment without dementia	Min 2016 (MA of 15 studies)(192): Acupuncture superior to usual care or medication; low quality evidence	***Unclear***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Cardiovascular/respiratory conditions (contd)		
Vascular dementia	Cao 2013 (SR of 12 RCTs)(106): Acupuncture plus other therapies significantly improved Mini Mental State scores; low quality evidence	***Unclear***
Musculoskeletal disorders		
Acute ankle sprain in adults	Park 2013 (SR of 17 RCTs; 2 high quality, 15 low quality)(193): Acupuncture superior to various controls in relieving pain, facilitating return to normal activity, and promoting QoL based on subgroup analysis of 2 high quality studies **Kim 2014 (Cochrane SR of 15 RCTs, 5 quasi-randomised trials)(186):** Insufficient evidence; Low to very low quality evidence	***Potential positive*** in USVA review 2014; Insufficient evidence/ low to very low quality evidence (Cochrane) ***Downgrade to unclear***
Carpal tunnel syndrome	Hadianfard 2015 (RCT comparing acupuncture plus night wrist splints with ibuprofen plus night wrist splints, n=50)(167): Acupuncture superior to ibuprofen in function and symptoms	USVA review 2014 'Evidence of no effect'; 1 positive RCT in 2015 ***Upgrade to unclear***
Fibromyalgia	**Deare 2013 (Cochrane SR of 9 RCTs)**(112): Acupuncture superior to no treatment or standard care in reducing pain and stiffness; low to moderate quality evidence Acupuncture not different from sham in reducing pain, fatigue or improving sleep and global wellbeing; moderate quality evidence EA is probably better than manual acupuncture in reducing pain and stiffness and improving global well-being, sleep and fatigue. Yang 2014 (MA of 9 RCTs)(113): Insufficient evidence; low quality evidence Lauche 2015 (SR of reviews; 2 high and 2 low quality reviews)(114): Inconsistent evidence	***Unclear***
Lateral elbow pain	Gadau 2014 (SR of 19 RCTs)(173): Acupuncture superior to sham; moderate quality evidence Tang 2015 (SR of 4 RCTs)(174): Insufficient evidence: low to very low quality evidence	Moderate quality evidence when 19 RCTs included – ***Upgrade to potential positive***
Lumbar spinal stenosis	Kim 2013 (SR of 6 RCTs, 6 controlled trials) (194): Acupuncture superior to controls in pain intensity, functional improvements and QoL; Low quality evidence	***Unclear***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Musculoskeletal disorders (contd)		
Low back pain	Taylor 2014 (51): Cost effective for chronic low back pain Andronis 2016 (50): Likely to be cost effective	Chronic and acute low back pain need to be differentiated in SRs
Acute low back pain	Lee 2013 (SR of 11 RCTs; 5 low risk of bias, 6 high)(47): Acupuncture superior to NSAIDS for improving symptoms; acupuncture superior to sham for pain but not function; Chou 2016 [AHRQ Comparative Effectiveness review])(45): Low quality evidence for pain and function	***Upgrade to potential positive***
Chronic low back pain	Lam 2013 (32 RCTs; 25 in MA)(46): Acupuncture may be effective for pain and functional limitation in chronic non-specific low back pain: Evidence Level 1 Wellington 2014 (SR of non-invasive interventions)(48): High quality evidence for acupuncture; moderate quality evidence for acupressure Liu 2015 (Overview of 16 SRs)(49): Acupuncture alone or as an adjunct to usual care provided short-term improvement in pain and function; low to high quality evidence; 'should be advocated in routine clinical practice' Chou 2016 [AHRQ Comparative Effectiveness review])(45): Moderate quality evidence for pain and function Nahin 2016 (4 RCTs; Excluded studies not performed in USA or by US researchers)(195): Acupuncture superior to usual care; Acupuncture superior to sham in 1 RCT, but not superior in 2 RCTs	Moderate to high quality evidence Cost effective, safe ***Upgrade to positive***
Neck pain	Van der Velde 2015 (SR of 6 studies)(175): Acupuncture plus usual medical care is cost-effective for neck pain and its associated disorders (NAD) **Trinh 2016 (Cochrane update with 27 RCTS)**(176): Acupuncture superior to sham acupuncture or inactive treatment (at completion of treatment and short-term follow-up) for pain relief; Moderate quality evidence	Moderate quality evidence (Cochrane update); Acupuncture plus medication is cost-effective ***Potential positive for NAD***
Knee osteoarthritis pain	Corbett 2013 (Network meta-analysis - 152 studies on 22 interventions: 12 RCTs included in network MA)(52): Acupuncture was equal to balneotherapy and superior to sham acupuncture, muscle-strengthening exercise, Tai Chi, weight loss, standard care and aerobic exercise (in ranked order). Acupuncture superior to standard care and muscle-strengthening exercises in sub-analysis of moderate to high quality studies Nahin 2016 (4 RCTs; Excluded studies not performed in USA or by US researchers)(195): Acupuncture superior to attention control or usual care in 3/4 studies; Acupuncture superior to sham in 2/4 studies	Moderate to high quality evidence ***Upgrade to positive***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Musculoskeletal disorders (contd)		
Osteoarthritis	Kim 2012 (Cost effectiveness analysis)(76): Acupuncture is cost effective for dysmenorrhoea, allergic rhinitis, osteoarthritis & headache Manyanga 2014 (SR & MA of 12 trials)(53): Significant reductions in pain intensity, improvement in functional mobility and quality of life; low quality evidence	Cost-effective
Plantar heel pain		***Potential positive*** in USVA review 2014; no updates
Restless leg syndrome	Bega 2016 (Overview of alternative treatment of restless leg syndrome)(99): insufficient evidence	***Potential positive***
Sciatica	Lewis 2015 (Network MA of 21 interventions)(196): Acupuncture 2nd out of 21 interventions for global effect and pain intensity Qin 2015 (SR & MA of 11 RCTs; 10 acupuncture vs medications; 1 acupuncture vs sham)(197): Acupuncture may be superior to drugs and may enhance the effect of drugs for patients with sciatica; low quality evidence Ji 2015 (SR of 12 RCTs)(198): Acupuncture superior to conventional Western medicine in outcomes effectiveness, pain intensity and pain threshold; low quality evidence	Acupuncture 2nd out of 21 interventions for global effect and pain intensity ***Potential positive***
Shoulder pain: Shoulder impingement syndrome (SIS)	Dong 2015 (SR and network MA; 2 high quality acupuncture studies)(178): For non-operative treatment options at an early stage of SIS, exercise combined with therapies such as kinesio taping, specific exercises, and acupuncture should be considered as the first-line choices, whereas pulsed electromagnetic field therapy, localized corticosteroid injection, diacutaneous fibrolysis, and ultrasound therapy may be considered as the second-line treatment choices; however, low-level laser therapy and the localized injection of NSAIDs are not recommended	Moderate to high quality evidence ***Potential positive***
Whiplash associated disorder (WAD)	Moon 2014 (SR of 6 RCTs)(177): Limited evidence of effectiveness; low quality evidence	***Unclear for WAD***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Neurological disorders		
Acute stroke	Vados 2015 (SR of 17 RCTs; 5 high quality)(128) Acupuncture plus rehabilitation superior to rehabilitation alone for acute and subacute stroke sequelae Liu 2015 (MA of 18 RCTs)(129): Acute ischaemic stroke: EA superior to usual care in Barthel Index, Fugl-Meyer Assessment, National Institutes of Health Stroke Scale, and Revised Scandinavian Stroke Scale; Moderate to high quality evidence Liu 2015: (Acute ischaemic stroke) EA superior to usual care in Barthel Index, Fugl-Meyer Assessment, National Institutes of Health Stroke Scale, and Revised Scandinavian Stroke Scale; Moderate to high quality evidence	Moderate to high quality evidence ***Potential positive***
Bell's palsy	Li 2015 (SR & MA of 14 RCTs)(102): Seems to be effective; insufficient evidence of efficacy and safety; low quality evidence Kwon 2015 (RCT acupuncture (n=36) vs waitlist (n=13))(103): RCT acupuncture vs waitlist (n=26 vs 13) Acupuncture superior to waitlist in physical and social function	***Unclear***
Epilepsy	**Cheuk 2014 (Cochrane update)**(123): No evidence of effect; low quality evidence	***No evidence of effect*** (Cochrane update)
Parkinson's disease	Kim 2014 (Review of 11 studies: 6 RCTs, 4 uncontrolled open label studies & I crossover trial)(199): Insufficient evidence; low to very low quality evidence	***Unclear***
Post-stroke spasticity	Lim 2015 (SR & MA of 5 RCTs)(131): Acupuncture or EA significantly decreased spasticity after stroke; low quality evidence Rodriguez-Mansilla 2016 (SR of 9 RCTs or controlled studies: 6 high quality; 3 moderate) (132) Acupuncture improved passive resistance to stretching, degree of personal dependence and motor function; insufficient evidence	***Potential positive***
Stroke	Zhang 2014 (Review of SRs: 8 reviews high quality, 6 moderate, 10 low)(127): Acupuncture may be effective for treating post-stroke neurological impairment and dysfunction such as dysphagia, but does not prevent post-stroke death	Moderate to high quality evidence
Stroke rehabilitation	**Yang 2016 (Cochrane update)**(130): May have beneficial effects on improving dependency, global neurological deficiency, and some specific neurological impairments; low to very low quality evidence	***Potential positive*** (Cochrane update)

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Mental health		
Anxiety	Bazzan 2014 (Narrative review)(79): Acupuncture has 'potential use' Goyata 2016 (Integrative review of 19 studies including 6 RCTs; 11 high quality studies; 5 moderate)(80): Positive and statistically significant effects; Moderate to high quality evidence	Moderate to high quality evidence ***Potential positive***
Alzheimers disease	Zhou 2015 (SR & MA of 10 RCTs)(200): Acupuncture superior to medication in improving cognitive function on MMSE. Acupuncture plus medication superior to medication alone. Acupuncture is safe; no assessment of quality of evidence	***Unclear***
Chronic fatigue syndrome	Kim 2015 (Multi-centre non-blinded RCT, n=150)(111): Acupuncture plus usual care may improve fatigue in chronic fatigue syndrome and idiopathic chronic fatigue	***Unclear***
Depression	Chan 2015 (SR & MA of 13 RCTs;1 high quality, 5 moderate, 7 low)(88): Acupuncture plus SSRIs superior to SSRIs alone, with an early onset of action and was safe and well-tolerated; EA had greater effect than manual acupuncture Bosch 2015 (Review of SRs & MAs)(82): Effective and safe for major depressive disorder, especially in improving sleep, mood and QoL by modulating and normalizing the limbic–paralimbic–neocortical network (LPNN), including the default mode network (DMN); 'promising' evidence Spackman 2014 (Cost-effectiveness analysis)(89): Acupuncture is cost-effective compared with counselling or usual care alone, although the ranking of counselling and acupuncture depends on the relative cost of delivering these interventions	***Potential positive*** in USVA 2014; 2 positive SRs since Cost-effective
Insomnia	Zhao 2013 (SR)(90): Acupuncture may be superior to medication. Acupuncture for insomnia is potentially mediated by norepinephrine, melatonin, gamma-aminobutyric acid, and beta-endorphin; Insufficient evidence Shergis 2016 (SR of 30 studies)(91): Acupuncture statistically superior to sham (3 studies) and medication (27 studies); low quality evidence	***Potential positive*** in USVA 2014; 2 positive SRs since
Opioid detoxification	Wu 2016 (109): Acupuncture is effective in opiate detoxification (and associated depression and anxiety) which is mediated by endogenous dynorphin; no effect on opioid cravings; low quality evidence	***Unclear***
Post-traumatic stress disorder	Engel 2015 (RCT acupuncture plus usual care vs usual care, n=55)(81): Acupuncture plus usual care superior to usual care in PTSD severity, depression, pain and physical and mental functioning	***Potential positive*** in USVA 2014; positive RCT in 2015
Pre-treatment anxiety	Au 2015 (SR of 7 RCTs, MA of 5)(201): Acupressure effective in reducing anxiety; Moderate to high quality evidence	Moderate to high quality evidence ***Potential positive***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Mental health (contd)		
Schizophrenia	Bosch 2015 (Review of SRs & MAs)(82): Acupuncture effective for schizophrenia, especially in improving sleep, mood and QoL by modulating and normalizing the limbic–paralimbic–neocortical network (LPNN), including the default mode network (DMN); limited evidence **Shen 2014 (Cochrane update of 30 RCTs)**(83): Acupuncture plus antipsychotic medication superior to antipsychotic medication alone, in terms of mental state and length of hospitalisation (moderate quality evidence) with fewer adverse effects (low quality evidence)	Moderate quality evidence for acupuncture with antipsychotics ***Potential positive***
Smoking cessation	**White 2014 (Cochrane SR 0f 38 RCTs)(84):** Acupuncture and acupressure superior to sham short-term; low quality evidence Insufficient evidence of effects for 6 months or more	***Potential positive*** short term effects ***No evidence of effect*** after 6 months (Cochrane update)
Gynaecology and obstetrics		
Back or pelvic pain during pregnancy	Selva Olid 2013 (Review of 8 SRs and 9 RCTs)(93): Promising results; low quality evidence Close 2014 (SR of 8 RCTs on CAM; 2 acupuncture RCTs with low risk of bias)(94): Clinically important and statistically significant changes **Liddle 2015 (Cochrane SR: Comparison of interventions 26 RCTs – 7 acupuncture RCTs)(95):** Moderate quality evidence showed that acupuncture or exercise, tailored to the stage of pregnancy, significantly reduced evening pelvic or lumbo-pelvic pain. Acupuncture superior to exercise for reducing evening pelvic pain; Both acupuncture and exercise were superior to usual care; Insufficient evidence	***Potential positive***
Dysmenorrhoea	Chen et al, 2013 (MA of 3 acupuncture and 4 acupressure RCTs)(202): Acupuncture is effective and acupressure may be effective for pain relief; acupuncture trials had low to moderate risk of bias; acupressure trials high risk of bias Xu 2014 (MA of 20 RCTs of acupoint stimulation)(183): Acupoint stimulation superior to controls for pain relief; low to moderate quality evidence Abaraogu 2015 (SR of 8 RCTs and MA of 4 RCTs)(184): Acupuncture and acupressure vs placebo, waitlist or medication reduced pain intensity, while acupuncture also improved physical and mental aspects of QoL; moderate quality evidence **Smith 2016 (Cochrane update)**(185): Insufficient evidence; low to very low quality evidence Kim 2012(76): Acupuncture is cost effective for dysmenorrhoea, allergic rhinitis, osteoarthritis & headache	**Conflicting SRs (3 positive SRs vs Cochrane SR insufficient evidence)** Moderate quality evidence vs low to very low quality evidence; Cost effective ***Downgrade to unclear***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Gynaecology and obstetrics (contd)		
Induction of labour	**Smith 2013 (Cochrane SR of 14 RCTs)(100):** Insufficient evidence; included studies ranged from high to low quality evidence Mollart 2015 (SR of 7 RCTS)(101): Acupuncture may reduce the duration of labour especially the first stage; insufficient evidence	***Unclear*** (Cochrane update)
Labour pain	Levett 2014 (Critical narrative review of SRs)(92): Acupuncture & acupressure 'promising' – Conflicting results due to heterogeneity in study designs, research questions, treatment protocols and outcomes measures	***Potential positive***
Menopausal hot flushes	Chiu 2015 (MA of 12 studies; 2 high quality, 8 moderate and 2 low)(136): Acupuncture improves hot flash frequency and severity, menopause-related symptoms, and QoL (vasomotor domain) in natural menopause Selva Ovid 2013 (Review of 8 SRs and 9 RCTs) (93): Promising results; low quality evidence **Dodin 2013 (Cochrane SR of 16 RCTs)**(137): Acupuncture superior to wait-list or no treatment; low quality evidence Acupuncture superior to sham in reducing severity but not frequency; very low quality evidence Acupuncture inferior to hormone therapy in QoL and frequency; no difference in severity; low quality evidence Chen 2016 (SR of 12 RCTs) (152): Seems to be effective; insufficient evidence; low quality evidence	'Promising'; very low to moderate quality evidence ***Upgrade to potential positive***
Nausea in pregnancy	**Matthews 2015 (Cochrane SR of interventions for nausea in pregnancy; 2 RCTs on acupuncture)** (122): No significant difference between real and sham acupuncture; low quality evidence	***No evidence of effect***
Hyperemesis gravidarum	Boelig 2016 (SR of interventions - 1 acupuncture study)(203): Insufficient evidence to identify clear differences between acupuncture and metoclopramide; very low quality evidence	***Unclear***
Melasma	Chai 2015 (SR of 8 RCTs; 2 high quality studies; 6 low to moderate)(204): Acupuncture appeared to be effective and safe; insufficient evidence	***Unclear***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Gynaecology and obstetrics (contd)		
Perimenopausal and postmenopausal sleep disturbance	Chiu 2016 (SR of 34 RCTs; 4 high quality)(138): Significant reduction in sleep disturbance which appears to be associated with changes in serum estradiol, FSH and LH; acupuncture recommended as adjunctive therapy in improving sleep disturbances in perimenopausal and postmenopausal women Bezerra 2015 (SR of 7 RCTs; 4 high quality; no studies with high risk of bias)(139): Improved sleep quality; limited evidence; moderate to high quality evidence	High quality studies favour acupuncture as adjunctive therapy; moderate to high quality evidence ***Potential positive***
Assisted conception in ART	Manheimer 2013 (SR & MA of 16 RCTs) (205): Insufficient evidence **Cheong 2013 (Cochrane SR of 20 RCTs)(117):** No evidence that acupuncture improves live birth or pregnancy rates in ART regardless of whether performed around the time of oocyte retrieval or embryo transfer Shen 2015 (SR & MA)(118): Acupuncture ineffective when used only on the day of oocyte retrieval but effective when used at follicle phase and 25 min before and after embryo transfer Qian 2016 (SR of 30 RCTs & MA)(119) Acupuncture improves clinical pregnancy rates in women undergoing IVF. Optimal positive effects were seen when acupuncture was used during controlled ovarian hyperstimulation. Jo 2017 (SR of 4 RCTs & MA)(120) Acupuncture may increase the clinical pregnancy rate and ongoing pregnancy rate and decrease the risk of ovarian hyperstimulation syndrome in women with PCOS undergoing IVF or intracytoplasmic sperm injection	***Unclear***
Oocyte retrieval pain relief	**Kwan 2013 (Cochrane SR of 21 RCTs)(206):** Insufficient evidence; low quality evidence	***Unclear*** (Cochrane update)
Polycystic ovarian syndrome	Ren 2014 (SR & MA of 31 studies)(207): Acupuncture may be effective; low quality evidence **Lim 2016 (Cochrane SR of 5 RCTs)(208):** Insufficient evidence; low to very low quality evidence	***Unclear***
Premenstrual syndrome	A SR review in 2014 included only studies before 2012, hence no new evidence (Jang 2014)(115) Insufficient evidence (Hofmeister 2016 - Narrative review)(116)	***Unclear*** in USVA review 2014; no change in level
Primary ovarian insufficiency	Jo 2015 (SR of 8 RCTs & MA)(209): Acupuncture significantly lowered serum FSH levels and more women receiving acupuncture reported resumption of menses; low quality evidence	***Unclear***
Uterine fibroids	Dalton-Brewer 2016 (Narrative review of CAM)(105): Acupuncture may be a treatment option as part of a CAM treatment approach	***Unclear***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Gastrointestinal disorders		
Constipation		***Potential positive*** - USVA review 2014; no updates
Dyspespsia in diabetic gastroparesis (DGP)	Yang 2013 (SR of 14 RCTs)(210): May be effective for dyspepsia in DGP; insufficient evidence; low quality evidence	***Unclear***
Functional dyspepsia	**Lan 2014 (Cochrane SR of X RCTs)(211):** Insufficient evidence; low quality evidence Kim 2015 (SR of 20 RCTs; high risk of bias)(212):Acupuncture significantly superior to sham and medication; low quality evidence	***Unclear***
Inflammatory bowel disease	Langhorst 2015 (SR of 2 RCTs: one on Crohn's disease, one on ulcerative colitis)(213): Acupuncture superior to sham in disease activity and wellbeing but no different in QoL; low quality evidence (2 studies with low risk of bias but small samples)	***Unclear***
Irritable bowel syndrome	MacPherson 2016 (High quality RCT)(169): Acupuncture superior to usual care on IBS symptom severity score at 6, 9 and 12 months but not at 24 months	Unclear in USVA review 2014; ***Upgrade to potential positive*** **-** positive high quality RCT in 2016
Obesity	Esteghamati 2015 (Critical review of 3 SRs)(98): Acupuncture superior to medication, sham and lifestyle modification; low to very low quality evidence	***Potential positive*** - USVA review 2014; no updates
Headache and migraine		
Headache	Kim 2012(76): Acupuncture is cost effective for dysmenorrhoea, allergic rhinitis, osteoarthritis & headache Coeytaux 2016 (Brief review of selected SRs and MAs)(44): A potentially important role for acupuncture as part of a treatment plan for migraine, tension-type headache, and several different types of chronic headache disorders. Cost-effective in Germany and UK Lardon 2016 (SR of 15 RCTs)(124): Acupuncture can reduce workplace headache pain intensity, frequency and related disability; low quality evidence	'A potentially important role for acupuncture' as part of a treatment plan for migraine, tension-type headache, and several different types of chronic headache disorders. ***Positive***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Headache and migraine (contd)		
Migraines	(Da Silva 2015 - Narrative review of large high quality RCTs)(40): Acupuncture seems to be at least as effective as conventional preventative medication for migraine and is safe, long lasting, and cost-effective **Linde 2016 (Cochrane SR of 22 RCTs of at least 8 weeks duration)(41):** Acupuncture reduces migraine frequency. Acupuncture superior to sham and may be as effective as prophylactic drugs; subgroup analysis showed larger effect size when 16 or more treatments given (Z = 4.06) compared to 12 treatments or less (Z = 2.32); Moderate quality evidence Yang 2016 (SR of 10 RCTs)(42): Acupuncture superior to sham in effectiveness and reduced risk of recurrence; Moderate to high quality evidence	Moderate to high quality evidence, safe and cost-effective (including Cochrane update); 16 or more treatments more effective than 12 treatments or less - ***Positive***
Tension-type headache	**Linde 2016 (Cochrane SR of 12 RCTs)(43):** Effective for frequent episodic or chronic tension-type headaches; Moderate or low quality evidence	***Positive***
Genitourinary/sexual disorders		
Chronic kidney disease	**Kim 2016 (Cochrane SR of 24 RCTs or quasi-randomised CTs)(214):** Insufficient evidence; low to very low quality evidence	***Unclear***
Erectile dysfunction	Cui 2016 (SR of 3 RCTs): Insufficient evidence; low quality evidence	***Unclear***
Poor sperm quality	Jerng 2014 (SR of 4 RCTs)(215): Insufficient evidence; low quality evidence	***Unclear***
Prostatitis pain/chronic pelvic pain syndrome	Chang 2016 (SR of 7 RCTs: 3 high quality, 1 moderate and 3 low)(96): Acupuncture superior to both sham and to usual care and safe, thus it should be offered when available Qin 2016 (SR of 7 RCTs)(97): Acupuncture superior to sham in pain, voiding and QoL; acupuncture superior to medication in pain relief but no different in voiding and QoL; acupuncture as an adjunctive treatment for symptom control should be considered; (3 high quality studies, 1 moderate and 3 low)	***Potential positive***
Stress urinary incontinence in adults	**Wang 2013 (Cochrane SR of 1 study: acupuncture vs midodrine)(216):** Insufficient evidence; low quality evidence	***Unclear***
Urinary incontinence	Paik 2013 (SR of 4 RCTs)(217): Limited support for acupuncture or acupressure; Insufficient evidence; low to very low quality evidence	***Unclear***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Surgery		
Surgical conditions	Lee 2014 (Overview of 12 SRs on postsurgical nausea and vomiting and postsurgical pain)(163): Conflicting evidence; insufficient evidence	Generic systematic reviews on surgical conditions need to be more targeted to specific conditions
Ambulatory anaesthesia	Liodden 2013 (Narrative review)(165): Acupuncture may reduce preoperative anxiety, and postoperative pain, nausea, vomiting, shivering and emergence delirium. Acupuncture is safe and cost-effective. Acupuncture may be a beneficial adjunctive therapy for ambulatory anaesthesia.	Acupuncture safe, cost-effective and effective as an adjunctive therapy; no assessment of quality of evidence ***Potential positive***
Postoperative nausea & vomiting	Cheong 2013 (SR of 30 RCTs)(56): Acupuncture and acupressure reduced number of cases of early nausea and vomiting (up to 24 hours); low quality evidence **Lee 2015 (Cochrane SR of 59 RCTs of PC 6 stimulation)(16):** PC 6 stimulation was superior to sham (low quality evidence); no difference between PC 6 stimulation and anti-emetics (moderate quality evidence); insufficient evidence that PC 6 plus anti-emetics is superior to anti-emetics alone.	***Upgrade to positive*** (Cochrane update)
Postoperative nausea and vomiting and pain after tonsillectomy	Cho 2016 (MA of 12 RCTs; 7 high quality)(125): Pain scores, analgesic need and nausea and vomiting were reduced (acupuncture vs control); no significant adverse events; insufficient evidence Shin 2016 (SR & MA - 4 RCTs – 3 with low risk of bias; 3 randomised prospective studies and 1 pilot)(126): Acupuncture superior to controls and cost-effective; insufficient evidence	***Upgrade to positive*** Cost effective
Postoperative pain	Wu 2016 (SR & MA of 13 RCTs)(17): Some forms of acupuncture (acupuncture, EA and TEAS) improved pain on day 1 after surgery and reduced opioid use; subgroup analysis showed acupuncture and TEAS superior to EA; moderate quality evidence	***Upgrade to positive***
Postoperative pain – back surgery	Cho 2015 (SR of 5 RCTs – 3 high quality)(57): Encouraging but limited evidence	***Upgrade to positive***
Postoperative pain – knee surgery	Barlow 2013 (SR of 5 RCTs: 3 acupuncture; 1 acupressure)(58): Acupressure reduced pain; acupuncture did not reduce pain but resulted in reduced use of ibuprofen; low quality evidence Chen 2015 (RCT acupuncture vs sham, n=60)(59): Acupuncture superior to sham in post-operative fentanyl use, time to first request for fentanyl and pain intensity	***Upgrade to positive***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Surgery (contd)		
Craniotomy anaesthesia	Asmussen 2016 (MA of 10 RCTs)(164): Acupuncture significantly reduced the amount of volatile anaesthetics and led to faster extubation time and postoperative patient recovery and reduced postoperative nausea and vomiting. In addition, significantly reduced blood levels of the brain tissue injury marker S100beta 48 hours after operation; (low quality studies excluded from MA)	MA which excluded low quality studies found positive effects; moderate to high quality evidence, but not definitive - ***Potential positive***
Dentistry	Naik 2014 (Narrative review of 40 RCTs)(218): Acupuncture effective for inducing dental analgesia, relieving dental pain, myofacial pain and TMJ pain, controlling gag reflex, reducing dental anxiety and reducing post-operative pain and inflammation; no assessment of quality of evidence	'Promising' narrative review; no assessment of quality of evidence ***Unclear***
Postoperative gastroparesis syndrome (PGS)	Cheong 2014 (SR of 16 RCTs; MA of 7)(219): Might be effective; insufficient evidence; low quality evidence	Insufficient evidence; low quality evidence ***Unclear***
Postoperative ileus	Cheong 2016 (SR of 8 RCTs; MA of 4)(220): Acupuncture might be effective in reducing postoperative ileus; low quality evidence	***Unclear***
Oncology		
Aromatase-inhibitor-induced arthralgia	Bae 2015 (SR of 4 RCTs)(158): Acupuncture superior to sham in 2 high quality studies; no different from sham in 2 low-quality studies Chien 2015 (SR of 5 RCTs)(159): Acupuncture reduces joint pain and stiffness but not superior to sham; moderate to high quality evidence	***Potential positive***
Cancer-related insomnia	Choi 2016 (SR of 6 RCTs)(149): Acupuncture may be superior to sham acupuncture, drugs or hormones therapy. Number of studies and effect size are small for clinical significance; low quality evidence	***Unclear***
Cancer pain	**Pailey 2015 (Cochrane SR of 5 RCTs)(86):** Insufficient evidence; low to very low quality evidence Hu 2016 (SR of 20 RCTs)(221): Acupuncture plus medication superior to medication alone; very low quality evidence Chiu 2016 (SR of 29 RCTs)(87): Acupuncture relieved malignancy-related and surgery-induced pain but not pain induced by chemotherapy, radiotherapy or hormone therapy	Conflicting evidence ***Unclear***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Oncology (contd)		
Cancer-related fatigue	He 2013 (SR of 7 RCTs)(144): Acupuncture and moxibustion appear to be efficacious adjunctive therapy; Insufficient evidence; low quality evidence Ling 2013 (SR of RCTs)(145): Acupuncture and acupressure tend to be effective, acupuncture more than acupressure; low quality evidence Posadzki 2013 (SR of 7 RCTs)(146): Conflicting evidence: 4 studies showed acupuncture or acupuncture plus usual care superior to sham, usual care, enhanced usual care or no treatment; 3 studies showed no difference between acupuncture and sham; very low quality evidence Finnegan-John 2013 (SR of CAM 20 studies; 3 acupuncture/acupressure RCTs)(147): Acupuncture may reduce fatigue after cancer treatment; low quality evidence Zeng 2014 (MA of 7 studies)(148): Acupuncture plus education superior to usual care; low quality evidence	***Potential positive***
Cancer-related psychological symptoms	Haddad 2014 (SR of 12 studies; 8 RCTs)(162): All included studies suggest benefits in depression, anxiety, sleep disturbance, and for improving QoL; strong evidence for safety; no assessment of quality of evidence	***Unclear***
Chemotherapy-induced nausea & vomiting (CINV)	McKeon 2013 (SR of 7 acupuncture, 6 acupressure RCTs)(21): Acupuncture reduced the frequency of acute vomiting and the dose of rescue medication but did not reduce acute nausea severity or frequency compared to control. Acupressure showed a decrease in frequency of nausea but not acute vomiting or delayed symptoms. All studies used state-of-the-art combination antiemetics. Insufficient evidence due to underpowered studies; acupuncture low to moderate quality evidence; acupressure moderate to high quality evidence Garcia 2014 (SR update: 18 new RCTs)(55): Acupuncture is an appropriate referral option for chemotherapy-induced nausea and vomiting	***Positive***
Chemotherapy-induced peripheral neuropathy	Franconi 2013 (SR of 3 RCTs, 3 case series, 1 rat study)(160): Acupuncture superior to sham in one RCT; very low quality evidence	***Unclear***
Myelosuppression after chemotherapy	Fu 2015 (Narrative review of 7 RCTs)(161): Insufficient evidence; low to very low quality evidence	***Unclear***
Recovery after colorectal cancer resection	Kim 2016 (SR of 7 RCTs)(157): Acupuncture efficacious and effective; Low to moderate quality evidence	***Potential positive***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Oncology (contd)		
Hot flushes in breast cancer	Garcia 2015 (SR of 8 RCTs)(150): Acupuncture superior to sham in some studies and superior to baseline in all studies; low quality evidence Johns 2016: (SR of interventions; 2 acupuncture vs medication studies)(151): Acupuncture had similar efficacy to venlafaxine and gabapentin but may have longer durability after completing treatment and fewer side effects Chen 2016 (SR of 12 RCTs)(152): Acupuncture superior to sham in 3 studies; no different from sham in 6 studies; inferior to hormone therapy in 2 studies; low quality evidence Salehi 2016 (SR of 12 studies)(153): Conflicting evidence; low quality evidence Chiu 2016 (SR of 7 studies; 4 high quality)(87): Acupuncture yielded small-size effects on reducing hot-flash frequency and the severity of menopause-related symptoms	Insufficient or conflicting evidence; Low to high quality studies ***Unclear***
Xerostomia in cancer	Zhuang 2013 (SR of 4 studies)(154): Insufficient evidence **Furness 2013 (Cochrane SR of non-parmacological interventions 9 RCTs; 5 acupuncture)(155):** Small increase in saliva production; Low quality evidence Hanchanale 2015 (SR of 6 RCTs)(156): Acupuncture was superior to sham; low quality evidence	***Unclear***
Eye, ear, nose, throat		
Allergic rhinitis	Feng 2015 (SR of 13 RCTs)(54): Significant improvements in nasal symptoms scores and RQLQ; Moderate quality evidence Taw 2015 (SR of 2 large multi-centre RCTs, 3 acupuncture vs medication RCTs and 1 cost-effectiveness study)(15): High quality evidence of efficacy and effectiveness Seidman 2015 (OHNSF clinical practice guideline)(37): Option 5: Clinicians may offer acupuncture, or refer to a clinician who can offer acupuncture, for patients with AR who are interested in non-pharmacologic therapy; Aggregate evidence quality - Grade B McDonald 2016 (High quality RCT)(32): PAR - Significant improvements in symptoms, QoL, and reductions in total IgE and dust mite specific IgE and Substance P; high quality evidence Xue 2015 (High quality RCT)(222): SAR - Significant improvement in symptoms; high quality evidence Kim 2012(76): Acupuncture is cost effective for dysmenorrhoea, allergic rhinitis, osteoarthritis & headache Reinhold 2103(77): SAR - Acupuncture significantly superior to rescue medication in QALY gained, but may cost more short term	Moderate to high quality evidence; safe and cost-effective for both SAR and PAR ***Evidence of positive effect***
Dry eye	Yang 2015 (SR of 7 RCTs)(166): Acupuncture was superior to artificial tears in tear break-up time, Schirmer I test, and cornea fluorescein staining; Low to moderate quality evidence	***Upgrade from unclear to potential positive effect***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Eye, ear, nose, throat (contd)		
Glaucoma	**Law 2013 (Cochrane SR; I RCT on auricular acupressure)(104):** Insufficient evidence; low quality evidence	***Unclear***
Meniere's disease/syndrome	He 2016 (SR of 12 RCTs)(223): Acupoint stimulation significantly effective in controlling vertigo but did not improve hearing loss; very low evidence	***Unclear***
Sudden sensorineural hearing loss	Zhang 2015 (SR of 12 RCTs)(224): Acupuncture plus usual care superior to usual care alone; low to very low quality evidence	***Unclear***
Tinnitus	He 2016 (SR of 5 RCTs)(91): EA - Insufficient evidence; low quality evidence	***Unclear***
Paediatrics		
Attention Deficit Hyperactivity Disorder (ADHD)	**Li 2011: (Cochrane SR; No eligible studies)(225):** Insufficient evidence	***Unclear*** **[not included in previous reviews]**
Autism spectrum disorder (ASD)	**Cheuk 2011 (Cochrane SR of 10 RCTs)(226):** (4 high quality studies; 6 low quality) Insufficient evidence; low quality evidence	***Unclear*** **[not included in previous reviews]**
Hypoxic ischemic encephalopathy in neonates	**Wong 2013 (Cochrane SR; No eligible studies)(227):** Insufficient evidence	***Unclear*** **[not included in previous reviews]**
Mumps in children	**He 2015 (Cochrane SR; No eligible studies)(228):** Insufficient evidence	***Unclear*** **[not included in previous reviews]**
Slowing progression of myopia	**Wei 2011 (Cochrane SR of 2 RCTs):** (2 high quality studies) Insufficient evidence; low quality evidence	***Unclear*** **[not included in previous reviews]**
Dermatology		
Dermatology	Ma 2015 (SR of 15 RCTs: 3 Level I RCTs; 12 Level II)(229): Acupuncture improves outcome measures in the treatment of dermatitis, chloasma, pruritus, urticaria, hyperhidrosis, and facial elasticity	***Unclear***
Atopic dermatitis	Tan 2015 (SR: no eligible RCTs)(230): Insufficient evidence Vieira 2016 (Evidence-based review of CAM)(231): Acupuncture and acupressure 'promising therapies'; insufficient evidence	***Unclear***
Chronic urticaria	Yao 2015 (SR of 6 RCTs)(232): Acupuncture might be effective and safe for relieving symptoms of chronic urticaria; low level evidence	***Unclear***

Table 6. All conditions reviewed sorted by clinical areas (contd)		
Condition	**THE ACUPUNCTURE EVIDENCE PROJECT**	**Comments**
Dermatology (contd)		
Itch	Yu 2015 (SR & MA of 3 RCTs)(233): Acupuncture superior to sham and no treatment in alleviating itch; acupuncture might be effective for treating itch; insufficient evidence	***Unclear***
Psoriasis vulgaris	Coyle 2015 (SR of 6 RCTs)(234): Some evidence of benefit but also conflicting evidence; low quality evidence	***Unclear***
Miscellaneous conditions		
Acupuncture in Emergency Department	Kim 2013 (SR of 2 RCTs & 2 observational studies)(235): Insufficient evidence; low quality evidence	***Unclear***
Exercise performance & post-exercise recovery	USVA review 2014 'unclear'; no updates	***Unclear***
Fatigue in systemic lupus erythematosus	del Pino-Sedeno 2016 (SR of non-pharmacological interventions; 1 acupuncture study)(236): Acupuncture and minimal acupuncture superior to usual care; moderate quality study	***Unclear***
Primary Sjogren's syndrome	Hackett 2015 (SR of non-pharmacological interventions; 1 acupuncture study)(237): Acupuncture not superior to usual care in increasing salivary flow rate; moderate quality study	***Unclear***
Sensory perception	Baeumler 2014 (MA of 85 high quality studies)(238): Acupuncture effects sensory thresholds especially pressure pain threshold; high quality evidence	***Potential positive effect***

Table 7. Conditions reported in this review with evidence of cost-effectiveness		
Condition	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**	**Comments**
Allergic Rhinitis	Taw 2015 (SR of 2 large multi-centre RCTs, 3 acupuncture vs medication RCTs and 1 cost-effectiveness study) Kim 2012(Cost effectiveness analysis)(76): Acupuncture is cost effective for dysmenorrhoea, allergic rhinitis, osteoarthritis & headache.	Safe and **cost-effective** for both SAR and PAR.
Ambulatory Anaesthesia	Liodden 2013 (Narrative review)(165): Acupuncture may reduce preoperative anxiety, and postoperative pain, nausea, vomiting, shivering and emergence delirium. Acupuncture is safe and cost-effective. Acupuncture may be a beneficial adjunctive therapy for ambulatory anaesthesia.	Acupuncture safe, **cost-effective** and effective as an adjunctive therapy.
Chronic Pain	MacPherson Oct 2016 (SR & MA of 29 trials) (239)The effects of a course of acupuncture treatment for patients with chronic pain do not appear to decrease importantly over 12 months. Patients can generally be reassured that treatment effects persist. Studies of the cost-effectiveness of acupuncture should take our findings into account.	**"Studies of the cost-effectiveness of acupuncture should take our findings into account."**
Depression	Spackman 2014 (Cost-effectiveness analysis)(89): Acupuncture is cost-effective compared with counselling or usual care alone, although the ranking of counselling and acupuncture depends on the relative cost of delivering these interventions.	**Cost-effective**
Dysmenorrhoea	Kim 2012 (Cost effectiveness analysis)(76): Acupuncture is cost effective for dysmenorrhoea, allergic rhinitis, osteoarthritis & headache.	**Cost effective**
Headache	Kim 2012 (Cost effectiveness analysis)(76): Acupuncture is cost effective for dysmenorrhoea, allergic rhinitis, osteoarthritis & headache. Coeytaux 2016 (Brief review of selected SRs and MAs)(44): A potentially important role for acupuncture as part of a treatment plan for migraine, tension-type headache, and several different types of chronic headache disorders. Cost-effective in Germany and UK.	A potentially important role for acupuncture' as part of a treatment plan for migraine, tension-type headache, and several different types of chronic headache disorders. **Cost effective**
Low back pain	Taylor 2014 (Cost effectiveness analysis/MA)(51): Cost effective for chronic low back pain. Andronis 2016 (SR of 33 studdies)(50): Likely to be cost effective.	Moderate to high quality evidence **Cost effective**, safe.
Migraine	Da Silva 2015 (Narrative review of large high quality RCTs)(40): Acupuncture seems to be at least as effective as conventional preventative medication for migraine and is safe, long lasting, and cost-effective.	Moderate to high quality evidence, safe and **cost-effective** (including Cochrane update); 16 or more treatments more effective than 12 treatments or less.
Neck Pain	Van der Velde 2015 (SR of 6 studies)(175): Acupuncture plus usual medical care is cost-effective for neck pain and its associated disorders (NAD).	Moderate quality evidence (Cochrane update); Acupuncture plus medication is **cost-effective.**
Osteoarthritis	Kim 2012 (Cost effectiveness analysis)(76): Acupuncture is cost effective for dysmenorrhoea, allergic rhinitis, osteoarthritis & headache.	**Cost-effective**
Post-operative nausea and vomiting	Shin 2016 (SR & MA - 4 RCTs – 3 with low risk of bias; 3 randomised prospective studies and 1 pilot)(126): Acupuncture superior to controls and cost-effective.	**Cost effective**

Table 8. Conditions reported in this review with evidence of safety		
Condition	**The Acupuncture Evidence Project (Mar 2013 - Sept 2016)**	**Comments**
Acupuncture generally prior to this review	Zhang et al 2010 (Review of 98 case reports and 17 case series)(240) 'Various types of acupuncture-related adverse events have been reported in China. Similar events have been reported by other countries, usually as a result of inappropriate technique. Acupuncture can be considered inherently safe in the hands of well-trained practitioners.'	**Acupuncture can be considered inherently safe in the hands of well-trained practitioners.**
Allergic Rhinitis	Taw 2015 (SR of 2 large multi-centre RCTs, 3 acupuncture vs medication RCTs and 1 cost-effectiveness study). Kim 2012(76): Acupuncture is cost effective for dysmenorrhoea, allergic rhinitis, osteoarthritis & headache.	**Safe** and cost-effective for both SAR and PAR.
Ambulatory Anaesthesia	Liodden 2013 (Narrative review)(165): Acupuncture may reduce preoperative anxiety, and postoperative pain, nausea, vomiting, shivering and emergence delirium. Acupuncture is safe and cost-effective. Acupuncture may be a beneficial adjunctive therapy for ambulatory anaesthesia.	Acupuncture **safe**, cost-effective and effective as an adjunctive therapy.
Alzheimers disease	Zhou 2015 (SR & MA of 10 RCTs)(200): Acupuncture superior to medication in improving cognitive function on MMSE. Acupuncture plus medication superior to medication alone. Acupuncture is safe.	Acupuncture is **Safe.**
Cancer-related psychological symptoms	Haddad 2014 (SR of 12 studies; 8 RCTs)(162): All included studies suggest benefits in depression, anxiety, sleep disturbance, and for improving QoL; strong evidence for safety; no assessment of quality of evidence.	Strong evidence for **safety.**
Depression	Chan 2015 (SR & MA of 13 RCTs;1 high quality, 5 moderate, 7 low)(88): Acupuncture plus SSRIs superior to SSRIs alone, with an early onset of action and was safe and well-tolerated; EA had greater effect than manual acupuncture. Bosch 2015 (Review of SRs & MAs)(82): Effective and safe for major depressive disorder, especially in improving sleep, mood and QoL by modulating and normalizing the limbic–paralimbic–neocortical network (LPNN), including the default mode network (DMN); 'promising' evidence.	**Safe** and well tolerated. Effective and **safe** for major depressive disorder.
Low back pain	Nahin 2016 (4 RCTs; Excluded studies not performed in USA or by US researchers)(195): Acupuncture superior to usual care; Acupuncture superior to sham in 1 RCT, but not superior in 2 RCTs. NIH (2016) Promise in the following for safety and effectiveness in treating pain: Acupuncture and yoga for back pain, acupuncture and tai chi for osteoarthritis of the knee (241). Chou et al 2016 (Comparative effectiveness review) (47): Serious adverse events were not reported in any trial.	Moderate to high quality evidence Cost effective. Promise in **safety** and effectiveness. Serious adverse events were not reported in any trial.
Migraine	Da Silva 2015 (Narrative review of large high quality RCTs)(40): Acupuncture seems to be at least as effective as conventional preventative medication for migraine and is safe, long lasting, and cost-effective.	Moderate to high quality evidence, **safe** and cost-effective (including Cochrane update); 16 or more treatments more effective than 12 treatments or less.
Osteoarthritis of the Knee	Nahin 2016 (4 RCTs; Excluded studies not performed in USA or by US researchers)(195). NIH 2016 (241): Promise in the following for safety and effectiveness in treating pain: Acupuncture and yoga for back pain, acupuncture and tai chi for osteoarthritis of the knee.	Promise in **safety** and effectiveness.
Prostatitis pain/chronic pelvic pain syndrome	Chang 2016 (SR of 7 RCTs: 3 high quality studies, 1 moderate and 3 low)(96)Acupuncture superior to both sham and to usual care and safe, thus it should be offered when available.	Acupuncture superior to both sham and to usual care and **safe.**

APPENDIX

Table 9. NHMRC Evidence Hierarchy: designations of 'levels of evidence' according to type of research question (242)

Level	Intervention	Diagnostic accuracy	Prognosis	Aetiology	Screening Intervention
I	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies	A systematic review of level II studies
II	A randomised controlled trial	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation	A prospective cohort study	A prospective cohort study	A randomised controlled trial
III-1	A pseudorandomised controlled trial (i.e. alternate allocation or some other method)	A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among non-consecutive persons with a defined clinical presentation	All or none	All or none	A pseudorandomised controlled trial (i.e. alternate allocation or some other method)
III-2	A comparative study with concurrent controls: ▪ Non-randomised, experimental trial ▪ Cohort study ▪ Case-control study ▪ Interrupted time series with a control group	A comparison with reference standard that does not meet the criteria required for Level II and III-1 evidence	Analysis of prognostic factors amongst persons in a single arm of a randomised controlled trial	A retrospective cohort study	A comparative study with concurrent controls: ▪ Non-randomised, experimental trial ▪ Cohort study ▪ Case-control study
III-3	A comparative study without concurrent controls: ▪ Historical control study ▪ Two or more single arm study ▪ Interrupted time series without a parallel control group	Diagnostic case-control study	A retrospective cohort study	A case-control study	A comparative study without concurrent controls: ▪ Historical control study ▪ Two or more single arm study
IV	Case series with either post-test or pre-test/post-test outcomes	Study of diagnostic yield (no reference standard)	Case series, or cohort study of persons at different stages of disease	A cross-sectional study or case series	Case series

GRADE and guideline development

GRADE quality levels reflect how much confidence the reviewers have that the estimate of effect is close to the true effect in a systematic review. GRADE considers five factors in making this judgement: imprecision, inconsistency, indirectness of study results, publication bias and bias generally. GRADE levels do not necessarily infer a recommendation, and the GRADE process is separate to the process of making recommendations. Although a high level of evidence is likely to lead to a recommendation, low or very low evidence can lead to a strong recommendation in some cases. The development of recommendations involves more than just the quality of evidence and requires consideration of other factors including cost, clinical judgement and patient preference (8).

Table 10. Cochrane GRADE: Significance of the four levels of evidence (243)

Quality level	Definition
High	We are very confident that the true effect lies close to that of the estimate of the effect
Moderate	We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low	Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect
Very low	We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

PLAIN ENGLISH SUMMARY

Bottom Line

Our study found evidence for the effectiveness of acupuncture for 117 conditions, with stronger evidence for acupuncture's effectiveness for some conditions than others. Acupuncture is considered safe in the hands of a well-trained practitioner and has been found to be cost effective for some conditions. The quality and quantity of research into acupuncture's effectiveness is increasing.

Background

Acupuncture originated in China and is now practised throughout the world. Although acupuncture has been practised for thousands of years, evidence of its effectiveness is still controversial. The Australian Acupuncture and Chinese Medicine Association Ltd (AACMA) identified the need for an updated review of the evidence with greater rigour than was possible in the past and commissioned The Acupuncture Evidence Project.

We searched the literature with a focus on systematic reviews and meta analyses (the highest form of evidence available). We sorted the evidence to identify the conditions for which acupuncture has been found to be most effective for. We also looked for evidence of acupuncture's safety and cost-effectiveness, and we reported how the evidence for acupuncture's effectiveness has changed over an eleven-year time-frame.

Key results

Of the 122 conditions identified, strong evidence supported the effectiveness of acupuncture for eight conditions, moderate evidence supported the use of acupuncture for a further 38 conditions, weak positive/unclear evidence supported the use of acupuncture for 71 conditions, and little or no evidence was found for the effectiveness of acupuncture for five conditions (meaning that further research is needed to clarify the effectiveness of acupuncture in these last two categories).

It is no longer possible to say that the effectiveness of acupuncture is because of the placebo effect, or that it is useful only for musculoskeletal pain.

In addition, research showed that acupuncture was cost effective for 10 conditions, and is safe in the hands of a well-trained practitioner. The level of evidence has increased over the 11-year period of this study for 24 conditions. Placebo-controlled clinical trials consistently underestimate the true effect size of acupuncture (which means that acupuncture is more effective than the type of trials used in this review show), yet they have still demonstrated National Health and Medical Research Council (NHMRC) Level I evidence for the effectiveness of acupuncture for 117 conditions.

Summary of Findings

Summary of Findings 1: The following tables summarise the effectiveness of acupuncture for various conditions.

Table 1. Conditions with strong evidence supporting the effectiveness of acupuncture	
Reviews with consistent statistically significant positive effects and where authors have recommended the intervention. The quality of evidence is rated as moderate or high quality.	
- Allergic rhinitis (perennial & seasonal) - Chemotherapy-induced nausea and vomiting (with anti-emetics) - Chronic low back pain - Headache (tension-type and chronic)	- Knee osteoarthritis - Migraine prophylaxis - Postoperative nausea & vomiting - Postoperative pain

Table 2. Conditions with moderate evidence supporting the effectiveness of acupuncture	
Reviews reporting all individual RCTs or pooled effects across RCTs as positive, but the reviewers deeming the evidence insufficient to draw firm conclusions. The quality of evidence is rated as moderate or high quality.	
- Acute low back pain - Acute stroke - Ambulatory anaesthesia - Anxiety - Aromatase-inhibitor-induced arthralgia - Asthma in adults - Back or pelvic pain during pregnancy - Cancer pain - Cancer-related fatigue - Constipation - Craniotomy anaesthesia - Depression (with antidepressants) - Dry eye - Hypertension (with medication) - Insomnia - Irritable bowel syndrome - Labour pain - Lateral elbow pain - Menopausal hot flushes	- Modulating sensory perception thresholds - Neck pain - Obesity - Perimenopausal & postmenopausal insomnia - Plantar heel pain - Post-stroke insomnia - Post-stroke shoulder pain - Post-stroke spasticity - Post-traumatic stress disorder - Prostatitis pain/chronic pelvic pain syndrome - Recovery after colorectal cancer resection - Restless leg syndrome - Schizophrenia (with antipsychotics) - Sciatica - Shoulder impingement syndrome (early stage) (with exercise) - Shoulder pain - Smoking cessation (up to 3 months) - Stroke rehabilitation - Temporomandibular pain

Summary of Findings 1 (continued): The following tables summarise the effectiveness of acupuncture for various conditions

Table 3. Conditions with weak positive/unclear evidence supporting the effectiveness of acupuncture

Reviews consisted mostly of weak positive evidence or conflicting evidence between reviews or between authors within a review, with reviewers summarising the evidence as inconclusive. Reviews are of low or very low quality; or there is conflicting levels of evidence within or between reviews.

- Acupuncture in Emergency Department
- Acute ankle sprain in adults
- Alzheimer's disease
- Angina pectoris
- Assisted conception in ART
- Asthma in children
- Atopic dermatitis
- Attention Deficit Hyperactivity Disorder (ADHD)
- Autism spectrum disorder (ASD)
- Bell's palsy
- Bladder pain syndrome
- Cancer-related insomnia
- Cancer-related psychological symptoms
- Carpal tunnel syndrome
- Chemotherapy-induced peripheral neuropathy
- Chronic fatigue syndrome
- Chronic kidney disease
- Chronic obstructive pulmonary disease (COPD)
- Chronic urinary retention due to spinal cord injury
- Chronic urticaria
- Dysmenorrhoea
- Dyspepsia in diabetic gastroparesis (DGP)
- Erectile dysfunction
- Exercise performance & post-exercise recovery
- Fatigue in systemic lupus erythematosus
- Fibromyalgia
- Functional dyspepsia
- Gag reflex in dentistry
- Glaucoma
- Heart failure
- Hot flushes in breast cancer
- Hyperemesis gravidarum
- Hypoxic ischemic encephalopathy in neonates
- Induction of labour
- Inflammatory bowel disease
- Itch
- Lumbar spinal stenosis
- Melasma
- Meniere's disease/syndrome
- Menopausal syndrome
- Multiple sclerosis
- Mumps in children
- Myelosuppression after chemotherapy
- Oocyte retrieval pain relief
- Opiate addiction
- Opioid detoxification
- Parkinson's disease
- Polycystic ovarian syndrome
- Poor sperm quality
- Postnatal depression
- Postoperative gastroparesis syndrome (PGS)
- Postoperative ileus
- Post-stroke hiccoughs
- Premenstrual syndrome
- Primary ovarian insufficiency
- Primary Sjogren's syndrome
- Psoriasis vulgaris
- Rheumatoid arthritis Slowing progression of myopia
- Spinal cord injury
- Stress urinary incontinence in adults
- Sudden sensorineural hearing loss
- Surgery analgesia
- Tinnitus
- Traumatic brain injury
- Urinary incontinence
- Uterine fibroids
- Vascular cognitive impairment without dementia
- Vascular dementia
- Whiplash associated disorder (WAD)
- Xerostomia in cancer

Summary of Findings 1 (continued): The following tables summarise the effectiveness of acupuncture for various conditions

Table 4. Conditions with little or no evidence supporting the effectiveness of acupuncture	
Reviews have consistently found little support for acupuncture. The quality of the evidence is consistently low or very low. Further research required.	
- Alcohol dependence - Cocaine addiction - Epilepsy	- Nausea in pregnancy - Smoking cessation (more than 6 months)

Summary of Findings 2: Conditions with evidence of cost-effectiveness.

Table 5. Conditions with evidence of cost effectiveness	
- Allergic Rhinitis - Ambulatory Anaesthesia - Chronic Pain - Depression - Dysmenorrhoea - Headache	- Low back pain - Migraine - Neck Pain (plus usual medical care) - Osteoarthritis - Post-operative nausea and vomiting

Summary of Findings 3: Conditions with evidence of safety.

Table 6. Conditions with evidence of safety	
Condition	Comments
Acupuncture generally prior to this review	Acupuncture can be considered inherently safe in the hands of well-trained practitioners.
Allergic Rhinitis	**Safe** and cost-effective
Ambulatory Anaesthesia	Acupuncture **safe**, cost-effective and effective as an adjunctive therapy.
Alzheimers disease	Acupuncture is **Safe.**
Cancer-related psychological symptoms	Strong evidence for **safety.**
Depression	Strong evidence for **safety.**
Low back pain	**Safe** and well tolerated. Effective and **safe** for major depressive disorder.
Migraine	Moderate to high quality evidence Cost effective. Promise in **safety** and effectiveness. Serious adverse events were not reported in any trial.
Osteoarthritis of the Knee	Promise in **safety** and effectiveness.
Prostatitis pain/chronic pelvic pain syndrome	Acupuncture superior to both sham and to usual care and **safe.**

Summary of Findings 4: Changes in evidence levels over the eleven-year period covered by this review

Table 7. Statistical summary of findings of this review			
Evidence Level	**Number of Conditions**	**Changes in Level of Evidence**	**Number of Conditions**
Strong Evidence of effect	8	Increase to strong evidence	5
Moderate Evidence effect	38	Increase to moderate evidence	18
Unclear/mixed evidence	71	Increase to weak positive/unclear evidence	1
Little of no evidence of effect	5	Decreased evidence level	2
Total conditions with some evidence of effect (any level)	117	_____	____
Total conditions reviewed	122	Total increases in evidence level since prior reviews	24

REFERENCES

1. Bannerman R. Acupuncture. The World Health Organization View. Geneva. The World Health Organisation; 1979.

2. Chmielnicki B. Evidence-Based Acupuncture: WHO official position. Chmielnicki, B.; 2014 [3 December, 2016]; Available from: http://www.evidencebasedacupuncture.org/who-official-position/.

3. NIH Consensus Conference. Acupuncture. JAMA. 1998 Nov 4;280(17):1518-24.

4. World Health Organization. Acupuncture: review and analysis of reports on controlled clinical trials. Geneva: World Health Organization; 2002.

5. Biotext. Alternative therapies and Department of Veterans' Affairs Gold and White Card arrangements. In: Australian Government Department of Veterans' Affairs, editor: Australian Government Department of Veterans' Affairs; 2010.

6. Hempel S, Taylor SL, Solloway MR, Miake-Lye IM, Beroes JM, Shanman R, et al. VA Evidence-based Synthesis Program Reports. Evidence Map of Acupuncture. Washington (DC): Department of Veterans Affairs; 2014.

7. National Health and Medical Research Council. NHMRC additional levels of evidence and grades for recommendations for developers of guidelines. National Health and Medical Research Council; 2009.

8. Balshem H, Helfand M, Schunemann HJ, Oxman AD, Kunz R, Brozek J, et al. GRADE guidelines: 3. Rating the quality of evidence. J Clin Epidemiol. 2011 Apr;64(4):401-6.

9. Wehling M. Non-steroidal anti-inflammatory drug use in chronic pain conditions with special emphasis on the elderly and patients with relevant comorbidities: management and mitigation of risks and adverse effects. Eur J Clin Pharmacol. 2014 Oct;70(10):1159-72.

10. Krashin D, Murinova N, Sullivan M. Challenges to Treatment of Chronic Pain and Addiction During the 'Opioid Crisis'. Curr Pain Headache Rep. 2016 Dec;20(12):65.

11. Sostres C, Gargallo CJ, Lanas A. Nonsteroidal anti-inflammatory drugs and upper and lower gastrointestinal mucosal damage. Arthritis Res Ther. 2013;15 Suppl 3:S3.

12. Schmidt M, Lamberts M, Olsen AM, Fosboll E, Niessner A, Tamargo J, et al. Cardiovascular safety of non-aspirin non-steroidal anti-inflammatory drugs: review and position paper by the working group for Cardiovascular Pharmacotherapy of the European Society of Cardiology. Eur Heart J Cardiovasc Pharmacother. 2016 Apr;2(2):108-18.

13. Fransen M, Nairn L, Bridgett L, Crosbie J, March L, Parker Mbbs D, et al. Post-acute rehabilitation after total knee replacement: A multicentre randomized clinical trial comparing long-term outcomes. Arthritis Care Res (Hoboken). 2016 Nov 21.

14. Steiner TJ, Stovner LJ, Birbeck GL. Migraine: the seventh disabler. J Headache Pain. 2013 Jan 10;14:1.

15. Taw MB, Reddy WD, Omole FS, Seidman MD. Acupuncture and allergic rhinitis. Curr Opin Otolaryngol Head Neck Surg. 2015 Jun;23(3):216-20.

16. Lee A, Chan SK, Fan LT. Stimulation of the wrist acupuncture point PC6 for preventing postoperative nausea and vomiting. Cochrane Database Syst Rev. 2015(11):Cd003281.

17. Wu MS, Chen KH, Chen IF, Huang SK, Tzeng PC, Yeh ML, et al. The Efficacy of Acupuncture in Post-Operative Pain Management: A Systematic Review and Meta-Analysis. PLOS ONE. 2016;11(3):e0150367.

18. Center for Disease Control and Prevention. Osteoarthritis. In: US Department of Health and Human Services, editor. USA. 2015.

19. Cross M, Smith E, Hoy D, Nolte S, Ackerman I, Fransen M, et al. The global burden of hip and knee osteoarthritis: estimates from the global burden of disease 2010 study. Ann Rheum Dis. 2014;73(7):1323-30.

20. Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, et al. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis. 2014 Jun;73(6):968-74.

21. McKeon C, Smith, C.A., Hardy, J. & Chang, E. Acupunctrue and acupressure for chemotherapy-induced nausea and vomiting : a systematic review. Australian Journal of Acupuncture and Chinese Medicine. 2013;8(1):2-17.

22. Morris ZS, Wooding S, Grant J. The answer is 17 years, what is the question: understanding time lags in translational research. J R Soc Med. 2011 Dec;104(12):510-20.

23. Birch S. A review and analysis of placebo treatments, placebo effects, and placebo controls in trials of medical procedures when sham is not inert. J Altern Complement Med. 2006 Apr;12(3):303-10.

24. Linde K, Niemann K, Meissner K. Are sham acupuncture interventions more effective than (other) placebos? A re-analysis of data from the Cochrane review on placebo effects. Forsch Komplementmed. 2010 Oct;17(5):259-64.

25. Langevin HM, Wayne PM, Macpherson H, Schnyer R, Milley RM, Napadow V, et al. Paradoxes in acupuncture research: strategies for moving forward. Evid Based Complement Alternat Med. 2011;2011:180805.

26. Lund I, Lundeberg T. Are minimal, superficial or sham acupuncture procedures acceptable as inert placebo controls? Acupunct Med. 2006 Mar;24(1):13-5.

27. Lund I, Naslund J, Lundeberg T. Minimal acupuncture is not a valid placebo control in randomised controlled trials of acupuncture: a physiologist's perspective. Chin Med. 2009;4:1.

28. Linde K, Niemann K, Schneider A, Meissner K. How large are the nonspecific effects of acupuncture? A meta-analysis of randomized controlled trials. BMC Med. 2010;8:75.

29. Lundeberg T, Lund I, Sing A, Naslund J. Is placebo acupuncture what it is intended to be? Evid Based Complement Alternat Med. 2011;2011:932407.

30. Patsopoulos NA. A pragmatic view on pragmatic trials. Dialogues Clin Neurosci. 2011 Jun;13(2):217-24.

31. National Centre for Complementary and Alternative Health. Acupuncture Research - Areas of High and Low Programmatic Priorities. US Department of Health and Human Services; 2015 [cited 2016]; Available from: https://nccih.nih.gov/grants/acupuncture/priorities?nav=fb.

32. McDonald JL, Smith PK, Smith CA, Changli Xue C, Golianu B, Cripps AW. Effect of acupuncture on house dust mite specific IgE, substance P, and symptoms in persistent allergic rhinitis. Ann Allergy Asthma Immunol. 2016 Jun;116(6):497-505.

33. Schug SA, Palmer GM, Scott DA, Halliwell R, Trinca J. Acute pain management: scientific evidence, fourth edition, 2015. Med J Aust. 2016 May 2;204(8):315-7.

34. Hopman K KL, Lukersmith S, McColl AR, & Vine K. Clinical Practice Guidelines for the Management of Rotator Cuff Syndrome in the Workplace. The University of New South Wales. 2013.

35. Gan TJ, Diemunsch P, Habib AS, Kovac A, Kranke P, Meyer TA, et al. Consensus guidelines for the management of postoperative nausea and vomiting. Anesth Analg. 2014 Jan;118(1):85-113.

36. Birch S, Alraek T, Lee MS. Challenges for clinical practice guidelines in traditional medicines: The example of acupuncture. European Journal of Integrative Medicine. http://dx.doi.org/doi:10.1016/j.eujim.2016.07.032

37. Seidman MD, Gurgel RK, Lin SY, Schwartz SR, Baroody FM, Bonner JR, et al. Clinical practice guideline: Allergic rhinitis. Otolaryngol Head Neck Surg. 2015 Feb;152(1 Suppl):S1-43.

38. National Institute for Health Care and Excellence. Management of migraine (with or without aura): NICE guideline CG150. In: National Institute for Health Care and Excellence, editor. 2012 (updated 2015).

39. Scottish Incollegiate Guidelines Network (SIGN). Management of Chronic Pain (SIGN publication no. 136). Scottish Incollegiate Guidelines Network (SIGN); 2013.

40. Da Silva AN. Acupuncture for migraine prevention. Headache. 2015 Mar;55(3):470-3.

41. Linde K, Allais G, Brinkhaus B, Fei Y, Mehring M, Vertosick EA, et al. Acupuncture for the prevention of episodic migraine. Cochrane Database Syst Rev. 2016(6):Cd001218.

42. Yang Y, Que Q, Ye X, Zheng G. Verum versus sham manual acupuncture for migraine: a systematic review of randomised controlled trials. Acupunct Med. 2016 Apr;34(2):76-83.

43. Linde K, Allais G, Brinkhaus B, Fei Y, Mehring M, Shin BC, et al. Acupuncture for the prevention of tension-type headache. Cochrane Database Syst Rev. 2016;4:Cd007587.

44. Coeytaux RR, Befus D. Role of Acupuncture in the Treatment or Prevention of Migraine, Tension-Type Headache, or Chronic Headache Disorders. Headache. 2016 Jul;56(7):1238-40.

45. Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, et al. AHRQ Comparative Effectiveness Reviews. Noninvasive Treatments for Low Back Pain. Rockville (MD): Agency for Healthcare Research and Quality (US); 2016.

46. Lam M, Galvin R, Curry P. Effectiveness of acupuncture for nonspecific chronic low back pain: a systematic review and meta-analysis. Spine (Phila Pa 1976). 2013 Nov 15;38(24):2124-38.

47. Lee JH, Choi TY, Lee MS, Lee H, Shin BC, Lee H. Acupuncture for acute low back pain: a systematic review. Clin J Pain. 2013 Feb;29(2):172-85.

48. Wellington J. Noninvasive and alternative management of chronic low back pain (efficacy and outcomes). Neuromodulation. 2014 Oct;17 Suppl 2:24-30.

49. Liu L, Skinner M, McDonough S, Mabire L, Baxter GD. Acupuncture for low back pain: an overview of systematic reviews. Evid Based Complement Alternat Med. 2015;2015:328196.

50. Andronis L, Kinghorn P, Qiao S, Whitehurst DG, Durrell S, McLeod H. Cost-Effectiveness of Non-Invasive and Non-Pharmacological Interventions for Low Back Pain: a Systematic Literature Review. Appl Health Econ Health Policy. 2016 Aug 22.

51. Taylor P, Pezzullo L, Grant SJ, Bensoussan A. Cost-effectiveness of Acupuncture for Chronic Nonspecific Low Back Pain. Pain Pract. 2014 Sep;14(7):599-606.

52. Corbett MS, Rice SJ, Madurasinghe V, Slack R, Fayter DA, Harden M, et al. Acupuncture and other physical treatments for the relief of pain due to osteoarthritis of the knee: network meta-analysis. Osteoarthritis Cartilage. 2013 Sep;21(9):1290-8.

53. Manyanga T, Froese M, Zarychanski R, Abou-Setta A, Friesen C, Tennenhouse M, et al. Pain management with acupuncture in osteoarthritis: a systematic review and meta-analysis. BMC Complement Altern Med. 2014;14:312.

54. Feng S, Han M, Fan Y, Yang G, Liao Z, Liao W, et al. Acupuncture for the treatment of allergic rhinitis: a systematic review and meta-analysis. Am J Rhinol Allergy. 2015 Jan-Feb;29(1):57-62.

55. Garcia MK, McQuade J, Lee R, Haddad R, Spano M, Cohen L. Acupuncture for symptom management in cancer care: an update. Curr Oncol Rep. 2014 Dec;16(12):418.

56. Cheong KB, Zhang JP, Huang Y, Zhang ZJ. The effectiveness of acupuncture in prevention and treatment of postoperative nausea and vomiting--a systematic review and meta-analysis. PLOS ONE. 2013;8(12):e82474.

57. Cho YH, Kim CK, Heo KH, Lee MS, Ha IH, Son DW, et al. Acupuncture for acute postoperative pain after back surgery: a systematic review and meta-analysis of randomized controlled trials. Pain Pract. 2015 Mar;15(3):279-91.

58. Barlow T, Downham C, Barlow D. The effect of complementary therapies on post-operative pain control in ambulatory knee surgery: a systematic review. Complement Ther Med. 2013 Oct;21(5):529-34.

59. Chen CC, Yang CC, Hu CC, Shih HN, Chang YH, Hsieh PH. Acupuncture for pain relief after total knee arthroplasty: a randomized controlled trial. Reg Anesth Pain Med. 2015 Jan-Feb;40(1):31-6.

60. Zhang R, Lao L, Ren K, Berman BM. Mechanisms of acupuncture-electroacupuncture on persistent pain. Anesthesiology. 2014 Feb;120(2):482-503.

61. Zhao ZQ. Neural mechanism underlying acupuncture analgesia. Prog Neurobiol. 2008 Aug;85(4):355-75.

62. Han JS. Acupuncture analgesia: areas of consensus and controversy. Pain. 2011 Mar;152(3 Suppl):S41-8.

63. Han JS. Acupuncture and endorphins. Neurosci Lett. 2004 May 6;361(1-3):258-61.

64. McDonald JL, Cripps AW, Smith PK. Mediators, Receptors, and Signalling Pathways in the Anti-Inflammatory and Antihyperalgesic Effects of Acupuncture. Evid Based Complement Alternat Med. 2015;2015:975632.

65. McDonald JL, Cripps AW, Smith PK, Smith CA, Xue CC, Golianu B. The anti-inflammatory effects of acupuncture and their relevance to allergic rhinitis: a narrative review and proposed model. Evid Based Complement Alternat Med. 2013;2013:591796.

66. Li YM, Zhuang LX, Lai XS, Jiang GH. [Effects of electroacupuncture on plasma vasoactive intestinal peptide and substance P in perennial allergic rhinitis patients]. Zhen Ci Yan Jiu. 2007 Apr;32(2):136-8.

67. Zhang Z, Wang C, Gu G, Li H, Zhao H, Wang K, et al. The effects of electroacupuncture at the ST36 (Zusanli) acupoint on cancer pain and transient receptor potential vanilloid subfamily 1 expression in Walker 256 tumor-bearing rats. Anesth Analg. 2012 Apr;114(4):879-85.

68. LU ZZ, Yin, X.J., Teng, W.J., Chen, Y.H., Sun. J., Zhao, J.M., Wang, A.Q.Bao C.H. & Shi, Y. Comparative effect of EA and moxibustion on the expression of SP and VIP in patients with IBS. Journal of Traditional Chinese Medicine. 2015;35(4):402-10.

69. Zhang YN, Zhao HJ, Wang Y, Lu Y, Wang SJ. [Effect of Electroacupuncture Intervention on Constipation-predominant Irritable Bow l Syndrome and Colonic CGRP and SP Expression in Rats]. Zhen Ci Yan Jiu. 2016 Feb;41(1):31-4.

70. Li W, Zhong, GW, Qi, M, Liu, WP, Wang, S, Wen, LB et al. Acupuncture treatment of migraine and plasma CGRP and SP content changes. World Journal of Acupuncture-Moxibustion. 2001;11(3):11-4.

71. Shi H, Li JH, Ji CF, Shang HY, Qiu EC, Wang JJ, et al. [Effect of electroacupuncture on cortical spreading depression and plasma CGRP and substance P contents in migraine rats]. Zhen Ci Yan Jiu. 2010 Feb;35(1):17-21.

72. Stener-Victorin E, Wu X. Effects and mechanisms of acupuncture in the reproductive system. Auton Neurosci. 2010 Oct 28;157(1-2):46-51.

73. Li H, He T, Xu Q, Li Z, Liu Y, Li F, et al. Acupuncture and regulation of gastrointestinal function. World J Gastroenterol. 2015 Jul 21;21(27):8304-13.

74. Qin Q, Mo Q, Liu K, He X, Gao X, Zhu B. Acupuncture at homotopic acupoints exerts dual effects on bladder motility in anesthetized rats. BMC Complement Altern Med. 2015;15:267.

75. Witt CM, Brinkhaus B. Efficacy, effectiveness and cost-effectiveness of acupuncture for allergic rhinitis - An overview about previous and ongoing studies. Auton Neurosci. 2010 Oct 28;157(1-2):42-5.

76. Kim SY, Lee H, Chae Y, Park HJ, Lee H. A systematic review of cost-effectiveness analyses alongside randomised controlled trials of acupuncture. Acupunct Med. 2012 Dec;30(4):273-85.

77. Reinhold T, Roll S, Willich SN, Ortiz M, Witt CM, Brinkhaus B. Cost-effectiveness for acupuncture in seasonal allergic rhinitis: economic results of the ACUSAR trial. Ann Allergy Asthma Immunol. 2013 Jul;111(1):56-63.

78. Reinhold T, Brinkhaus B, Willich SN, Witt C. Acupuncture in patients suffering from allergic asthma: is it worth additional costs? J Altern Complement Med. 2014 Mar;20(3):169-77.

79. Bazzan AJ, Zabrecky G, Monti DA, Newberg AB. Current evidence regarding the management of mood and anxiety disorders using complementary and alternative medicine. Expert Rev Neurother. 2014 Apr;14(4):411-23.

80. Goyata SL, Avelino CC, Santos SV, Souza Junior DI, Gurgel MD, Terra FS. Effects from acupuncture in treating anxiety: integrative review. Rev Bras Enferm. 2016 Jun;69(3):602-9.

81. Engel CC, Cordova EH, Benedek DM, Liu X, Gore KL, Goertz C, et al. Randomized effectiveness trial of a brief course of acupuncture for posttraumatic stress disorder. Med Care. 2014 Dec;52(12 Suppl 5):S57-64.

82. Bosch P, van den Noort M, Staudte H, Lim S. Schizophrenia and Depression: A systematic Review of the Effectiveness and the Working Mechanisms Behind Acupuncture. Explore (NY). 2015 Jul-Aug;11(4):281-91.

83. Shen X, Xia J, Adams CE. Acupuncture for schizophrenia. Cochrane Database Syst Rev. 2014(10):Cd005475.

84. White AR, Rampes H, Liu JP, Stead LF, Campbell J. Acupuncture and related interventions for smoking cessation. Cochrane Database Syst Rev. 2014(1):Cd000009.

85. Grillo CM, Canales Gde L, Wada RS, Alves MC, Barbosa CM, Berzin F, et al. Could Acupuncture Be Useful in the Treatment of Temporomandibular Dysfunction? J Acupunct Meridian Stud. 2015 Aug;8(4):192-9.

86. Paley CA, Johnson MI, Tashani OA, Bagnall AM. Acupuncture for cancer pain in adults. Cochrane Database Syst Rev. 2015(10):Cd007753.

87. Chiu HY, Hsieh YJ, Tsai PS. Systematic review and meta-analysis of acupuncture to reduce cancer-related pain. Eur J Cancer Care (Engl). 2016 Feb 7.

88. Chan YY, Lo WY, Yang SN, Chen YH, Lin JG. The benefit of combined acupuncture and antidepressant medication for depression: A systematic review and meta-analysis. J Affect Disord. 2015 May 1;176:106-17.

89. Spackman E, Richmond S, Sculpher M, Bland M, Brealey S, Gabe R, et al. Cost-effectiveness analysis of acupuncture, counselling and usual care in treating patients with depression: the results of the ACUDep trial. PLOS ONE. 2014;9(11):e113726.

90. Zhao K. Acupuncture for the treatment of insomnia. Int Rev Neurobiol. 2013;111:217-34.

91. Shergis JL, Ni X, Jackson ML, Zhang AL, Guo X, Li Y, et al. A systematic review of acupuncture for sleep quality in people with insomnia. Complement Ther Med. 2016 Jun;26:11-20.

92. Levett KM, Smith CA, Dahlen HG, Bensoussan A. Acupuncture and acupressure for pain management in labour and birth: a critical narrative review of current systematic review evidence. Complement Ther Med. 2014 Jun;22(3):523-40.

93. Selva Olid A, Martinez Zapata MJ, Sola I, Stojanovic Z, Uriona Tuma SM, Bonfill Cosp X. Efficacy and Safety of Needle Acupuncture for Treating Gynecologic and Obstetric Disorders: An Overview. Med Acupunct. 2013 Dec 1;25(6):386-97.

94. Close C, Sinclair M, Liddle SD, Madden E, McCullough JE, Hughes C. A systematic review investigating the effectiveness of Complementary and Alternative Medicine (CAM) for the management of low back and/or pelvic pain (LBPP) in pregnancy. J Adv Nurs. 2014 Aug;70(8):1702-16.

95. Liddle SD, Pennick V. Interventions for preventing and treating low-back and pelvic pain during pregnancy. Cochrane Database Syst Rev. 2015(9):Cd001139.

96. Chang SC, Hsu CH, Hsu CK, Yang SS, Chang SJ. The efficacy of acupuncture in managing patients with chronic prostatitis/chronic pelvic pain syndrome: A systemic review and meta-analysis. Neurourol Urodyn. 2016 Jan 6.

97. Qin Z, Wu J, Zhou J, Liu Z. Systematic Review of Acupuncture for Chronic Prostatitis/Chronic Pelvic Pain Syndrome. Medicine (Baltimore). 2016 Mar;95(11):e3095.

98. Esteghamati A, Mazaheri T, Vahidi Rad M, Noshad S. Complementary and alternative medicine for the treatment of obesity: a critical review. Int J Endocrinol Metab. 2015 Apr;13(2):e19678.

99. Bega D, Malkani R. Alternative treatment of restless legs syndrome: an overview of the evidence for mind-body interventions, lifestyle interventions, and neutraceuticals. Sleep Med. 2016 Jan;17:99-105.

100. Smith CA, Crowther CA, Grant SJ. Acupuncture for induction of labour. Cochrane Database Syst Rev. 2013(8):Cd002962.

101. Mollart LJ, Adam J, Foureur M. Impact of acupressure on onset of labour and labour duration: A systematic review. Women Birth. 2015 Sep;28(3):199-206.

102. Li P, Qiu T, Qin C. Efficacy of Acupuncture for Bell's Palsy: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. PLOS ONE. 2015;10(5):e0121880.

103. Kwon HJ, Choi JY, Lee MS, Kim YS, Shin BC, Kim JI. Acupuncture for the sequelae of Bell's palsy: a randomized controlled trial. Trials. 2015;16:246.

104. Law SK, Li T. Acupuncture for glaucoma. Cochrane Database Syst Rev. 2013(5):Cd006030.

105. Dalton-Brewer N. The Role of Complementary and Alternative Medicine for the Management of Fibroids and Associated Symptomatology. Curr Obstet Gynecol Rep. 2016;5:110-8.

106. Cao H, Wang Y, Chang D, Zhou L, Liu J. Acupuncture for vascular mild cognitive impairment: a systematic review of randomised controlled trials. Acupunct Med. 2013 Dec;31(4):368-74.

107. Cui X, Zhou J, Qin Z, Liu Z. Acupuncture for Erectile Dysfunction: A Systematic Review. Biomed Res Int. 2016;2016:2171923.

108. He M, Li X, Liu Y, Zhong J, Jiang L, Liu Y, et al. Electroacupuncture for Tinnitus: A Systematic Review. PLOS ONE. 2016;11(3):e0150600.

109. Wu SL, Leung AW, Yew DT. Acupuncture for Detoxification in Treatment of Opioid Addiction. East Asian Arch Psychiatry. 2016 Jun;26(2):70-6.

110. Grant S, Kandrack R, Motala A, Shanman R, Booth M, Miles J, et al. Acupuncture for substance use disorders: A systematic review and meta-analysis. Drug Alcohol Depend. 2016 Jun 1;163:1-15.

111. Kim JE, Seo BK, Choi JB, Kim HJ, Kim TH, Lee MH, et al. Acupuncture for chronic fatigue syndrome and idiopathic chronic fatigue: a multicenter, nonblinded, randomized controlled trial. Trials. 2015;16:314.

112. Deare JC, Zheng Z, Xue CC, Liu JP, Shang J, Scott SW, et al. Acupuncture for treating fibromyalgia. Cochrane Database Syst Rev. 2013(5):Cd007070.

113. Yang B, Yi G, Hong W, Bo C, Wang Z, Liu Y, et al. Efficacy of acupuncture on fibromyalgia syndrome: a meta-analysis. J Tradit Chin Med. 2014 Aug;34(4):381-91.

114. Lauche R, Cramer H, Hauser W, Dobos G, Langhorst J. A Systematic Overview of Reviews for Complementary and Alternative Therapies in the Treatment of the Fibromyalgia Syndrome. Evid Based Complement Alternat Med. 2015;2015:610615.

115. Jang SH, Kim DI, Choi MS. Effects and treatment methods of acupuncture and herbal medicine for premenstrual syndrome/premenstrual dysphoric disorder: systematic review. BMC Complement Altern Med. 2014;14:11.

116. Hofmeister S, Bodden S. Premenstrual Syndrome and Premenstrual Dysphoric Disorder. Am Fam Physician. 2016 Aug 1;94(3):236-40.

117. Cheong YC, Dix S, Hung Yu Ng E, Ledger WL, Farquhar C. Acupuncture and assisted reproductive technology. Cochrane Database Syst Rev. 2013(7):Cd006920.

118. Shen C, Wu M, Shu D, Zhao X, Gao Y. The role of acupuncture in in vitro fertilization: a systematic review and meta-analysis. Gynecol Obstet Invest. 2015;79(1):1-12.

119. Qian Y, Xia XR, Ochin H, Huang C, Gao C, Gao L, et al. Therapeutic effect of acupuncture on the outcomes of in vitro fertilization: a systematic review and meta-analysis. Arch Gynecol Obstet. 2016 Dec 19.

120. Jo J, Lee YJ. Effectiveness of acupuncture in women with polycystic ovarian syndrome undergoing in vitro fertilisation or intracytoplasmic sperm injection: a systematic review and meta-analysis. Acupunct Med. 2017 Jan 11.

121. Fernandez-Llanio Comella N, Fernandez Matilla M, Castellano Cuesta JA. Have complementary therapies demonstrated effectiveness in rheumatoid arthritis? Reumatol Clin. 2016 May-Jun;12(3):151-7.

122. Matthews A, Haas DM, O'Mathuna DP, Dowswell T. Interventions for nausea and vomiting in early pregnancy. Cochrane Database Syst Rev. 2015(9):Cd007575.

123. Cheuk DK, Wong V. Acupuncture for epilepsy. Cochrane Database Syst Rev. 2014(5):Cd005062.

124. Lardon A, Girard MP, Zaim C, Lemeunier N, Descarreaux M, Marchand AA. Effectiveness of preventive and treatment interventions for primary headaches in the workplace: A systematic review of the literature. Cephalalgia. 2016 Mar 2.

125. Cho HK, Park IJ, Jeong YM, Lee YJ, Hwang SH. Can perioperative acupuncture reduce the pain and vomiting experienced after tonsillectomy? A meta-analysis. Laryngoscope. 2016 Mar;126(3):608-15.

126. Shin HC, Kim JS, Lee SK, Kwon SH, Kim MS, Lee EJ, et al. The effect of acupuncture on postoperative nausea and vomiting after pediatric tonsillectomy: A meta-analysis and systematic review. Laryngoscope. 2016 Aug;126(8):1761-7.

127. Zhang JH, Wang D, Liu M. Overview of systematic reviews and meta-analyses of acupuncture for stroke. Neuroepidemiology. 2014;42(1):50-8.

128. Vados L, Ferreira A, Zhao S, Vercelino R, Wang S. Effectiveness of acupuncture combined with rehabilitation for treatment of acute or subacute stroke: a systematic review. Acupunct Med. 2015 Jun;33(3):180-7.

129. Liu AJ, Li JH, Li HQ, Fu DL, Lu L, Bian ZX, et al. Electroacupuncture for Acute Ischemic Stroke: A Meta-Analysis of Randomized Controlled Trials. Am J Chin Med. 2015;43(8):1541-66.

130. Yang A, Wu HM, Tang JL, Xu L, Yang M, Liu GJ. Acupuncture for stroke rehabilitation. Cochrane Database Syst Rev. 2016 Aug 26;8:Cd004131.

131. Lim SM, Yoo J, Lee E, Kim HJ, Shin S, Han G, et al. Acupuncture for spasticity after stroke: a systematic review and meta-analysis of randomized controlled trials. Evid Based Complement Alternat Med. 2015;2015:870398.

132. Rodriguez-Mansilla J, Espejo-Antunez L, Bustamante-Lopez AI. [Effectiveness of acupuncture in spasticity of the post-stroke patient. Systematic review]. Aten Primaria. 2016 Apr;48(4):226-34.

133. Lee SH, Lim SM. Acupuncture for insomnia after stroke: a systematic review and meta-analysis. BMC Complement Altern Med. 2016;16:228.

134. Lee SH, Lim SM. Acupuncture for Poststroke Shoulder Pain: A Systematic Review and Meta-Analysis. Evid Based Complement Alternat Med. 2016;2016:3549878.

135. Yue J, Liu M, Li J, Wang Y, Hung ES, Tong X, et al. Acupuncture for the treatment of hiccups following stroke: a systematic review and meta-analysis. Acupunct Med. 2016 Jun 10.

136. Chiu HY, Pan CH, Shyu YK, Han BC, Tsai PS. Effects of acupuncture on menopause-related symptoms and quality of life in women in natural menopause: a meta-analysis of randomized controlled trials. Menopause. 2015 Feb;22(2):234-44.

137. Dodin S, Blanchet C, Marc I, Ernst E, Wu T, Vaillancourt C, et al. Acupuncture for menopausal hot flushes. Cochrane Database Syst Rev. 2013(7):Cd007410.

138. Chiu HY, Hsieh YJ, Tsai PS. Acupuncture to Reduce Sleep Disturbances in Perimenopausal and Postmenopausal Women: A Systematic Review and Meta-analysis. Obstet Gynecol. 2016 Mar;127(3):507-15.

139. Bezerra AG, Pires GN, Andersen ML, Tufik S, Hachul H. Acupuncture to Treat Sleep Disorders in Postmenopausal Women: A Systematic Review. Evid Based Complement Alternat Med. 2015;2015:563236.

140. Lau CH, Wu X, Chung VC, Liu X, Hui EP, Cramer H, et al. Acupuncture and Related Therapies for Symptom Management in Palliative Cancer Care: Systematic Review and Meta-Analysis. Medicine (Baltimore). 2016 Mar;95(9):e2901.

141. Lu W, Rosenthal DS. Acupuncture for cancer pain and related symptoms. Curr Pain Headache Rep. 2013 Mar;17(3):321.

142. Towler P, Molassiotis A, Brearley SG. What is the evidence for the use of acupuncture as an intervention for symptom management in cancer supportive and palliative care: an integrative overview of reviews. Support Care Cancer. 2013 Oct;21(10):2913-23.

143. Lian WL, Pan MQ, Zhou DH, Zhang ZJ. Effectiveness of acupuncture for palliative care in cancer patients: a systematic review. Chin J Integr Med. 2014 Feb;20(2):136-47.

144. He XR, Wang Q, Li PP. Acupuncture and moxibustion for cancer-related fatigue: a systematic review and meta-analysis. Asian Pac J Cancer Prev. 2013;14(5):3067-74.

145. Ling WM, Lui LY, So WK, Chan K. Effects of acupuncture and acupressure on cancer-related fatigue: a systematic review. Oncol Nurs Forum. 2014 Nov 1;41(6):581-92.

146. Posadzki P, Moon TW, Choi TY, Park TY, Lee MS, Ernst E. Acupuncture for cancer-related fatigue: a systematic review of randomized clinical trials. Support Care Cancer. 2013 Jul;21(7):2067-73.

147. Finnegan-John J, Molassiotis A, Richardson A, Ream E. A systematic review of complementary and alternative medicine interventions for the management of cancer-related fatigue. Integr Cancer Ther. 2013 Jul;12(4):276-90.

148. Zeng Y, Luo T, Finnegan-John J, Cheng AS. Meta-Analysis of Randomized Controlled Trials of Acupuncture for Cancer-Related Fatigue. Integr Cancer Ther. 2014 May;13(3):193-200.

149. Choi TY, Kim JI, Lim HJ, Lee MS. Acupuncture for Managing Cancer-Related Insomnia: A Systematic Review of Randomized Clinical Trials. Integr Cancer Ther. 2016 Aug 16.

150. Garcia MK, Graham-Getty L, Haddad R, Li Y, McQuade J, Lee RT, et al. Systematic review of acupuncture to control hot flashes in cancer patients. Cancer. 2015 Nov 15;121(22):3948-58.

151. Johns C, Seav SM, Dominick SA, Gorman JR, Li H, Natarajan L, et al. Informing hot flash treatment decisions for breast cancer survivors: a systematic review of randomized trials comparing active interventions. Breast Cancer Res Treat. 2016 Apr;156(3):415-26.

152. Chen YP, Liu T, Peng YY, Wang YP, Chen H, Fan YF, et al. Acupuncture for hot flashes in women with breast cancer: A systematic review. J Cancer Res Ther. 2016 Apr-Jun;12(2):535-42.

153. Salehi A, Marzban M, Zadeh AR. Acupuncture for treating hot flashes in breast cancer patients: an updated meta-analysis. Support Care Cancer. 2016 Aug 6.

154. Zhuang L, Yang Z, Zeng X, Zhua X, Chen Z, Liu L, et al. The preventive and therapeutic effect of acupuncture for radiation-induced xerostomia in patients with head and neck cancer: a systematic review. Integr Cancer Ther. 2013 May;12(3):197-205.

155. Furness S, Bryan G, McMillan R, Worthington HV. Interventions for the management of dry mouth: non-pharmacological interventions. Cochrane Database Syst Rev. 2013(8):Cd009603.

156. Hanchanale S, Adkinson L, Daniel S, Fleming M, Oxberry SG. Systematic literature review: xerostomia in advanced cancer patients. Support Care Cancer. 2015 Mar;23(3):881-8.

157. Kim KH, Kim DH, Kim HY, Son GM. Acupuncture for recovery after surgery in patients undergoing colorectal cancer resection: a systematic review and meta-analysis. Acupunct Med. 2016 Aug;34(4):248-56.

158. Bae K, Yoo HS, Lamoury G, Boyle F, Rosenthal DS, Oh B. Acupuncture for Aromatase Inhibitor-Induced Arthralgia: A Systematic Review. Integr Cancer Ther. 2015 Nov;14(6):496-502.

159. Chien TJ, Liu CY, Chang YF, Fang CJ, Hsu CH. Acupuncture for treating aromatase inhibitor-related arthralgia in breast cancer: a systematic review and meta-analysis. J Altern Complement Med. 2015 May;21(5):251-60.

160. Franconi G, Manni L, Schroder S, Marchetti P, Robinson N. A systematic review of experimental and clinical acupuncture in chemotherapy-induced peripheral neuropathy. Evid Based Complement Alternat Med. 2013;2013:516916.

161. Fu H, Chen B, Hong S, Guo Y. Acupuncture Therapy for the Treatment of Myelosuppression after Chemotherapy: A Literature Review over the Past 10 Years. J Acupunct Meridian Stud. 2015 Jun;8(3):122-6.

162. Haddad NE, Palesh O. Acupuncture in the treatment of cancer-related psychological symptoms. Integr Cancer Ther. 2014 Sep;13(5):371-85.

163. Lee MS, Ernst E. Acupuncture for surgical conditions: an overview of systematic reviews. Int J Clin Pract. 2014 Jun;68(6):783-9.

164. Asmussen S, Maybauer DM, Chen JD, Fraser JF, Toon MH, Przkora R, et al. Effects of Acupuncture in Anesthesia for Craniotomy: A Meta-Analysis. J Neurosurg Anesthesiol. 2016 Mar 10.

165. Liodden I, Norheim AJ. Acupuncture and related techniques in ambulatory anesthesia. Curr Opin Anaesthesiol. 2013 Dec;26(6):661-8.

166. Yang L, Yang Z, Yu H, Song H. Acupuncture therapy is more effective than artificial tears for dry eye syndrome: evidence based on a meta-analysis. Evid Based Complement Alternat Med. 2015;2015:143858.

167. Hadianfard M, Bazrafshan E, Momeninejad H, Jahani N. Efficacies of Acupuncture and Anti-inflammatory Treatment for Carpal Tunnel Syndrome. J Acupunct Meridian Stud. 2015 Oct;8(5):229-35.

168. Manheimer E, Wieland LS, Cheng K, Li SM, Shen X, Berman BM, et al. Acupuncture for irritable bowel syndrome: systematic review and meta-analysis. Am J Gastroenterol. 2012 Jun;107(6):835-47; quiz 48.

169. MacPherson H, Tilbrook H, Agbedjro D, Buckley H, Hewitt C, Frost C. Acupuncture for irritable bowel syndrome: 2-year follow-up of a randomised controlled trial. Acupunct Med. 2016 Mar 15.

170. Wang J, Xiong X, Liu W. Acupuncture for essential hypertension. Int J Cardiol. 2013 Nov 20;169(5):317-26.

171. Li DZ, Zhou Y, Yang YN, Ma YT, Li XM, Yu J, et al. Acupuncture for essential hypertension: a meta-analysis of randomized sham-controlled clinical trials. Evid Based Complement Alternat Med. 2014;2014:279478.

172. Zhao XF, Hu HT, Li JS, Shang HC, Zheng HZ, Niu JF, et al. Is Acupuncture Effective for Hypertension? A Systematic Review and Meta-Analysis. PLOS ONE. 2015;10(7):e0127019.

173. Gadau M, Yeung WF, Liu H, Zaslawski C, Tan YS, Wang FC, et al. Acupuncture and moxibustion for lateral elbow pain: a systematic review of randomized controlled trials. BMC Complement Altern Med. 2014;14:136.

174. Tang H, Fan H, Chen J, Yang M, Yi X, Dai G, et al. Acupuncture for Lateral Epicondylitis: A Systematic Review. Evid Based Complement Alternat Med. 2015;2015:861849.

175. van der Velde G, Yu H, Paulden M, Cote P, Varatharajan S, Shearer HM, et al. Which interventions are cost-effective for the management of whiplash-associated and neck pain-associated disorders? A systematic review of the health economic literature by the Ontario Protocol for Traffic Injury Management (OPTIMa) Collaboration. Spine J. 2015 Nov 26.

176. Trinh K, Graham N, Irnich D, Cameron ID, Forget M. Acupuncture for neck disorders. Cochrane Database Syst Rev. 2016(5):Cd004870.

177. Moon TW, Posadzki P, Choi TY, Park TY, Kim HJ, Lee MS, et al. Acupuncture for treating whiplash associated disorder: a systematic review of randomised clinical trials. Evid Based Complement Alternat Med. 2014;2014:870271.

178. Dong W, Goost H, Lin XB, Burger C, Paul C, Wang ZL, et al. Treatments for shoulder impingement syndrome: a PRISMA systematic review and network meta-analysis. Medicine (Baltimore). 2015 Mar;94(10):e510.

179. Liu CF, Chien LW. Efficacy of acupuncture in children with asthma: a systematic review. Ital J Pediatr. 2015;41:48.

180. Lee SH, Chang GT, Zhang X, Lee H. Acupoint Herbal Patching for Asthma: A Systematic Review and Meta-analysis of Randomized Controlled Trials. Medicine (Baltimore). 2016 Jan;95(2):e2439.

181. Su L, Meng L, Chen R, Wu W, Peng B, Man L. Acupoint Application for Asthma Therapy in Adults: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Forsch Komplementmed. 2016;23(1):16-21.

182. Chen MN, Chien LW, Liu CF. Acupuncture or Acupressure at the Sanyinjiao (SP6) Acupoint for the Treatment of Primary Dysmenorrhea: A Meta-Analysis. Evid Based Complement Alternat Med. 2013;2013:493038.

183. Xu T, Hui L, Juan YL, Min SG, Hua WT. Effects of moxibustion or acupoint therapy for the treatment of primary dysmenorrhea: a meta-analysis. Altern Ther Health Med. 2014 Jul-Aug;20(4):33-42.

184. Abaraogu UO, Tabansi-Ochuogu CS. As Acupressure Decreases Pain, Acupuncture May Improve Some Aspects of Quality of Life for Women with Primary Dysmenorrhea: A Systematic Review with Meta-Analysis. J Acupunct Meridian Stud. 2015 Oct;8(5):220-8.

185. Smith CA, Armour M, Zhu X, Li X, Lu ZY, Song J. Acupuncture for dysmenorrhoea. Cochrane Database Syst Rev. 2016;4:Cd007854.

186. Kim TH, Lee MS, Kim KH, Kang JW, Choi TY, Ernst E. Acupuncture for treating acute ankle sprains in adults. Cochrane Database Syst Rev. 2014(6):Cd009065.

187. Xu L, Xu H, Gao W, Wang W, Zhang H, Lu DP. Treating angina pectoris by acupuncture therapy. Acupunct Electrother Res. 2013;38(1-2):17-35.

188. Yu C, Ji K, Cao H, Wang Y, Jin HH, Zhang Z, et al. Effectiveness of acupuncture for angina pectoris: a systematic review of randomized controlled trials. BMC Complement Altern Med. 2015;15:90.

189. Zhang Z, Bai R, Zhang L, Qi W, Wang Y, Li B, et al. [Acupuncture combined with Western medicine for angina of coronary artery disease: a systematic review]. Zhongguo Zhen Jiu. 2015 Apr;35(4):407-11.

190. Coyle ME, Shergis JL, Huang ET, Guo X, Di YM, Zhang A, et al. Acupuncture therapies for chronic obstructive pulmonary disease: a systematic review of randomized, controlled trials. Altern Ther Health Med. 2014 Nov-Dec;20(6):10-23.

191. Lee H, Kim TH, Leem J. Acupuncture for heart failure: A systematic review of clinical studies. Int J Cardiol. 2016 Jul 30;222:321-31.

192. Min D, Xu-Feng W. An Updated Meta-Analysis of the Efficacy and Safety of Acupuncture Treatment for Vascular Cognitive Impairment Without Dementia. Curr Neurovasc Res. 2016;13(3):230-8.

193. Park J, Hahn S, Park JY, Park HJ, Lee H. Acupuncture for ankle sprain: systematic review and meta-analysis. BMC Complement Altern Med. 2013;13:55.

194. Kim KH, Kim TH, Lee BR, Kim JK, Son DW, Lee SW, et al. Acupuncture for lumbar spinal stenosis: a systematic review and meta-analysis. Complement Ther Med. 2013 Oct;21(5):535-56.

195. Nahin RL, Boineau R, Khalsa PS, Stussman BJ, Weber WJ. Evidence-Based Evaluation of Complementary Health Approaches for Pain Management in the United States. Mayo Clin Proc. 2016 Sep;91(9):1292-306.

196. Lewis RA, Williams NH, Sutton AJ, Burton K, Din NU, Matar HE, et al. Comparative clinical effectiveness of management strategies for sciatica: systematic review and network meta-analyses. Spine J. 2015 Jun 1;15(6):1461-77.

197. Qin Z, Liu X, Wu J, Zhai Y, Liu Z. Effectiveness of Acupuncture for Treating Sciatica: A Systematic Review and Meta-Analysis. Evid Based Complement Alternat Med. 2015;2015:425108.

198. Ji M, Wang X, Chen M, Shen Y, Zhang X, Yang J. The Efficacy of Acupuncture for the Treatment of Sciatica: A Systematic Review and Meta-Analysis. Evid Based Complement Alternat Med. 2015;2015:192808.

199. Kim HJ, Jeon BS. Is acupuncture efficacious therapy in Parkinson's disease? J Neurol Sci. 2014 Jun 15;341(1-2):1-7.

200. Zhou J, Peng W, Xu M, Li W, Liu Z. The effectiveness and safety of acupuncture for patients with Alzheimer disease: a systematic review and meta-analysis of randomized controlled trials. Medicine (Baltimore). 2015 Jun;94(22):e933.

201. Au DW, Tsang HW, Ling PP, Leung CH, Ip PK, Cheung WM. Effects of acupressure on anxiety: a systematic review and meta-analysis. Acupunct Med. 2015 Oct;33(5):353-9.

202. Chen HM, Chen CH. Effects of acupressure at the Sanyinjiao point on primary dysmenorrhoea. J Adv Nurs. 2004 Nov;48(4):380-7.

203. Boelig RC, Barton SJ, Saccone G, Kelly AJ, Edwards SJ, Berghella V. Interventions for treating hyperemesis gravidarum. Cochrane Database Syst Rev. 2016(5):Cd010607.

204. Chai Q, Fei Y, Cao H, Wang C, Tian J, Liu J. Acupuncture for melasma in women: a systematic review of randomised controlled trials. Acupunct Med. 2015 Aug;33(4):254-61.

205. Manheimer E, van der Windt D, Cheng K, Stafford K, Liu J, Tierney J, et al. The effects of acupuncture on rates of clinical pregnancy among women undergoing in vitro fertilization: a systematic review and meta-analysis. Hum Reprod Update. 2013 Nov-Dec;19(6):696-713.

206. Kwan I, Bhattacharya S, Knox F, McNeil A. Pain relief for women undergoing oocyte retrieval for assisted reproduction. Cochrane Database Syst Rev. 2013(1):Cd004829.

207. Ren LN, Guo LH, Ma WZ, Zhang R. [A meta-analysis on acupuncture treatment of polycystic ovary syndrome]. Zhen Ci Yan Jiu. 2014 Jun;39(3):238-46.

208. Lim CE, Ng RW, Xu K, Cheng NC, Xue CC, Liu JP, et al. Acupuncture for polycystic ovarian syndrome. Cochrane Database Syst Rev. 2016(5):Cd007689.

209. Jo J, Lee YJ, Lee H. Effectiveness of Acupuncture for Primary Ovarian Insufficiency: A Systematic Review and Meta-Analysis. Evid Based Complement Alternat Med. 2015;2015:842180.

210. Yang M, Li X, Liu S, Li Z, Xue M, Gao D, et al. Meta-analysis of acupuncture for relieving non-organic dyspeptic symptoms suggestive of diabetic gastroparesis. BMC Complement Altern Med. 2013;13:311.

211. Lan L, Zeng F, Liu GJ, Ying L, Wu X, Liu M, et al. Acupuncture for functional dyspepsia. Cochrane Database Syst Rev. 2014(10):Cd008487.

212. Kim KN, Chung SY, Cho SH. Efficacy of acupuncture treatment for functional dyspepsia: A systematic review and meta-analysis. Complement Ther Med. 2015 Dec;23(6):759-66.

213. Langhorst J, Wulfert H, Lauche R, Klose P, Cramer H, Dobos GJ, et al. Systematic review of complementary and alternative medicine treatments in inflammatory bowel diseases. J Crohns Colitis. 2015 Jan;9(1):86-106.

214. Kim KH, Lee MS, Kim TH, Kang JW, Choi TY, Lee JD. Acupuncture and related interventions for symptoms of chronic kidney disease. Cochrane Database Syst Rev. 2016(6):Cd009440.

215. Jerng UM, Jo JY, Lee S, Lee JM, Kwon O. The effectiveness and safety of acupuncture for poor semen quality in infertile males: a systematic review and meta-analysis. Asian J Androl. 2014 Nov-Dec;16(6):884-91.

216. Wang Y, Zhishun L, Peng W, Zhao J, Liu B. Acupuncture for stress urinary incontinence in adults. Cochrane Database Syst Rev. 2013(7):Cd009408.

217. Paik SH, Han SR, Kwon OJ, Ahn YM, Lee BC, Ahn SY. Acupuncture for the treatment of urinary incontinence: A review of randomized controlled trials. Exp Ther Med. 2013 Sep;6(3):773-80.

218. Naik PN, Kiran RA, Yalamanchal S, Kumar VA, Goli S, Vashist N. Acupuncture: An Alternative Therapy in Dentistry and Its Possible Applications. Med Acupunct. 2014 Dec 1;26(6):308-14.

219. Cheong KB, Zhang JP, Huang Y. The effectiveness of acupuncture in postoperative gastroparesis syndrome--a systematic review and meta-analysis. Complement Ther Med. 2014 Aug;22(4):767-86.

220. Cheong KB, Zhang J, Huang Y. [Effectiveness of acupuncture in postoperative ileus: a systematic review and Meta-analysis]. J Tradit Chin Med. 2016 Jun;36(3):271-82.

221. Hu C, Zhang H, Wu W, Yu W, Li Y, Bai J, et al. Acupuncture for Pain Management in Cancer: A Systematic Review and Meta-Analysis. Evid Based Complement Alternat Med. 2016;2016:1720239.

222. Xue CC, Zhang AL, Zhang CS, DaCosta C, Story DF, Thien FC. Acupuncture for seasonal allergic rhinitis: a randomized controlled trial. Ann Allergy Asthma Immunol. 2015 Oct;115(4):317-24.e1.

223. He J, Jiang L, Peng T, Xia M, Chen H. Acupuncture Points Stimulation for Meniere's Disease/Syndrome: A Promising Therapeutic Approach. Evid Based Complement Alternat Med. 2016;2016:6404197.

224. Zhang XC, Xu XP, Xu WT, Hou WZ, Cheng YY, Li CX, et al. Acupuncture therapy for sudden sensorineural hearing loss: a systematic review and meta-analysis of randomized controlled trials. PLOS ONE. 2015;10(4):e0125240.

225. Li S, Yu B, Zhou D, He C, Kang L, Wang X, et al. Acupuncture for Attention Deficit Hyperactivity Disorder (ADHD) in children and adolescents. Cochrane Database Syst Rev. 2011(4):Cd007839.

226. Cheuk DK, Wong V, Chen WX. Acupuncture for autism spectrum disorders (ASD). Cochrane Database Syst Rev. 2011(9):Cd007849.

227. Wong V, Cheuk DK, Chu V. Acupuncture for hypoxic ischemic encephalopathy in neonates. Cochrane Database Syst Rev. 2013(1):Cd007968.

228. He J, Jia P, Zheng M, Zhang M, Jiang H. Acupuncture for mumps in children. Cochrane Database Syst Rev. 2015(2):Cd008400.

229. Ma C, Sivamani RK. Acupuncture as a Treatment Modality in Dermatology: A Systematic Review. J Altern Complement Med. 2015 Sep;21(9):520-9.

230. Tan HY, Lenon GB, Zhang AL, Xue CC. Efficacy of acupuncture in the management of atopic dermatitis: a systematic review. Clin Exp Dermatol. 2015 Oct;40(7):711-5; quiz 5-6.

231. Vieira BL, Lim NR, Lohman ME, Lio PA. Complementary and Alternative Medicine for Atopic Dermatitis: An Evidence-Based Review. Am J Clin Dermatol. 2016 Jul 7.

232. Yao Q, Li S, Liu X, Qin Z, Liu Z. The Effectiveness and Safety of Acupuncture for Patients with Chronic Urticaria: A Systematic Review. Biomed Res Int. 2016;2016:5191729.

233. Yu C, Zhang P, Lv ZT, Li JJ, Li HP, Wu CH, et al. Efficacy of Acupuncture in Itch: A Systematic Review and Meta-Analysis of Clinical Randomized Controlled Trials. Evid Based Complement Alternat Med. 2015;2015:208690.

234. Coyle M, Deng J, Zhang AL, Yu J, Guo X, Xue CC, et al. Acupuncture therapies for psoriasis vulgaris: a systematic review of randomized controlled trials. Forsch Komplementmed. 2015;22(2):102-9.

235. Kim KH, Lee BR, Ryu JH, Choi TY, Yang GY. The role of acupuncture in emergency department settings: a systematic review. Complement Ther Med. 2013 Feb;21(1):65-72.

236. del Pino-Sedeno T, Trujillo-Martin MM, Ruiz-Irastorza G, Cuellar-Pompa L, de Pascual-Medina AM, Serrano-Aguilar P. Effectiveness of Nonpharmacologic Interventions for Decreasing Fatigue in Adults With Systemic Lupus Erythematosus: A Systematic Review. Arthritis Care Res (Hoboken). 2016 Jan;68(1):141-8.

237. Hackett KL, Deane KH, Strassheim V, Deary V, Rapley T, Newton JL, et al. A systematic review of non-pharmacological interventions for primary Sjogren's syndrome. Rheumatology (Oxford). 2015 Nov;54(11):2025-32.

238. Baeumler PI, Fleckenstein J, Takayama S, Simang M, Seki T, Irnich D. Effects of acupuncture on sensory perception: a systematic review and meta-analysis. PLOS ONE. 2014;9(12):e113731.

239. MacPherson H, Vertosick EA, Foster NE, Lewith G, Linde K, Sherman KJ, et al. The persistence of the effects of acupuncture after a course of treatment: A meta-analysis of patients with chronic pain. Pain. 2016 Oct 17.

240. Zhang J, Shang H, Gao X, Ernst E. Acupuncture-related adverse events: a systematic review of the Chinese literature. Bulletin of the World Health Organization. [Review]. 2010 Dec 1;88(12):915-21C.

241. National Centre for Complementary and Alternative Health. News Releases - NIH review finds nondrug approaches effective for treatment of common pain conditions. US Department of Health and Human Services; 2016 [cited 2016]; Available from: https://www.nih.gov/news-events/news-releases/nihreview-finds-nondrug-approaches-effective-treatment-common-pain-conditions.

242. National Health and Medical Research Council. NHMRC additional levels of evidence and grades for recommendations for developers of guidelines. Table 3. NHMRC Evidence Hierarchy: designations of 'levels of evidence' according to type of research question (including explanatory notes). National Health and Medical Research Council; 2009.

243. Balshem H, Helfand M, Schunemann HJ, Oxman AD, Kunz R, Brozek J, et al. GRADE guidelines: 3. Rating the quality of evidence. Table 2. Significance of the four levels of evidence. J Clin Epidemiol. 2011 Apr;64(4):404.

Appendix G. Details of ASH/AHRQ Retroactive Acupuncture Study.

We respectfully submit the following results of American Specialty Health Incorporated's survey and study of 89,000 acupuncture patients.

ACUPUNCTURE

Does Acupuncture Provided Within a Managed Care Setting Meet Patient Expectations and Quality Outcomes?

A 2-Year Retroactive Study of 89,000 Managed Network Patients

SOURCE: American Specialty Health Incorporated Health Services Department

American Specialty Health

"When 99% of your members receiving services from an ASH-contracted provider rate the overall quality of care and service as good to excellent, then we know ASH and our providers are doing something right. We're very pleased to offer health services that exceed national benchmarks for patient satisfaction."

Douglas Metz, DC, Chief Health Services Officer,
American Specialty Health Incorporated

Success in Treating Conditions

93%

of respondents nationally said their provider was successful in treating their primary condition in 2014 & 2015.

Quality of Care and Service

99%

of members surveyed nationally rated quality of care and service from their ASH network acupuncturist as good to excellent in 2014 & 2015.

Recommend Health Plan

90.5%

of 2015 respondents and 89% of 2014 respondents said they would probably or definitely recommend their health plan to others.

INTRODUCTION

Acupuncture is gaining in popularity as a mainstream health care service that offers adjunctive treatment as well as primary intervention. Through its subsidiaries, American Specialty Health Incorporated (ASH) has been managing acupuncture services for more than 18 years by building national and regional practitioner networks and providing claims services, credentialing, clinical quality management, and medical necessity review processes. ASH currently contracts with approximately 6,000 acupuncturists across the country who provide evidence-supported acupuncture services.

The ASH credentialing process ensures providers have the appropriate professional credentials, possess the required malpractice insurance, adhere to clinical guidelines, and maintain practice environments that meet professional health and safety standards. Contracted acupuncturists agree to adhere to ASH clinical guidelines and clinical quality evaluation processes.

Since 2012, the ASH acupuncturist network has cared for more than 157,000 patients.

Musculoskeletal pain syndromes represent the major category of health conditions covered by ASH acupuncture programs. Spinal pain in the lower back and neck is the most prevalent condition treated under ASH programs.

OUTCOMES MONITORING

To evaluate the quality of care and outcomes of acupuncture services, ASH implements annual measurement processes. These processes measure and report outcomes data for program evaluation and quality improvement. ASH's outcomes monitoring and survey research are designed to achieve the following objectives:

- Assess and track patient satisfaction based on the type of specialist seen
- Measure overall and specific areas of patient satisfaction with their practitioner
- Examine patient satisfaction with the access and availability of specialty care
- Measure patient satisfaction with their specialty benefits design
- Determine the effectiveness of treatment from the specialty practitioner

By examining patient satisfaction, ASH can proactively address quality improvement opportunities and thereby improve overall satisfaction with acupuncture care services provided by our networked practitioners.

A key measurement tool used by ASH is the Clinician & Group Consumer Assessment of Healthcare Providers and Systems (CG-CAHPS®) survey. This survey, created by the U.S. Department of Health & Human Services' Agency for Healthcare Research and Quality (AHRQ), is being adopted widely as the standard for measuring patient perceptions of quality by health providers.

THE STUDY

In a recent study, ASH set out to determine whether acupuncture services provided within a managed care setting could meet or exceed national CG-CAHPS benchmarks for patient satisfaction. In this study, results from the CG-CAHPS survey, along with results from additional ASH proprietary questions, were used to measure the satisfaction rates of acupuncture patients in a managed acupuncture program administered by ASH. Satisfaction with overall provider, access, communication, and office staff were measured.

KEY FINDINGS

Willingness to Recommend Health Plan

90.5% of 2015 respondents and 89% of 2014 respondents nationally said they would probably or definitely recommend their health plan to others.

A key measure of satisfaction is whether a patient is willing to recommend their practitioner or insurance plan to family or friends.

In 2014, 89 percent of national acupuncture respondents and 90 percent of California acupuncture respondents said they probably or definitely would recommend their health plan to others. In 2015, responses were 90.5 percent and 93 percent, respectively, for national and California acupuncture respondents.

Willingness to Recommend Provider

The 2014 survey showed 96.5 percent of national acupuncture respondents and 93.2 percent of California acupuncture respondents said they agreed or strongly agreed that they would recommend their ASH network acupuncture practitioner to family and friends. The 2015 results were 96.7 percent for national and 96.2 percent in California.

Quality of Care and Service

99% of members surveyed nationally rated quality of care and service from their ASH network acupuncturist as good to excellent in 2014 & 2015.

When asked to rate the overall quality of the care and services they received from their ASH network acupuncturist, 99 percent of national and 95 percent of California acupuncture respondents reported good, very good, or excellent service quality in 2014. The 2015 survey showed similar responses at 99 percent of national and 97 percent of California respondents.

Overall Treatment Success

93% of respondents nationally said their provider was successful in treating their primary condition in 2014 & 2015.

Patients were asked if their acupuncture provider was successful in treating their primary condition. Overall, 93 percent of national and 88 percent of California respondents agreed or strongly agreed that their ASH network provider was successful in treating their condition in both 2014 and 2015.

Treatment Success: Medical Pain Clinic Referral Program

ASH operates a program where patients who are being treated in a medical pain clinic are offered the option to seek acupuncture treatment for their pain. Results from this referral program are included in the California data. In 2014, 84.8 percent of the patients in this chronic pain, physician referral-only, ASH-managed acupuncture program reported that the acupuncture provider was successful in treating their primary condition. In 2015, the success rate increased slightly to 85.2 percent. While this is lower than the organization's average of 94 percent for direct access patients, it is still a significantly positive result in a population of patients with severe chronic pain conditions.

Overall Referral Rates

In 2014, national respondents reported they were referred to acupuncture services from another health care practitioner in 24.1 percent of cases; California responders reported 63.3 percent were referred (including the physician referral program noted above). Results in 2015 were similar at 24.4 percent of national and 59.2 percent of California respondents.

Safety

In the 2014 survey, 98 percent of national and 97 percent of California acupuncture respondents agreed or strongly agreed that the provider and staff ensured their safety. In 2015, both national and California respondents rated this category at 98.3 – 98.4 percent. Some patients will be fearful for their safety in any medical environment. Therefore, a result of 100 percent agreement with this survey question likely cannot be achieved.

METHODS

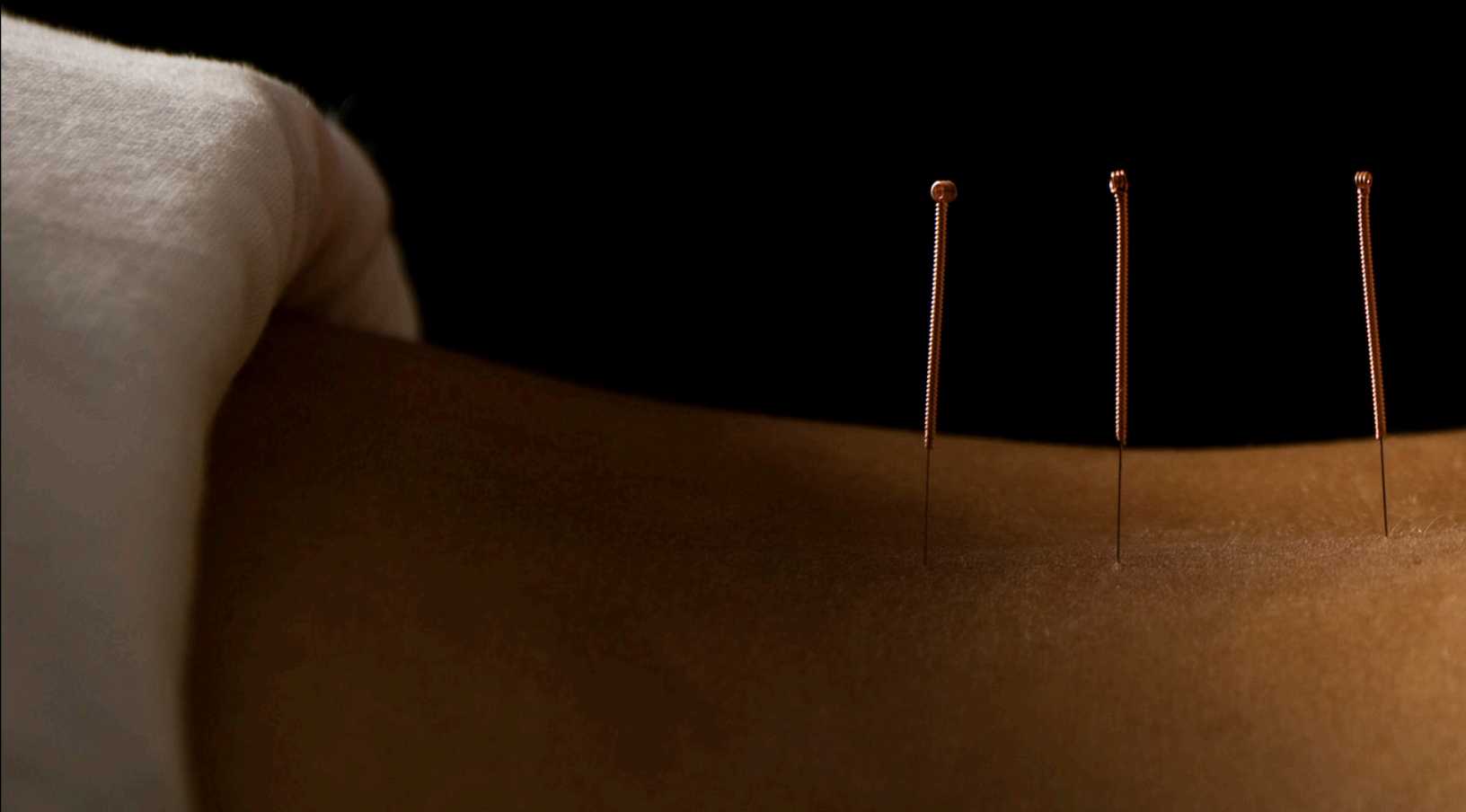
Data was extracted from the Adult 12-Month CG-CAHPS 2.0 survey and several additional ASH proprietary measures. The survey was performed by an independent third party research firm specializing in health care and certified in CAHPS surveys. The population surveyed included those 18 years of age or older who were seen by an ASH-contracted specialist within the first 6 months of both 2014 and 2015. ASH provided the research firm with a list of eligible patients. The survey was conducted using a mail methodology in accordance with AHRQ CG-CAHPS protocols. Initial surveys were mailed in September and October of both 2014 and 2015, and follow-up surveys were mailed to non-responders approximately one month after the initial survey. Responses were accepted through late October.

PATIENT POPULATION CHARACTERISTICS

The average age of the ASH network acupuncture patient respondents for 2014 was 59 – 60.9 years; approximately 75 percent were female; about 85 percent had completed some college education, and the majority were white/Caucasian (78 percent of national and 68 percent of California). Fifty-four percent of national and nearly 39 percent of California acupuncture survey responders rated their health as excellent or very good. Similarly, 2015 respondent demographics showed an average age of 60.2 – 60.4 years. Seventy-seven percent of national acupuncture respondents and 70.9 percent of California respondents in the 2015 survey were female. The percentages of survey year 2015 respondents who rated their overall health as excellent or very good were 57.9 nationally and 43.6 in California.

"The results of this important survey of acupuncture patient satisfaction are incredibly validating. To learn that 93% of patients agreed that their provider successfully treated their condition is exceptional. This makes a very strong case for the continued growth of acupuncture as an option for patients in pain."

Matthew Bauer, L.Ac.
Private practice, La Verne, California,
Board Member, American Specialty Health Group, Inc.



RESULTS

Survey response rates for the national acupuncture and California acupuncture sample patient populations are represented in the table below. The 2014 and 2015 response rates were very similar to those of 2013, but had increased approximately one-third over 2011 and 2012 levels.

	2012		2013		2014		2015	
Specialty	Received	Response Rate	Received	Response Rate	Received	Response Rate	Received	Response Rate
Acupuncture (National)	205	26%	664	37%	641	36%	619	34%
Acupuncture (California)	202	24%	710	35%	617	34%	567	31%

CG-CAHPS: Overall Patient Rating for ASH Network Providers

Eighty-seven percent of national acupuncture patient respondents and 80 percent of California patient respondents rated their ASH network provider highly (9 or 10 on a 0 to 10 scale) in 2014. The 2015 survey showed the same category rated at 87 percent national and 82 percent California. For both years, ASH's national acupuncture satisfaction rates were higher than the CG-CAHPS benchmarks (76 percent in 2014 and 80 percent in 2015).

	2014		2015	
Specialty	ASH	CG-CAHPS Benchmark	ASH	CG-CAHPS Benchmark
Acupuncture (National)	87%	76%	87%	80%
Acupuncture (California)	80%	76%	82%	80%

Results represent top 2-box CG-CAHPS results for benchmark and ASH results.

CG-CAHPS: Access to ASH Network Providers

The access composite measure included information such as the ability to schedule appointments for routine or urgent care, success with obtaining answers to health questions during and after business hours, and whether or not the patient was seen by their health care provider within 15 minutes of the appointment time.

	2014		2015	
Specialty	Provider Access Composite Results "Usually," "Always"	CG-CAHPS Benchmark	Provider Access Composite Results "Usually," "Always"	CG-CAHPS Benchmark
Acupuncture (National)	97%	84%	97%	86%
Acupuncture (California)	93%	84%	96%	86%

Results represent top 2-box CG-CAHPS results for benchmark and ASH results.

CG-CAHPS: Communication from ASH Network Providers

The next survey composite measure addressed communication. Questions included whether the practitioner explained things well, listened carefully, gave easy-to-understand information, showed respect, knew important information about the patient's history, and spent enough time with the patient.

	2014		2015	
Specialty	Provider Communication Composite Results "Usually," "Always"	CG-CAHPS Benchmark	Provider Communication Composite Results "Usually," "Always"	CG-CAHPS Benchmark
Acupuncture (National)	99%	95%	99%	96%
Acupuncture (California)	95%	95%	95%	96%

Results represent top 2-box CG-CAHPS results for benchmark and ASH results.

CG-CAHPS: Office Staff

Office staff was rated by the survey respondents in the areas of courtesy and helpfulness.

	2014		2015	
Specialty	Office Staff Composite Results "Usually," "Always"	CG-CAHPS Benchmark	Office Staff Composite Results "Usually," "Always"	CG-CAHPS Benchmark
Acupuncture (National)	97%	93%	99%	96%
Acupuncture (California)	96%	93%	97%	96%

Results represent top 2-box CG-CAHPS results for benchmark and ASH results.

ADVERSE EVENTS

During this reporting period from 2014 – 2015, ASH received and investigated 13 reports of adverse events involving patients seen for acupuncture:

- 2 minor burns
- 1 breathing issue when exposed to the herb moxa and incense
- 1 report of nausea and vomiting unrelated to acupuncture needle insertion
- 4 experiences of transient pain after acupuncture; 1 also with bruising
- 2 retained needles after treatment
- 1 reported skin infection

This represents a safety profile of 13 events per 89,769 patients in 2014 and 2015 combined, or 0.014 percent of members reported an adverse event.

CONCLUSION

These results demonstrate that patient satisfaction with acupuncture services can be maintained at or above national CG-CAHPS benchmarks in a managed care environment. Patients report high levels of satisfaction with overall care, safety, and the practitioner's ability to effectively treat their presenting health conditions. Patients also report high levels of willingness to recommend others to ASH for benefits and to their individual practitioners—key indicators of satisfaction.

ASH's management processes of credentialing and clinical quality evaluation for medical necessity of acupuncture services help maintain safety and quality of acupuncture services. The high quality of clinical care provided by ASH network practitioners supports ASH's goals to safely and effectively address the patient's health concerns and produce the high levels of satisfaction reflected in these survey results.


American Specialty Health

Appendix H. Additional Evidence Addressing Safety and Adverse Events with Acupuncture Treatment.

We respectfully submit the following studies supporting the safety of acupuncture treatment and addressing evidence of adverse events. We believe that acupuncture, when practiced by a properly trained provider, is a safe and effective modality for treating a variety of conditions.

---

1. Given, S., "Clean Needle Technique Manual for Acupuncturists: Guidelines and Standards for the Clean and Safe Practice of Acupuncture, 6th Edition," National Acupuncture Foundation: Nov 2009.

2. Guerreiro de Silva, JB., Saidah, R., Megid, CB., Ramos, NA., "Adverse events following acupuncture: a prospective survey of 13,884 consultations in a university outpatient acupuncture training clinic in Brazil," European Journal of Integrative Medicine. Vol. 6, Aug 2014.

3. Jaung-Geng Lin, Yi-Hung Chen, Xin-Yan Gao, Lixing Hao, Hyejung Lee, and Gerhard Litscher, "Clinical Efficacy, Mechanisms, and Safety of Acupuncture and Moxibustion," Evidence-Based Complementary and Alternative Medicine, vol. 2014, Article ID 356258, 2 pages, 2014.

4. Kim, Me-Riong et al. "Safety of Acupuncture and Pharmacupuncture in 80,523 Musculoskeletal Disorder Patients: A Retrospective Review of Internal Safety Inspection and Electronic Medical Records." Ed. Romy Lauche. *Medicine* 95.18 (2016): e3635. *PMC*. Web. 17 Nov. 2017.

5. Kim, YJ., Kim, SK., Cho, SY., Park, SU., Jung, WS., Moon, SK., Ko, CN., Cho, KH., Kim, SB., Shin WC., Park, JM., "Safety of acupuncture treatments for patients taking warfarin or antiplatelet medications: Retrospective chart review study," European Journal of Integrative Medicine, Vol. 6, Aug 2014.

6. Lao, Lixing; Hamilton, Gayle R; Fu, Jianping; Berman, Brian M. "Is Acupuncture Safe? A Systematic Review of Case Reports." Alternative Therapies in Health and Medicine; Aliso Viejo Vol. 9, Iss. 1, (Jan/Feb 2003): 72-83.

7. MacPherson H, Thomas K., Walters S, et al. The York acupuncture safety study: prospective survey of 34,000 treatments by traditional acupuncturists. *BMJ* 2001; 323:486-87.

8. Witt CM, Pach D, Brinkhaus B, et al. Safety of acupuncture: results of a prospective observational study with 229,230 patients and introduction of a medical information and consent form. *Forsch Komplementmed* 2009; 16:91-97.

9. Wu, J., Hu, Y., Zhu, Y., Yin, P., Litscher, G., & Xu, S., "Systematic Review of Adverse Effects: a Further Step Towards Modernization of Acupuncture in China." Evidence-based Complementary and Alternative Medicine. July 2014.