CDC Request for Comments: Management of Acute and Chronic Pain

CDC Due Date: April 11, 2022

Submitted by: Oregon Association of Acupuncturists (OAA)

Introduction

The Oregon Association of Acupuncturists (OAA) appreciates the opportunity to respond to the Centers for Disease Control and Prevention's (CDC) March 2022 request for comments on managing acute and chronic pain [document citation 87 FR 7838; docket no. CDC-2022-0024]. The OAA represents over 1,500 actively practicing acupuncturists in the state of Oregon and works closely with the American Society of Acupuncturists (ASA), the national governing professional board. The OAA acknowledges and appreciates the CDC's efforts to investigate and seek nonpharmacological interventions for acute and chronic pain management.

In response to the CDC's request for feedback to inform its *Guideline for Prescribing Opioids for Chronic Pain,* the OAA encourages the CDC to fully consider and implement evidence-based pathways to non-opioid and non-pharmacological pain-management treatments, including acupuncture. The OAA encourages the CDC to further investigate the current research evidence base for the effects of acupuncture on acute and chronic pain. The OAA encourages the CDC and other entities within the Department of Health and Human Services (HHS) to initiate and fund acupuncture research studies that are led by or include nationally certified, licensed, and physician acupuncturists.

Acupuncture: An Effective, Evidence-Based Acute and Chronic Pain-Management Option

In this document the OAA provides summaries of current research demonstrating acupuncture as a safe and effective acute and chronic pain-management option and alternative for opioid substance use detox.

In January 2020 "the Centers for Medicare & Medicaid Services (CMS) [began covering] acupuncture for chronic low back pain under section 1862(a)(1)(A) of the Social Security Act." This coverage is based on the CMS's acknowledgement that nonpharmacologic treatments "may potentially decrease the need for, and the side effects of, assorted medications which are used to treat cLBP" and further underscores that "nonpharmacologic therapies have included various physical treatments, including acupuncture." The Department of Veterans Affairs (DVA)

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1. Centers for Medicaid and Medicaid Services (CMS). Decision memo for acupuncture for chronic low back pain (CAG-00452N). Accessed March 31, 2022, from https://www.cms.gov/medicare-coverage-database/details/nca-decision-memo.aspx?NCAId=295.

2. U.S. Department of Veterans Affairs. Veterans Health Administration. Acupuncture in VA - fact sheet. Retrieved on April 4, 2022. https://www.va.gov/WHOLEHEALTH/docs/AcupunctureFactSheet_508.pdf#:~:text=This%20allows%20acupuncture%20care%20to%20be%20covered%20by,provide%20acupuncture%20care%20at%20VA%20Medical%20Centers%20%28VAMC%29

includes acupuncture as "one of the complementary and integrative health (CIH) approaches within the VHA Whole Health System of care included in VHA Directive 1137 – Provision of Complementary and Integrative Health," published in May 2017.[2] Additionally, in 2018 the DVA "permitted licensed acupuncturists to be hired to provide acupuncture care at VA Medical Centers (VAMC)."[2] In 2017, the American Academy of Pain Medicine (AAPM) issued a statement regarding the need for multidisciplinary care and nonpharmacologic pain-management interventions and included acupuncture in this statement.[3] In 2017 the American College of Physicians called for acupuncture to be a first line modality for treating chronic pain.[4] The FDA's 2017 "Education Blueprint for Health Care Providers Involved in the Management or Support of Patients with Pain" urged doctors to "inform themselves and their patients about the efficacy of acupuncture for pain management" and suggested that education on this matter become part of medical doctors' formal training.[4] The Joint Commission, a large hospital accrediting agency, and the National Academies of Science, Engineering, and Medicine both recommended acupuncture as part of 2017 revised guidelines to treat chronic pain.[4] In 1998 National Institutes of Health (NIH) Consensus Development Conference determined that "there is sufficient evidence of acupuncture's value to expand its use into conventional medicine and to encourage further studies of its physiological and clinical value."[5]

Chronic pain is prevalent: 20.4% of participants in a 2019 National Health Information Survey (NHIS) had experienced chronic pain.[6] Of those experiencing chronic pain, nearly ¼ (22.1%) had used a prescription opioid within the past three months.[6] Opioids offer short-term relief of symptoms such as anxiety and depression, but few long-term benefits and serious negative impacts such as reduced immunosuppression and reduction in natural killer cells.[7] Current pain management literature shows that "only a minority of patients with chronic noncancer pain show measurable benefit from any of the [usual] treatments commonly given for this condition, including opioid and nonopioid medication, injection therapy, implantable devices and surgery."[8]

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3. Stanos SP. Stemming the tide of the pain and opioid crisis: AAPM reaffirms its commitment to multidisciplinary biopsychosocial care and training. *Pain Med.* 2017;18:1005–1006. DOI:10.1093/pm/pnx120
4. Gong C-Z, Liu W. Acupuncture and the opioid epidemic in america. *Chin J Integr Med*. 2018;24(5):323-327.
5. NIH. NIH Consensus Conference. Acupuncture. JAMA. 1998;280(17):1518–1524.
6. Dahlhamer JM, Connor EM, Bose J, Lucas JW, Zelaya CE. Prescription opioid use among adults with chronic pain: United States, 2019. CDC National Health Statistics Reports (NHSR). 2021;162.
7. Sommers E, Vinjamury SP, Noborikawa J. Pain and opioid use: evidence for integrating acupuncture into treatment planning. *Glob Adv Health Med.* 2021;10:1–5. DOI: 10.1177/21649561211042571
8. International Association for the Study of Pain (IASP). Nonspecific treatment effects in pain medicine. Published January 2011. Accessed April 4, 2022. https://painsa.org.za/wp-content/uploads/2015/08/Nonspecific-Treatment-Effects-in-Pain-Medicine.pdf#:~:text=The%20nonspecific%20effects%20of%20treatment%20could%20be%20due,reduction%20of%20anxiety%2C%20increased%20optimism%2C%20and%20improved%20coping
9. Tick H, Nielsen A, Pelletier KR, Bonakdar R, Simmons S, Glick R, Ratner E, Lemmon RL, Wayne P, Zador V. Evidence-based nonpharmacologic strategies for comprehensive pain care: the consortium pain task force white paper. *Evid Based Nonpharm Pain Care*. 2018;14(3):177-211.

The opioid crisis is well-understood in national conversations to have reached epidemic proportions.[4,6,7,9] As of 2018, the cost of caring for pain within the healthcare system was roughly "$560–635 billion annually" and the economic burden of prescription opioid "overdose, abuse and dependency [was] estimated to be $78.5 billion each year in the United States."[7] Additionally, chronic pain impacts individuals' lives (physical and psychological impairment, lost work productivity, lower socioeconomic status, and higher healthcare expenses) and has a major overall economic impact. The following factors increase susceptibility to the impacts of chronic pain: "English as a second language, race and ethnicity, lower income and education, sex and gender, age group, geographic location, military veteran status, cognitive impairment, surgical patients, cancer patients[,] and the end of life." [9] Risk of opioid use and overdose are accelerated by lack of educational and job opportunities as well as systemic racism [6,7]

The effectiveness of using acupuncture for the treatment of acute and chronic pain is well-established [10,11] and the benefits of acupuncture persist over time.[7] The Acupuncture Evidence Project authors reported that acupuncture demonstrated a positive treatment effect for 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.[10] With acupuncture, patients report reduced pain, better quality of life, less need for opioid pain medication, and increased self-care.[7] The National Acupuncture Detox Association has promoted the use of auricular (ear) acupuncture to treat opioid addiction since the 1970's[12] and the use of this modality exits in many social service programs across the country, including Quest Center for Integrative Medicine in Portland, Oregon.[13] Acupuncture use for opioid use disorders (OUD) have resulted in improved retention and completion of substance use detox programs, have had "favorable influences on morbidity and mortality," and reduced opioid withdrawal symptoms (cravings, anxiety, depression, insomnia).[7]

Acupuncture has been shown to activate a variety of endogenous biochemical/molecular signaling cascades within various body systems involved with pain management: upregulating anti-inflammatory cytokines of the immune system;[14,15,16] regulating stress hormones, monoamine neurotransmitters such as GABA, and endogenous opioids within the hypothalamic-pituitary-adrenal axis of the neuroendocrine system;[4,14] upregulating antioxidant enzymes like superoxide dismutase and glutathione peroxidase of the body's adaptive stress

10. McDonald J, Janz S. The acupuncture evidence project: a comparative literature review. Australian Acupuncture and Chinese Medicine Association. January 2017. https://www.asacu.org/wp-content/uploads/2017/09/Acupuncture-Evidence-Project-The.pdf
11. Hempel S, Shekelle PG, Taylor SL, Solloway MR. The evidence map of acupuncture. Department of Veterans Affairs VA-ESP Project #05-226. January 2014. https://www.hsrd.research.va.gov/publications/esp/acupuncture.pdf
12. National Acupuncture Detox Association (NADA). https://acudetox.com/ Accessed April 4, 2022.
13. Quest Center for Integrative Medicine. https://quest-center.org/ Accessed April 8. 2022.
14. Li Y-H, Ma Q-L, Hu B, Wang Z-L. [Current state about research on selection of experimental index mechanisms of acupuncture underlying improvement of chronic fatigue syndrome]. *Zhen Ci Yan Jiu.* 2021;46(11):980-4. DOI: 10.13702/j.1000-0607.200998
15. Hei X-Y, Xu J-F, Zhu S-Q, Tian X-B, Zhang J-C, Chen Y-D, Lin R-Z. [Effect of internal heat-type acupuncture needle on the expression of osteoprotegerin, receptor activator of NF-κB ligand and receptor activator of NF-κB of subchondral bone in knee osteoarthritis rabbits]. *Zhen Ci Yan Jiu.* 2021 Aug 25;46(8):656-62. DOI: 10.13702/j.1000-0607.200976.

response systems;[14] and operating via the biochemical communication pathways responsible for musculoskeletal function.[17] A strong body of research has shown that acupuncture stimulates biochemical and biomechanical communication,[18,19,20,21,22] electrical impedance along connective tissue planes,[23] and vagal and cholinergic nerve pathways.[24]

The research literature demonstrates that acupuncture has a statistically significant impact upon pain management for a variety of conditions, as well as for opioid use and related symptoms. The equivalent results between true (verum) acupuncture and sham acupuncture have often been used to debunk the credibility of acupuncture. However, a monumental meta-analysis designed to reduce methodological differences and to standardize reporting for acupuncture research, showed that true acupuncture outperformed sham.[25] Although verum and sham acupuncture results are often similar in studies using small sample sizes, they both often have clinically superior outcomes to standard of care.[25,26] Increasing knowledge that sham and placebo-controlled acupuncture also produce treatment effects may have created a "consistent underestimation of the true effect size of acupuncture interventions."[10] This information demonstrates that the clinical effects of acupuncture may be under-reported in the scientific literature due to previously poor study design; with advances in research designs and rigor, more evidence for effectiveness has been demonstrated over time.

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16. Li N, Guo Y, Gong Y, Zhang Y, Fan W, Yao K, Chen Z, Dou B, Lin X, Chen B, Chen Z, Xu Z, Lyu Z. The anti-inflammatory actions and mechanisms of acupuncture from acupoint to target organs via neuro-immune regulation. *J Inflamm Res*. 2021;14:7191-7224. DOI: 10.2147/JIR.S341581. eCollection 2021.

17. Lei B-K, Zhao S, Xu T, Zhou Y, Xu S-S, Wang R-Y, Li J-P. [TGF-β1/ERK/CTGF pathway involved in effect of acupuncture on exercise-induced skeletal muscle fibrosis]. *Zhen Ci Yan Jiu.* 2021 Apr 25;46(4):306-11. DOI: 10.13702/j.1000-0607.200471.

18. Langevin, HM, Bouffard NA, Churchill DL, Badger GJ. Connective tissue fibroblast response to acupuncture: dose-dependent effect of bidirectional needle rotation. *J Altern Complement Med.* 2007;13:355-360.

19. 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;207:767-774.

20. Langevin HM, Konofagou EE, Badger GJ, Churchill DL, Fox JR, Ophir J, Garra BS. Tissue displacement during acupuncture using ultrasound elastography techniques. *Ultrasound Med Biol.* 2004;30(9):1173-1183. DOI:10.1016/j.ultrasmedbio.2004.07.010

21. Langevin HM, Churchill DL, Junru W, Badger GJ, Yandow JA, Fox JR, Krag MH. Evidence of connective tissue involvement in acupuncture. *FASEB J.* 2002.

22. Langevin HM, Churchill DL, Cipolla MJ. Mechanical signaling through connective tissue: mechanism for the therapeutic effect of acupuncture. *FASEB J.* 2001;15.

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25. Vickers AJ, Cronin AM, Maschino AC, Lewith G, MacPherson H, Foster NE, et al. Acupuncture for chronic pain: individual patient data meta-analysis. *Arch Intern Med.* 2012;172(19):1444-53.

26. Langevin HM, Wayne PM, MacPherson H, Schnyer R, Milley RM, Napadow W, Lao L, Park J, Harris RE, Cohen M, Sherman KJ, Haramati A, Hammerschlag R. Paradoxes in acupuncture research: strategies for moving forward. *Evid Based Complement Alternat Med.* 2011;1-11. DOI:10.1155/2011/180805

Discussions regarding whether the clinical results of acupuncture are due to the placebo effect have led to some interesting and valuable research. This research has shown that the "placebo effect" may be a misnomer, as these effects are actually a collection of treatment effects from

factors such as the patient-practitioner relationship, listening to and caring for the patient, practitioner communication style, the treatment setting, the practitioner's desire to help,[8,26,27,28,29,30] and "reduction of anxiety, increased optimism, and improved coping." [8] Despite the importance of considering these beneficial aspects of the patient encounter and the implications for both research design and clinical outcomes, these questions surrounding placebo effect merely detract from consideration of the large body of evidence pointing to acupuncture's beneficial effects on pain management, an area where pharmaceuticals fall short.

The CDC's current guidelines on opioid prescriptions do not include acupuncture as an opioid alternative, despite its use being supported by programs within the U.S. Department of Health and Human Services (DHHS), Department of Veterans' Affairs (DVA), Food and Drug Administration (FDA), and National Institute of Health (NIH), and by the American Academy of Physicians, American Academy of Pain Medicine (AAPM), The Joint Commission, and the National Academies of Science, Engineering, and Medicine. Yet acupuncture is one of the most safe, effective, and evidence-based non-pharmacological pain management options available.[31]

Recommendations

Given this information, it is time for the national conversation on non-pharmacologic pain management to include acupuncture. The OAA strongly urges the CDC to revise their guidelines for opioid prescription to acknowledge and include effective, evidence-based non-pharmacologic pain management alternatives, including acupuncture, and to fund research further contributing to the body of knowledge surrounding this alternative and other nonpharmacological pain management alternatives.

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27. 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. http://biomedcentral.com/1741-7015/8/75

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30. Jonas WB. The myth of the placebo response. *Perspect Sci.* 2019;10. DOI:10.3389/fpsyt/2019.00577

31. Fan AY, Miller DW, Bolash B, Bauer M, McDonald J, Faggert S, He H, Li YM, Matecki A, Camardella L, Koppelman MH, Stone JAM, 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 Nov;15(6):411-425. DOI: 10.1016/S2095-4964(17)60378-9.

Conclusion

There is a large evidence base to support the safe, effective use of acupuncture by trained professionals for the treatment of acute/chronic pain and opioid use, and that acupuncture is of equal or greater clinical effectiveness than pharmacological pain management. It is time for the national conversation on pain management and the opioid crisis to include nonpharmacologic options such as acupuncture. Professional acupuncturists in Oregon are licensed by the Oregon Medical Board (OMB) in collaboration with the National Certification Commission for Acupuncture and Oriental Medicine (NCCAOM), which sets professional testing and educational standards, and certifies and regulates practicing professionals.

Acupuncture Evidence-Base

Acupuncture for Opioid Use Reduction

- Cheng SI, Kelleher DC, DeMeo D, Zhong H, Birch G, Ast MP. Intraoperative acupuncture as part of a multimodal analgesic regimen to reduce opioid usage after total knee arthroplasty: a prospective cohort trial. *Med Acupunct.* 2022; 34(1). DOI: 10.1089/acu.2021.0072

Objective

- ➢ To study whether auricular acupuncture can help mitigate the need for intraoperative opiate medications from total knee arthroplasty (TKA) surgery, since intraoperative use of opioids can heighten pain sensitivity, increase risk of tolerance, and potentially lead to chronic use/dependence.

Materials and Methods

- ➢ This study was a prospective cohort study involving 41 patients undergoing TKA surgery.
- ➢ Patients received neuraxial anesthesia and a "standardized, opioid-free intraoperative protocol including electro-auricular acupuncture," with the goal of reducing the opioid dosage needed by patients.
- ➢ The main outcome assessment was "the number of patients able to remain on a low-dose opioid regimen," while other outcome assessments were subjective pain scores, side-effects, and past experiences with acupuncture.

Results

- ➢ 26/40 patients, or 65% of participants, maintained low-dose opioid intake. Three of these participants (7%) were opioid-free for 30 days, and 100% of participants were opioid-free after 30 days.

Conclusions

- ➢ The authors concluded that using electroauricular acupuncture intraoperatively within an "existing multimodal analgesia regimen" can be an effective method for reducing the need for high-dose opioids after TKA surgery.

- Pham T, Ma O, Agiro A, Bukowiec J, Flannery T. Do acupuncture services reduce subsequent utilization of opioids and surgical interventions compared to noninvasive therapies among patients with pain conditions? *Pain Med*. 2021;22(11):2754-2762. DOI: 10.1093/pm/pnab187.

Objective

- ➢ Authors compared the use of acupuncture and either anti-inflammatory drugs (NSAIDs) or physical therapy (PT) for opioid prescription use for invasive surgical interventions.

Methods

- ➢ The study design was retrospective observational study of administrative claims for large commercial insurance plans.
- ➢ 52,346 patients were included in the study; participants were identified from January 1, 2014, to December 31, 2017
- ➢ "Acupuncture patients were 1:1 propensity score matched to the NSAIDs/PT group on baseline characteristics."
- ➢ Outcomes: "opioid use, subsequent invasive surgical procedures, healthcare utilization such as hospitalizations or emergency department (ED) visits, and costs."
- ➢ Participant outcome data was "assessed in the 12-month period before index date (baseline) and 12-month period following index date (follow-up) using difference-in-difference (DID) analysis."
- ➢ "Results for opioid use were stratified by those with and without baseline opioid use."

Results

- ➢ Acupuncture treatment group resulted in lower patient use of post-index opioid use for those "with (49.2% vs 56.5%, P < .001) and without (15.9% vs 22.6%, P < .001) baseline opioid use."
- ➢ Acupuncture use resulted in a lower number of emergency department visits (DID -4.6% for all-cause; -3.3% for pain-related, all P < .001).
- ➢ A small increase in invasive surgical procedures occurred with the acupuncture group (3.1% vs 2.8%, P = .006).
- ➢ Acupuncture use resulted in higher total medical and pharmacy costs (DID +$1331 per patient, P = .006).

Conclusions

- ➢ Acupuncture reduced opioid use and emergency department visits.

- 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. *JAMA Surg.* 2017; 152(10): e172872.
  DOI: 10.1001/jamasurg.2017.2872

Objective

- ➢ Perform a systematic review and meta-analysis of the evidence for nonpharmacological treatment options for postoperative pain management after total knee arthroplasty.

Methods

- ➢ MEDLINE (PubMed), EMBASE (OVID), Cochrane Central Register of Controlled Trials (CENTRAL), Cochrane Database of Systematic Reviews, Web of Science (ISI database), Physiotherapy Evidence (PEDRO) database, and ClinicalTrials.gov were searched for randomized clinical trials comparing nonpharmacological interventions with other interventions in combination with standard care for total knee arthroplasty between January 1946 and April 2016.
- ➢ Three independent reviewers extracted data and assessed risk of bias.
- ➢ "A random-effects model was used for the analyses."
- ➢ Primary outcomes assessed: postoperative pain and consumption of opioids and analgesics.

Results

- ➢ 39 randomized clinical trials were included (out of 5,509 located) involving 2,391 patients.

- The most common interventions studied were continuous passive motion, preoperative exercise, cryotherapy, electrotherapy, and acupuncture.
- Moderate evidence for electrotherapy use to reduce opioid use (mean difference, −3.50; 95% CI, −5.90 to −1.10 morphine equivalents in milligrams per kilogram per 48 hours; $P = .004$; $I^2 = 17\%$)
- Moderate evidence that acupuncture delayed opioid use (mean difference, 46.17; 95% CI, 20.84 to 71.50 minutes to the first patient-controlled analgesia; $P < .001$; $I^2 = 19\%$)
- Low certainty, but statistically significant evidence for acupuncture reducing pain (mean difference, −1.14; 95% CI, −1.90 to −0.38 on a visual analog scale at 2 days; $P = .003$; $I^2 = 0\%$)
- Very low-certainty evidence for cryotherapy use to reduce opioid use (mean difference, −0.13; 95% CI, −0.26 to −0.01 morphine equivalents in milligrams per kilogram per 48 hours; $P = .03$; $I^2 = 86\%$)
- Very low-certainty evidence for cryotherapy use to reduce pain (mean difference, −0.51; 95% CI, −1.00 to −0.02 on the visual analog scale; $P < .05$; $I^2 = 62\%$)
- Low-certainty or very low-certainty evidence for continuous passive motion (mean differences −0.05 (95% CI, −0.35 to 0.25) on the visual analog scale ($P = .74$; $I^2 = 52\%$) and 6.58 (95% CI, −6.33 to 19.49) opioid consumption at 1 and 2 weeks ($P = .32$, $I^2 = 87\%$) to reduce pain and opioid consumption
- Low-certainty or very low-certainty evidence for preoperative exercise (mean difference −0.14 (95% CI, −1.11 to 0.84) on the Western Ontario and McMaster Universities Arthritis Index Scale ($P = .78$, $I^2 = 65\%$) to reduce pain and opioid consumption

Conclusions

- Electrotherapy and acupuncture after total knee arthroplasty surgery are associated with reduced and delayed opioid consumption.

Acupuncture for Opioid Addiction Treatment

- Wen H, Wei X, Ge S, Zeng J, Luo W, Chen R, Dong Y, Xiao S, Lai Y, Lu L. Clinical and economic evaluation of acupuncture for opioid-dependent patients receiving methadone maintenance treatment: the integrative clinical trial and evidence-based data. *Front Public Health.* 2021;9:1-12.

Objective

- The objective of this study was to determine the "clinical and economic effects" of acupuncture for methadone maintenance treatment (MMT) patients.

Methods

- ➢ The study was conducted in China in 2019, as a parallel-arm RCT, in which patients received acupuncture and MMT (exposed group) or just MMT (control group).
- ➢ Outcome assessments used included the following: daily methadone dosage, VAS score for drug cravings, Pittsburgh Sleep Quality Index (PSQI), and quality-adjusted life years (QALYs).

Results

- ➢ 123 participants were involved in the study.
- ➢ Those receiving acupuncture and MMT had significantly improved daily methadone dosage, VAS, and PSquality of lifeQI and these were shown to be "economically efficient."
- ➢ QALY as well as cost was higher for the treatment group than the control group.

Conclusion

- ➢ The authors concluded that acupuncture serves as an effective, cost-effective "adjuvant therapy" for MMT patients, "reducing the dosage of methadone, improving drug cravings, and alleviating insomnia," as well as improving quality of life.

- Jackson HJ, Walters J, Raman R. Auricular acupuncture to facilitate outpatient opioid weaning: a randomized pilot study. *Med Acupunct.* 2021;33(2):153-158. DOI: 10.1089/acu.2020.1450

Objective

- ➢ The objective of this study was "to integrate acupuncture within the standard of care during outpatient opioid tapering and assess impact of this treatment on cumulative withdrawal symptoms, psychologic distress, and pain."

Methods

- ➢ The study was a prospective randomized controlled pilot project involving use of the NADA protocol during outpatient opioid tapering and standard of care.

- ➢ Nine participants were randomized into the NADA group with opioid tapering and 6 participants were randomized into the standard of care for opioid tapering group.
- ➢ Outcome assessment measures included the following: the hospital anxiety and depression scale (HADS) measured psychological distress, the clinical institute narcotic assessment (CINA) measured subjective withdrawal symptoms, and the numerical rating scale (NRS) measured pain levels.

Results

- ➢ Anxiety was higher and depression was lower in the acupuncture group versus standard of care group.
- ➢ The standard of care group had greater withdrawal symptoms and higher pain levels.
- ➢ However, "there were no statistically significant differences among the standard of care and acupuncture groups."

Conclusions

- ➢ Although the impact of acupuncture treatment was not statistically significant compared with the standard of care group, researchers suggested that the auricular acupuncture NADA protocol can be easily and effectively incorporated into standard of care for opioid tapering.
- ➢ Due to the small size of this study, future larger studies are recommended to determine treatment effects.

- Chen Z, Wang Y, Wang R, Xie J, Ren Y. Efficacy of acupuncture for treating opioid use disorder in adults: a systematic review and meta-analysis. *Evid Based Complement Altern Med.*

Objective

- ➢ To assess the effectiveness of acupuncture to treat opioid use disorder (OUD).

Methods

- ➢ A systematic review of existing literature was performed by searching the following databases: PubMed, Cochrane Central Register of Controlled Trials (CENTRAL), Embase, PsycINFO, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science, ProQuest Dissertation and Teses, Allied and Complementary Medicine Database

(AMED), Clinicaltrials.gov, and who.int/trialsearch through December 23, 2017.

- ➢ Cochrane risk of bias assessment tool and the GRADE approach were used to assess studies for inclusion
- ➢ Statistical meta-analyses were conducted by RevMan 5.3.

Results

- ➢ Nine studies involving 1,063 participants were included.
- ➢ Acupuncture was more useful than no treatment or sham treatment to reduce opioid craving (MD -2.18, 95% CI -3.10 to -1.26), insomnia (MD 2.31, 95% CI 1.97 to 2.65), and depression (SMD -1.50, 95% CI -1.85 to -1.15).
- ➢ Electroacupuncture did a better job than sham electroacupuncture or TEAS to alleviate craving (SMD -0.50, 95% CI -0.94 to -0.05) and depression (SMD -1.07, 95% CI -1.88 to -0.25).
- ➢ TEAS alleviated symptoms of insomnia (MD 2.31, 95% CI 1.97 to 2.65) and anxiety (MD -1.26, 95% CI -1.60 to -0.92) compared to no treatment/sham TEAS.

Conclusion

- ➢ There is evidence supporting the use of acupuncture for treating opioid use disorder.
- ➢ There is evidence for the use of electroacupuncture to relieve opioid cravings and depression.
- ➢ There is evidence for the use of TEAS to reduce insomnia and anxiety symptoms.
- ➢ "Conclusions were limited due to the low-quality and small number of included studies."

- Wu SL, Leung AW, Yew DT. Acupuncture for detoxification in treatment of opioid addiction. *East Asian Arch Psychiatry.* 2016;26:70-76.

Summary

- ➢ Acupuncture as opioid addiction treatment has been studied in terms of relief withdrawal (animal studies), relief withdrawal (clinical studies), opioid withdrawal sleep disturbance, opioid withdrawal craving, and acupuncture as adjuvant to standard opioid withdrawal treatments.

Conclusions

- ➢ Acupuncture electrostimulation at 2 Hz increases endorphin and enkephalin production and at 100Hz increases dynorphin production.
- ➢ 100 Hz electroacupuncture stimulation suppresses opioid withdrawal, possibly at the spinal level.
- ➢ "Meta-analysis of clinical trials indicated the potential of acupuncture as a treatment for opioid-associated depression and anxiety, but no statistically significant beneficial effect was reported for opioid craving."
- ➢ Electroacupuncture (both 100 Hz and 2 Hz) in animal studies for opioid withdrawal sleep disturbance "significantly increased REM sleep, NERM sleep, and total sleep time."
- ➢ Acupuncture reduced craving, or "drug-seeking behavior" and "was reversed by pretreatment with selective GABA antagonists, suggesting mediation of morphine craving through the GABAergic pathway.
- ➢ Acupuncture as adjuvant to usual care "demonstrated considerable potential" but was not "superior to pharmacological treatment."

Acupuncture for Pain

- McDonald J, Janz S. The acupuncture evidence project: a comparative literature review. Australian Acupuncture and Chinese Medicine Association. January 2017.

Objectives

- ➢ To perform a systematic review and meta-analysis of the evidence supporting acupuncture to treat a pain conditions

Methods

- ➢ Literature reviews for the Australian Department of Veterans' Affairs (DVA) in 2010, United States Department of Veterans Affairs (USVA) in 2013, literature review of systematic reviews and meta-analyses March 2013 - September 2016, plus three reviews October 2016 - January 2017 pooled for analysis
- ➢ Studies' evidence levels rated using the Australian National Health and Medical Research Council (NHMRC) levels and when possible risk bias rated using Cochrane's GRADE system
- ➢ Outcomes included "changes in evidence level over time, as well as current state of evidence by clinical area."

Results

- ➢ 122 conditions reviewed
- ➢ "Evidence of effect" found for 117 conditions
- ➢ No evidence of effect found for five conditions
- ➢ Level of "evidence of effect" increased for 24 conditions over time

Conclusions

- ➢ Positive acupuncture treatment effect for eight conditions: migraine prophylaxis, headache, chronic low back pain, allergic rhinitis, knee osteoarthritis, chemotherapy-induced nausea/vomiting, post-operative nausea/vomiting, and post-operative pain.

- ➢ Cost-effectiveness identified for 10 conditions: allergic rhinitis, ambulatory anesthesia, chronic pain, depression, dysmenorrhea, headache, low back pain, migraine, neck pain, osteoarthritis, and post-operative nausea and vomiting.

- ➢ Evidence of safety identified for acupuncture in general prior to this review, as well as nine conditions: allergic rhinitis, ambulatory anesthesia, Alzheimer's disease, cancer-related psychological symptoms, depression, low back pain, migraine, knee osteoarthritis, and prostatitis pain/chronic pelvic pain syndrome.

- Hempel S, Shekelle PG, Taylor SL, Solloway MR. The evidence map of acupuncture. Department of Veterans Affairs VA-ESP Project #05-226. January 2014. https://www.hsrd.research.va.gov/publications/esp/acupuncture.pdf

Objective

- ➢ To perform a systematic review and meta-analysis of the evidence supporting acupuncture to treat a pain conditions
- ➢ To create an evidence map providing a visual overview of the evidence distribution for acupuncture (what is known and where there is little or no evidence base)
- ➢ To create executive summaries to assist stakeholders interpretations of the acupuncture evidence base to inform policy and clinical decision making

Methods

- ➢ Systematic review of English-language systematic reviews and new RCTs since 2005 involving adult acupuncture for any condition

- PubMed, the Database of Abstracts of Reviews of Effects (DARE), the Cochrane Library of Systematic Reviews, the Allied and Complementary Medicine (AMED) database, PROSPERO database searched in March 2013
- Reviews identified for inclusion grouped into categories: pain, wellness, mental health, other indications, and adverse events.
- Evidence "distilled into a visual overview … using a [3-dimensional] bubble plot format," showing "the estimated literature size (y-axis), the estimated treatment effect (x-axis), and the confidence in the reported effect (bubble size)."

Results

- 1,223 studies electronically located, of which 183 met inclusion criteria (65 for pain, 44 for wellness, 20 for mental health, and 49 for "other")

Conclusions

- Strong evidence of a positive effect from acupuncture found for headaches, chronic pain, and migraines
- Potential positive effects found for dysmenorrhea, osteoarthritis, general pain, cancer pain, labor pain, prostatitis, temporomandibular pain, plantar heel pain, pregnancy pain, and ankle sprain
- Unclear, but high-level, evidence found for back and neck pain
- Unclear evidence found for surgery analgesia, post-operative pain, fibromyalgia, shoulder pain, and rheumatoid arthritis
- No evidence found for effectiveness with carpal tunnel

- Vickers AJ, Vertosick EA, Lewith G, MacPherson H, Foster NE, Sherman KJ, Irnich D, Witt CM, Line K. Acupuncture for chronic pain: update of an individual patient data Meta-analysis. *J Pain.* 2018 May;19(5):455-474. DOI: 10.1016/j.jpain.2017.11.005.

Objective

- To update a 2012 "individual patient data meta-analysis to determine the effect size of acupuncture for 4 chronic pain conditions."

Methods

- MEDLINE and the Cochrane Central Registry of Controlled Trials were searched for randomized trials involving acupuncture for chronic pain published through December 31, 2015; 13 additional trials were included.

- "Randomized trials of acupuncture needling versus either sham acupuncture or no acupuncture control for nonspecific musculoskeletal pain, osteoarthritis, chronic headache, or shoulder pain" were included.
- Studies were only included if "allocation concealment was unambiguously determined to be adequate."
- Raw data collected from original studies' authors was used in an individual patient data meta-analysis
- Primary outcome assessment measures: pain and function

Results

- 39 studies involving data for 20,827 patients
- Acupuncture was found to be more effective than sham or no acupuncture for all four conditions (all $P < .001$)
- The authors reported "clear evidence that the effects of acupuncture persist over time with only a small decrease, approximately 15%, in treatment effect at 1 year."
- No relationship was found between the trial outcomes and acupuncture treatment characteristics
- Acupuncture effect sizes were related to the type of control group (smaller effects sizes for sham controlled trials that used a penetrating needle; smaller effect sizes for trials with high intensity of control arm intervention)

Conclusion

- "Acupuncture is effective for the treatment of chronic pain, with treatment effects persisting over time."
- "Although factors in addition to the specific effects of needling at correct acupuncture point locations are important contributors to the treatment effect, decreases in pain after acupuncture cannot be explained solely in terms of placebo effects."
- "Variations in the effect size of acupuncture in different trials are driven predominantly by differences in treatments received by the control group rather than by differences in the characteristics of acupuncture treatment."

Acupuncture for Acute Pain

- Zhu F, Yin S, Zhu X, Che D, Li Z, Zhong Y, Yan H, Gan D, Yang L, Wu X, Li L. Acupuncture for relieving abdominal pain and distension in acute pancreatitis: a systematic review and meta-analysis. *Front Psychiatry*. 2021;12:Article 786401. DOI: 10.3389/fpsyt.2021.786401

Objective

- ➢ To study acupuncture's safety and efficacy for treating abdominal pain and distention in acute pancreatitis

Methods

- ➢ A literature review was performed by searching PubMed, Web of Science, Embase, Cochrane Library, CNKI, Wanfang, VIP, and China Biomedical Literature databases for randomized controlled trials involving acupuncture plus routine treatment (RT) vs RT alone or RT plus sham acupuncture.
- ➢ Primary outcomes assessed were "total effectiveness rate, VAS scores for abdominal pain and distension, and time until relief of abdominal pain and distension." Secondary measures were "time until recovery of bowel sound, time until first defecation, length of hospital stay, and APACHE II score."

Results

- ➢ Nineteen studies involving 1,503 participants were included
- ➢ Acupuncture plus RT produced significant increase in total effectiveness rate [risk ratio: 1.15; 95% confidence interval (CI): 1.06–1.24; $P = 0.001$]
- ➢ Acupuncture reduced VAS scores for abdominal pain [weighted mean difference (WMD): −1.45; 95% CI: −1.71 to −1.19; $P < 0.0001$] and for abdominal distension (WMD: −0.71; 95% CI: −1.04 to −0.37; $P < 0.0001$)

Conclusion

- ➢ Acupuncture plus RT reduced abdominal pain and distention in patients with acute pancreatitis better than RT alone.

- Zhang K, Gao C, Li C, Li Y, Wang S, Tang Q, Zhao C, Zhai J. Acupuncture for acute pancreatitis: a systematic review and meta-analysis. *Pancreas*. 2019;48(9):1136-1147. DOI: 10.1097/MPA.0000000000001399

Objective

- ➢ To determine the safety and efficacy of acupuncture plus routine treatment (RT) for acute pancreatitis (AP).

Methods

- ➢ Researchers searched 8 databases through October 31, 2018 for randomized controlled trials involving acupuncture plus routine care or just routine care for acute pancreatitis.

Results

- ➢ Twelve studies were included in the final analysis.
- ➢ Acupuncture plus RT versus RT alone significantly improved total effectiveness rate and gastrointestinal function and reduced "acute physiology, Age, Chronic Health Evaluation II score, tumor necrosis factor α count," the time until resumption of regular diet, and length of stay in the hospital.
- ➢ 3 studies reported minor adverse events or reactions.

Conclusions

- ➢ Evidence supports the use of acupuncture with RT for acute pancreatitis.
- ➢ More rigorously designed randomized controlled trials are needed.

Acupuncture for Acute Low Back Pain

- Su X, Qian H, Chen B, Fan W, Xu D, Tang C, Lu L. Acupuncture for acute low back pain: a systematic review and meta-analysis. *Ann Palliat Med.* 2021;10(4):3924-3936. DOI: 10.21037/apm-20-1998 http://dx.doi.org/10.21037/apm-20-1998

Objective

- ➢ To perform a critical analysis of acupuncture for low back pain

Methods

- ➢ A literature review for randomized controlled trials (RCTs) for acupuncture to treat low back pain (LBP) was performed using English and Chinese databases up to May 2020.
- ➢ Cochrane Collaboration's RevMan 5.3 was used to analyze data on pain intensity, functional status, and analgesic use outcomes.

Results

- ➢ Thirteen RCTs met inclusion criteria.
- ➢ Eleven RCTs involving 707 participants demonstrated "moderate-quality evidence that acupuncture has a statistically significant association with improvements in VAS (visual analog scale) score" [MD: −1.75 (95% CI: −2.39, −1.12)].
- ➢ Two studies showed no impact upon RMDQ (Roland-Morris Disability Questionnaire) scores for low back pain effects on functional activities compared with the control [MD: −2.34 (95% CI: −5.34, 0.67)].
- ➢ Three studies showed that acupuncture impacted the ODI (Oswestry Disability Index) low back pain scores compared with the control [MD: −12.84 (95% CI: −23.94, −1.74)].
- ➢ Two studies demonstrated that acupuncture "influenced the number of pills more than the control treatment" [MD: −3.19 (95% CI: −3.45, −2.92)].

Conclusions

- ➢ The use of acupuncture for treating low back pain showed "modest improvements in the VAS score, ODI score, and the number of pills, but not the RMDQ score."

- Cho Y-H, Kim C-K, Heo K-H, Lee MS, Ha I-H, Son DW, Choi BK, Song G-S, Shin B-C. Acupuncture for acute postoperative pain after back surgery: a systematic review and meta-analysis of randomized controlled trials. *Pain Pract.* 2015;15(3):279-91. DOI: 10.1111/papr.12208. Epub 2014 Apr 28.

  Objective

  - ➢ To perform a systematic review evaluating the effectiveness of acupuncture for acute postoperative pain (≤1 week) after back surgery

  Methods

  - ➢ A literature review was performed by searching fifteen databases without language restriction.
  - ➢ Two independent reviews examined studies for eligibility and then data, outcomes, and bias risk were obtained in order to perform meta-analyses and subgroup analyses.

  Results

  - ➢ Five studies met the inclusion criteria. Three of these were high-quality.
  - ➢ Acupuncture for acute post-operative pain showed beneficial impact on "visual analogue scale (VAS) for pain intensity 24 hours after surgery" compared with sham acupuncture (standard mean difference -0.67 (-1.04 to -0.31), P = 0.0003), but not for 24-hour opiate demands compared with sham acupuncture (standard mean difference -0.23 (-0.58 to 0.13), P = 0.21).

  Conclusion

  - ➢ "Encouraging but limited evidence [exists] for the effectiveness of acupuncture treatment for acute postoperative pain after back surgery"

- Lee J-H, Choi T-Y, Lee MS, Lee H, Shin B-C, Lee H. Acupuncture for acute low back pain: a systematic review. *Clin J Pain*. 2013;29(2):172-85. DOI: 10.1097/AJP.0b013e31824909f9..

  Objective

  - ➢ To perform a systematic review of the evidence regarding use of acupuncture to treat acute low back pain

Methods

- ➢ Researchers performed a literature review by searching Medline, Central, Embase, 2 Chinese databases, relevant journals, and trial registries for randomized controlled trials involving acupuncture for the treatment of acute/subacute low back pain
- ➢ Risk of bias was assessed using the Cochrane Back Review Group assessment tool; two independent researchers assessed intervention quality.

Results

- ➢ Eleven RCTs involving 1,139 participants were included for analysis.
- ➢ Compared with nonsteroidal anti-inflammatory drugs (NSAIDs), acupuncture more effectively relieved acute low back pain in 5 studies; risk ratio, 1.11; 95% confidence interval: 1.06, 1.16).
- ➢ Acupuncture was more effective than sham acupuncture for pain relief (2 studies; mean difference, -9.38; 95% confidence interval: -17.00, -1.76), but was not more effective for function/disability.

Conclusion

- ➢ "Acupuncture may be more effective than medication for symptom improvement or relieve pain better than sham acupuncture in acute LBP."

Acupuncture for Chronic Low Back Pain

- Wang L, Yin Z, Zhang Y, Sun M, Yu Y, Lin Y, Zhao L. Optimal acupuncture methods for nonspecific low back pain: a systematic review and bayesian network meta-analysis of randomized controlled trials. *J Pain Res.* 2021;14 1097–1112. DOI https://doi.org/10.2147/JPR.S310385

Methods

- ➢ Two experienced acupuncturists served as reviewers to conduct independent, blind assessments of acupuncture treatment in the included trials using 8 assessment items "developed from the previous Cochrane review and the updated STRICTA recommendations to assess adequacy of treatment."

Results

- ➢ 33 studies including 8,270 participants were included involving needling acupuncture with manual stimulation, moxa, or e-stim compared with controls of "sham intervention, no treatment, usual care, or other therapies."
- ➢ Primary outcome measures: 1) pain intensity: visual analogue scale (VAS), numeric rating scale (NRS), Chronic Pain Grade Classification-pain (CPGS-pain); 2) back-specific functional status: Roland Morris Disability Questionnaire (RMDQ), Oswestry Disability Index (ODI), Hannover Functional Ability Questionnaire (HFAQ); 3) Quality of life: 36- or 12-item Short Form Health Survey (SF-36, SF-12)
- ➢ Secondary outcome measures: 1) Pain-related disability: pain disability index (PDI); 2) work-related: sick leave days, work status, absenteeism, presenteeism, productivity; 3) Global assessment of therapy effectiveness 4) Adverse events
- ➢ Follow-up timing: 1) Immediately: 0-7 days after treatments; 2) Short-term: 8 days - 3 months after treatments; 3) Intermediate: 4 months - 1 year after treatments

Conclusions

- ➢ "Acupuncture was more effective than no treatment in improving pain and function in the immediate term."
- ➢ When comparing acupuncture to usual care, acupuncture may improve immediate and short-term physical quality of life.
- ➢ Acupuncture was not found to be more effective than sham for pain relief immediately after treatment or short-term quality of life.
- ➢ Acupuncture was not found to be more effective than sham for back function immediately after treatment.

- Xiang Y, He JY, Tian HH, Cao BY, Li R. Evidence of efficacy of acupuncture in the management of low back pain: a systematic review and meta-analysis of randomised placebo- or sham-controlled trials. *Acupunct Med.* 2020. Internet *ISSN:* 1759-9873.

Objectives

- ➢ To determine the efficacy of acupuncture for treating non-specific low back pain (NSLBP) and to compare this therapy with sham or placebo controls

Methods

- ➢ The following databases were searched: Cochrane CENTRAL to December 2016, and PubMed, MEDLINE and Embase from 1980 through December 2016.
- ➢ Only randomized controlled trials involving acupuncture to treat adults with NSLBP were included.
- ➢ Only studies using placebo/sham controls were included.
- ➢ "The trials were combined using meta-analysis when the data reported allowed for statistical pooling."

Results

- ➢ Fourteen trials involving 2,110 participants were included; 9 were able to be included in the meta-analysis.
- ➢ After treatment acupuncture produced "*statistically significant differences in pain reduction*" as compared with sham or placebo (standardized mean difference (SMD) −0.40, 95% CI −0.54 to −0.25; I2 7%; 753 participants;9 studies), but *no differences in function* (weighted mean difference (WMD) −1.05, 95% CI −3.61 to 1.52;I2 79%; 462 participants; 4 studies).
- ➢ At follow-up, acupuncture produced significant differences in *pain reduction* (SMD −0.46, 95%CI−0.82 to −0.09; I2 67%), but *no differences in function* (WMD −0.98, 95%CI −3.36 to 1.40; I2 87%).

Conclusion

- ➢ Moderate-level evidence exists for the efficacy of acupuncture in reducing pain both after treatment and at follow-up for subacute and chronic non-specific low back pain as compared with sham and placebo controls.

- Liu L, Skinner M, McDonough S, et al. Acupuncture for low back pain: an overview of systematic reviews. *Evid Based Complement Alternat Med.* 2015;328196.

Objective

- ➢ "to critically appraise the evidence from relevant systematic reviews"

Methods

- ➢ Systematic reviews of randomized controlled trials (RCTs) involving acupuncture for low back pain were searched in seven databases and conclusions were drawn based on narrative summaries.

Results

- ➢ Sixteen systematic reviews included with low quality methodology and weak external validity
- ➢ Evidence that acupuncture has a more favorable effect than sham acupuncture in relieving acute low back pain and function was inconsistent.
- ➢ Evidence consistently demonstrated that acupuncture provides short-term clinically relevant benefits for chronic low back pain relief and function when compared with no treatment or acupuncture plus a conventional treatment.

Conclusion

- ➢ Acupuncture along or with another conventional therapy, "provides short-term improvements in pain and function for chronic [low back pain] LBP."

- Lam M, Galvin R, Curry P. Effectiveness of acupuncture for non-specific chronic lower back pain: a systematic review and meta-analysis. *Spine. (Phila Pa 1976).* 2013; 38(24):2124-2138.

Objective

- ➢ To evaluate all available evidence examining the effectiveness of acupuncture for nonspecific chronic low back pain (NSCLBP)

Methods

- ➢ Systematic review and meta-analysis of randomized controlled trials (RCTs) for nonspecific chronic low back pain without date or language restrictions up to May 2012
- ➢ The Cochrane risk of bias tool was used to assess methodological quality of each study. Outcome measures: impairment, activity limitation, and participation restriction.

Results

- ➢ Twenty-five out of 32 studies yielded data for the meta-analysis.
- ➢ Acupuncture reduced self-reported pain (mean difference =-16.76 [95% confidence interval, -33.33 to -0.19], P = 0.05, I = 90%) compared with sham.

- Acupuncture improved function (standard mean difference =-0.94 [95% confidence interval, -1.41 to -0.47], P < 0.00, I = 78%) compared with no treatment immediately after treatment.
- Acupuncture/electro-acupuncture plus usual care improved functional levels.
- Acupuncture compared with medications (NSAIDs, muscle relaxants, and analgesics) and usual care yielded statistically significant differences between treatment groups and the controls, but these were not clinically meaningful.

Conclusion

- "Acupuncture may have a favorable effect on self-reported pain and functional limitations on [nonspecific chronic low back pain] NSCLBP."

Acupuncture for Chronic Neck Pain

- Seo SY, Lee K-B, Shin J-S, Lee J, Kim M-R, Ha I-H, Ko Y, Lee YJ. Effectiveness of acupuncture and electroacupuncture for chronic neck pain: a systematic review and meta-analysis. *Am J Chin Med*. 2017;45(8):1573-1595. DOI: 10.1142/S0192415X17500859. Epub 2017 Nov 9.

Objective

- To examine the evidence from randomized controlled trials (RCTs) regarding the safety and effectiveness of acupuncture and electroacupuncture for chronic neck pain

Methods

- A literature review was performed by searching nine Chinese, Japanese, and Korean databases through July 2016 for studies involving acupuncture or electroacupuncture to treat adults with chronic neck pain.
- Outcome assessment tools used were "pain intensity, disability, quality of life (QoL) and adverse effects."

Results

- Sixteen randomized controlled trials were selected for inclusion.
- Acupuncture group versus active control did not yield significant differences in pain (SMD 0.24, 95% CI [Formula: see text]0.27-0.75), disability (SMD 0.51, 95% CI [Formula: see text]0.01-1.02), or QoL (SMD [Formula: see text]0.37, 95% CI [Formula: see text]1.09-0.35).

- Acupuncture plus control group showed "significantly higher relief of pain in studies with unclear allocation concealment (SMD [Formula: see text]1.78, 95% CI [Formula: see text]2.08-[Formula: see text]1.48), but did not show significant relief of pain in studies with good allocation concealment (SMD [Formula: see text]0.07, 95% CI [Formula: see text]0.26-0.12)."
- Electroacupuncture both compared to the control and added to the control yielded significant pain relief.
- There were no serious adverse events.
- Acupuncture compared with conventional medicine "have similar effectiveness on pain and disability"; acupuncture plus conventional medicine provided even greater pain relief.

Acupuncture for Post-Operative Pain

Park S, Lyu YR, Park SJ, Oh MS, Jung IC, Lee E-J. Electroacupuncture for post-thoracotomy pain: a systematic review and meta-analysis. *PLoS ONE*. 2021;16(7): e0254093. https://doi.org/10.1371/journal.pone.0254093 July 7, 2021

Objective

To evaluate the effect of electroacupuncture on post-thoracotomy pain.

Methods

- A systematic review was performed by searching PubMed, Cochrane Library, EMBASE, MEDLINE Complete, Google Scholar, China National Knowledge Infrastructure (CNKI), Korean Medical Database (KMBASE), Korean-studies Information Service System (KISS), and OASIS for randomized controlled trials. No language restriction was used.
- Quality assessment was performed using the Cochrane risk-of-bias tool
- Two outcome measures were assessed: pain score twenty-four hours after surgery and total opioid analgesics dose
- Meta-analysis was performed using RevMan 5.3.

Results

- Researchers located 11 randomized controlled trials that met inclusion criteria.
- Electroacupuncture showed a standard mean difference of -0.98 (95% CI: -1.62 to -0.35) compared to sham acupuncture for pain score twenty-four hours after surgery.

- Electroacupuncture showed a standard mean difference of -0.94 (95% CI: -1.33 to -0.55) compared to conventional analgesia.
- Electroacupuncture showed a standard mean difference of -0.95(95% CI: -1.42 to -0.47) compared to sham acupuncture for total dose of opioid analgesics.
- Electroacupuncture had a standard mean difference of -1.96 (95% CI: -2.82 to -1.10) compared to conventional analgesia.

Conclusions

- Electroacupuncture may be effective for relieving pain for post-thoracotomy patients.

- "Due to low quality and high heterogeneity of existing data, further rigorously designed studies should be performed."

Wu M-S, Chen K-H, Chen I-F, Huang SK, Tzeng P-C, Yeh M-L, Lee F-P, Lin J-G, Chen C. The efficacy of acupuncture in post-operative pain management: a systematic review and meta-analysis. *PLoS One*. 2016;11(3):e0150367. DOI: 10.1371/journal.pone.0150367. eCollection 2016.

Background

- **"**Postoperative pain resulting from surgical trauma is a significant challenge for healthcare providers. Opioid analgesics are commonly used to treat postoperative pain; however, these drugs are associated with a number of undesirable side effects."

Objective

- **"**This systematic review and meta-analysis evaluated the effectiveness of acupuncture and acupuncture-related techniques in treating postoperative pain."

Methods

- Literature review performed by searching MEDLINE, Cochrane Library, and EMBASE databases through September 2014 for randomized controlled trials involving acupuncture, electroacupuncture, or transcutaneous electrical acupoint stimulation (TEAS) for adults with acute post-operative pain

Results

- "Patients treated with acupuncture or related techniques had less pain and used less opioid analgesics on Day 1 after surgery compared with those treated with control ($P < 0.001$)."
- "Sensitivity analysis … indicated the findings are reliable and are not dependent on any one study."
- "No publication bias was detected."
- Acupuncture and transcutaneous electric acupoint stimulation (TEAS) yielded less postoperative pain on the day after surgery compared with control
- Electroacupuncture provided pain management similar to the control ($P = 0.116$).
- TEAS resulted in "significantly greater reduction in opioid analgesic use on day 1 post surgery than control ($P < 0.001$)"
- Acupuncture and electroacupuncture did not reduce opioid analgesic use compared with control ($P \geq 0.142$) in this study

Conclusion

- Acupuncture improves postoperative pain on the day after surgery and transcutaneous electrical acupoint stimulation reduces opioid use.

Acupuncture/Acupressure for Labor Pain

Chen Y, Xiang X-Y, Howe K, Chin R, Gao J, Wu J, Lao L, Chen H. Acupressure for labor pain management: a systematic review and meta-analysis of randomized controlled trials. *Acupunct Med.* 2021;39(4):243-252. DOI: 10.1177/0964528420946044

Objective

- To compare the effectiveness of acupressure, sham acupressure, and usual care for labor and delivery.

Methods

- A literature review was performed by searching ten databases through January 31, 2018.
- Two independent reviewers pulled data related to acupressure for the following outcomes: pain intensity, labor duration, mode of delivery, use of medications and adverse events.
- Meta-analysis was performed using RevMan 5.3.

- "Pooled standardized mean differences (SMDs) or odds ratios (ORs) were estimated" … "with a fixed or random effects model, according to the heterogeneity."

Results

- 13 studies including 1,586 participants were included in the analysis.
- "Acupressure plus standard procedures (ASP) for labor management significantly reduced pain sensation, compared with sham acupressure plus standard procedures (SASP) and standard procedures (SP) alone."
- "The analgesic effect of acupressure was immediate and persisted for at least 60 min (all $p < 0.01$)."
- Acupressure resulted in a shorter duration of labor, especially the first stage of labor (SMD = -0.76, 95% confidence interval (CI) = -1.10 to -0.43; $p < 0.001$; $I2 = 74\%$) and second stage of labor (SMD = -0.37, 95% CI = -0.59 to -0.18; $p < 0.001$; $I2 = 0\%$) compared with usual care.
- Acupressure related to reducing Cesarean section rate was inconclusive.
- There was no statistical difference in use of oxytocin and analgesics among the ASP, SASP and SP groups.
- No adverse events were reported in these studies.

Conclusions

- There is moderate evidence supporting the use of acupressure for labor pain and duration.
- More high-quality trials are needed to verify these results.

Smith CA, Collins CT, Levett KM, Armour M, Dahlen HG, Tan AL, Mesgarpour B. Acupuncture or acupressure for pain management during labour. *Cochrane Database Syst Rev.* 2020;2. Art. No.: CD009232. DOI: 10.1002/14651858.CD009232.pub2.

Objective

- "To evaluate the efficacy/effectiveness of acupressure as an adjunct to standard procedures during labor and delivery, compared with standard procedures with/without sham acupressure, in randomized controlled trials (RCTs)."

Methods

- A literature review for "published and unpublished randomised controlled trials (RCTs) comparing acupuncture or acupressure with placebo, no

treatment or other non-pharmacological forms of pain management in labour."

- ➢ Two reviewers performed independent assessments for "inclusion and risk of bias, extracted data and checked them for accuracy." GRADE was used to assess the quality of evidence.

Results

- ➢ 28 trials including 3,960 women (13 involving acupuncture, 15 involving acupressure)
- ➢ Pain intensity was measured using the visual analogue scale (VAS) of 0-10 or 0-100 (lower scores indicated lower pain).
- ➢ Acupuncture may be more effective than sham acupuncture for pain management and reduced analgesic pharmacological agents.
- ➢ Acupressure reduces pain intensity compared to "usual care."
- ➢ Acupressure decreases c-section rates compared to sham acupuncture.

Acupuncture for Dental Pain

de Matos NMP, Daniel Pach D, Xing JJ, Barth J, Beyer LE, Shi X, Kern A, Lukic N, Ettlin DA, Brugger M, Witt CM. Evaluating the effects of acupuncture using a dental pain model in healthy subjects − a randomized, cross-over trial. *J Pain*. 2020;21(3–4):440−454.

Objective

- ➢ To determine whether acupuncture can influence experimentally induced dental pain

Methods

- ➢ A newly validated human pain model was used to study the impact of acupuncture on dental pain.
- ➢ Manual verum (true) acupuncture, manual stimulation of a needle inserted at non-acupuncture points (sham acupuncture control), and a no acupuncture control were used to treat "experimentally induced dental pain in 35 healthy men."
- ➢ Participants were randomized into treatment groups.

- Outcomes measures included BORG CR10 pain ratings and autonomic responses (electrodermal activity and heart rate variability). Pre-intervention pain ratings and the trial sequence served as covariates.

Results

- Acupuncture compared to no acupuncture reduced pain intensity (b = .708, P = .002), equating to "a medium Cohen's d effect size of .56."
- Sham acupuncture was not statistically significantly different than acupuncture.

De Almeida TB, Zotelli VLR, Wada RS, Sousa MLR. Comparative analgesia between acupuncture and dipyrone in odontalgia. *J Acupunct Meridian Stud.* 2019;12(6):182e191.

Objective

- To compare the effectiveness of acupuncture to analgesics for toothache pain

Methods

- Double-blind randomized trial
- 56 participants with "toothache of pulpal origin with pain scale (Visual Analogue Scale) above 4, absence of medication for the pain, and aged over 18 years" were randomly divided into 4 groups: real acupuncture (with acupuncture needles), placebo acupuncture (non-piercing sham acupuncture devices), real dipyrone (tablet), and placebo dipyrone groups (tablet with no active ingredient).
- Treatments were given before dental procedures.
- Prior to treatment and after 20 minutes of treatment, saliva samples were collected and cortisol levels were analyzed, participants rated pain intensity using the VAS, and energy levels were measured using the Ryodoraku method.

Results

- The real acupuncture group had a greater reduction in VAS scores than with real dipyrone ($p<0.05$).

- There was no statistically significant difference in the groups' salivary cortisol and energy levels.

Conclusions

- "Acupuncture was more effective in reducing odontalgia than the dipyrone."
- The authors recommend using acupuncture as an alternative to pharmaceuticals for dental pain.

Acupuncture for Episodic Migraine Pain

Giovanardi CM, Cinquini M, Aguggia M, Allais G, Campesato M, Cevoli S, Gentili F, Matra A, Minozzi S. Acupuncture vs. pharmacological prophylaxis of migraine: a systematic review of randomized controlled trials. *Front Neurol.* 2020 Dec 15;11:576272. doi: 10.3389/fneur.2020.576272. eCollection 2020.

Objective

- **"**To assess the efficacy and safety of acupuncture for the prophylaxis of episodic or chronic migraine in adult patients compared to pharmacological treatment."

Methods

- A literature review was performed for randomized-controlled trials "published in western languages that compared any treatment involving needle insertion (with or without manual or electrical stimulation) at acupuncture points, pain points or trigger points, with any pharmacological prophylaxis in adult (≥18 years) with chronic or episodic migraine with or without aura according to the criteria of the International Headache Society."

Results

- Nine randomized trials involving 1,484 patients were analyzed.

- Acupuncture reduced the number of days with migraine per month: (SMD: -0.37; 95% CI -1.64 to -0.11).
- Acupuncture reduced migraine response rate (RR: 1.46; 95% CI 1.16-1.84).
- Acupuncture produced a moderate reduction of migraine pain intensity (SMD: -0.36; 95% CI -0.60 to -0.13).
- Acupuncture resulted in a large reduction in dropout rate due to any reason (RR 0.39; 95% CI 0.18 to 0.84) and dropout rate due to adverse events (RR 0.26; 95% CI 0.09 to 0.74).
- The quality of evidence was considered moderate for all outcomes.
- Treatment effects were still present at longest follow-up

Conclusions

- Acupuncture appears to be "mildly more effective and much safer than medication for the prophylaxis of migraine."

Linde K, Allais G, Brinkhaus B, et al. Acupuncture for the prevention of episodic migraine. *Cochrane Database Syst Rev.* 2016;(6):CD001218.

Objective

- To investigate the effectiveness of acupuncture compared with prophylactic treatment/routine care only, compared with sham (placebo) acupuncture; and compared with prophylactic treatment with drugs to reduce migraine headache frequency in adults with episodic migraine

Methods

- A literature review was performed of the Cochrane Central Register of Controlled Trials (CENTRAL: 2016, issue 1); MEDLINE (via Ovid, 2008 to January 2016); Ovid EMBASE (2008 to January 2016); and Ovid AMED (1985 to January 2016), PubMed through April 2016, and the World Health Organization (WHO) Clinical Trials Registry Platform through February 2016 for randomized trials that were at least eight weeks long comparing acupuncture with a no acupuncture (no prophylactic

treatment or routine care only), sham acupuncture, or prophylactic drug treatment in participants with episodic migraine.

- ➢ Two reviewers ensured study eligibility, extracted data, and assessed bias risk and quality of acupuncture treatment.
- ➢ The primary outcome measure was migraine frequency both after treatment and at follow-up; the secondary outcome measure was response showing at least 50% frequency of migraine reduction; safety outcome measures included the number of participants who left the study due to adverse events and the number of participants who reported at least one adverse event.
- ➢ Pooled effect size estimates were calculated using a fixed-effect model.
- ➢ Evidence was assessed using GRADE and 'Summary of findings' tables.

Results

- ➢ Twenty-two trials involving 4,985 participants were reviewed.
- ➢ In four trials, acupuncture plus usual care at migraine onset (usually painkillers) yielded 41/100 patients experiencing a 50% or greater reduction in headache frequency compared to 17/100 patients receiving usual care.
- ➢ In 15 trials, acupuncture treatment yielded 50/100 patients experiencing a 50% or greater reduction in headache frequency compared with sham acupuncture wherein 41/100 patients experienced a 50% or greater reduction in headache frequency.
- ➢ The results included "three good quality large trials (with about 1200 people) showing that the effect of true acupuncture was still present after six months."
- ➢ Real and sham acupuncture had no differences in the numbers of side effects or dropout numbers.
- ➢ Three trials compared acupuncture with a proven migraine treatment drug known to reduce migraine frequency. At 3 months, acupuncture yielded 57/100 patients experiencing a 50% or greater reduction in headache frequency compared with 46/100 patients receiving the drug; at 6 months acupuncture yielded 59/100 patients experiencing a 50% or greater reduction in headache frequency compared with 54/100 patients taking the drug.
- ➢ Acupuncture patients experienced fewer side effects and were less likely to drop out of the study than patients taking the drugs
- ➢ The evidence quality was moderate.

Conclusions

- ➢ Acupuncture can be used as an alternative to usual care for the treatment of migraine headaches

Zhao L, Chen J, Li Y, Sun X, Chang X, Zheng H, Gong B, Huang Y, Yang M, Wu X, Li X, Liang F. The long-term effect of acupuncture for migraine prophylaxis: a randomized clinical trial. *JAMA Intern Med*. 2017;177(4):508-515. DOI:10.1001/jamainternmed.2016.9378

Objective

- ➢ To investigate the long-term effects of true acupuncture compared with sham acupuncture and being placed in a waiting-list control group for migraine prophylaxis

Methods

- ➢ A 24-week randomized clinical trial (4 weeks of treatment and 20 weeks of follow-up) was conducted from Oct 2012 - Sept 2014 at 3 Chinese clinical outpatient settings.
- ➢ Participants were randomly assigned to the following groups: true acupuncture (treatment 5 days per week for 4 weeks), sham acupuncture (treatment 5 days per week for 4 weeks), or a wait-list control group (20 free acupuncture treatments provided at the end of the trial).
- ➢ 249 participants ages 18-65 years old who experienced "migraine without aura based on the criteria of the International Headache Society, with migraine occurring 2 to 8 times per month" were included in the study.
- ➢ Primary outcome measures included frequency of migraine episodes from baseline to 16 weeks; secondary outcome measures included "migraine days, average headache severity, and medication intake every 4 weeks within 24 weeks."

Results

- ➢ 249 patients ages 18 to 65 years old participated in the study. 189 (77.1%) of them were female.

- There were statistically significant differences in the mean (SD) change in frequency of migraine episodes among the 3 groups at 16 weeks (P < .001).
- The mean (SD) frequency of migraine episodes decreased by 3.2 (2.1) in the acupuncture group, by 2.1 (2.5) in the sham acupuncture group, and by 1.4 (2.5) in the wait-list group.
- Acupuncture produced a greater reduction in migraines than sham acupuncture (difference of 1.1 attacks; 95% CI, 0.4-1.9; P = .002) and waitlist group (difference of 1.8 attacks; 95% CI, 1.1-2.5; P < .001).
- Sham acupuncture results were not statistically different from the wait-list group (difference of 0.7 attacks; 95% CI, −0.1 to 1.4; P = .07).

Conclusions

- Acupuncture may produce long-term reduction in migraine recurrence in patients with migraine without aura compared to patients who receive sham acupuncture or are assigned to a wait list.

Acupuncture for Tension Headache Pain

Turkistani A, Shah A, Jose AM, Melo JP, Luenam K, Ananias P, Yaqub S, Mohammed L. Effectiveness of manual therapy and acupuncture in tension-type headache: a systematic review. *Cureus.* 2021;13(8):e17601. DOI: 10.7759/cureus.17601. eCollection 2021 Aug.

Objective

- To evaluate acupuncture and manual therapy for treating tension-type headaches

Methods

- A systematic literature review was performed using PubMed.

Results

- Eight articles (case reports, case-control trials, randomized controlled trials (RCTs), and systematic reviews) involving 3,846 participants were included in the analysis

- Acupuncture and manual therapy demonstrated effectiveness at treating tension-type headaches.
- Two large studies demonstrated moderate evidence-quality that "participants receiving acupuncture along with routine care experienced on average a 50% decrease in headache frequency compared to the group receiving routine care only. Trial 1 showed a relative risk reduction (RRR) of 2.5 (95% CI 2.1-3.0); trial 2 showed RRR 11 (95% CI 3.7-35)."
- "Acupuncture was not found to be superior to physiotherapy, exercise, and massage therapy."
- Manual therapy significantly decreased headache intensity.
- Manual therapy was equivalent to prophylactic medication and tricyclic antidepressants for tension headaches.

Conclusions

- The available data suggests that both acupuncture and manual therapy have beneficial effects on treating symptoms of tension-type headache.
- More research considering long-term benefits and risks is needed.

Linde K, Allais G, Brinkhaus B, et al. Acupuncture for the prevention of tension-type headache. *Cochrane Database Syst Rev.* 2016;(4):CD007587

Objective

- To research acupuncture's effectiveness compared with no prophylactic treatment/routine care, 'sham'(placebo) acupuncture, or other interventions to reduce episodic/chronic tension headache frequency in adults

Methods

- Randomized trials with a "post-randomisation observation period of at least eight weeks" comparing 1) acupuncture with control (acute headache treatment of usual care), 2) sham acupuncture, 3) preventative measures for episodic or chronic tension headaches were included for analysis.
- Two reviewers determined study eligibility, mined data, and checked for risk of bias and quality of intervention.
- The primary outcome measure was response (50% reduction in headache frequency) 3-4 months after beginning the treatment series.

Results

- Twelve studies with publication dates through January 2016 involving 2,349 adult patients, plus one additional new trial, were pooled and analyzed.
- Acupuncture plus usual care for acute migraine yielded 48/100 participants with a 50% or greater reduction in headache frequency versus 17/100 for usual care.
- Acupuncture compared with sham acupuncture resulted in 52/100 participants with a 50% or greater reduction in headache frequency versus 43/100 for sham acupuncture. The results from true acupuncture were long-lasting, up to 6 months after treatments.
- The results from studies comparing acupuncture to physiotherapy, massage, and relaxation were determined by the authors to have "no useful information."

Acupuncture for Osteoarthritis

Lin L-L. TU J-F, Wang L-Q, Yang J-W, Shi G-X, Li J-L, Zhang N, Shao J-K, Zou X, Liu C-Z. Acupuncture of different treatment frequencies in knee osteoarthritis: a pilot randomised controlled trial. *Pain.* 2020;161(11):2532-2538. DOI: 10.1097/j.pain.0000000000001940.

Objective

- To evaluate the effects of 3 sessions per week of acupuncture (TSWA) compared to 1 session per week of acupuncture (OSWA) on knee osteoarthritis

Methods

- 60 participants with knee osteoarthritis were randomized into groups for acupuncture treatment three times per week (TSWA) or once per week (OSWA).
- Treatments lasted for 8 weeks and there was a subsequent 8-week follow-up period.
- Primary outcome measures were response rate "percentage of participants achieving ≥2 points decrease on the numerical rating scale (NRS) and ≥6

points decrease in Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) function score at week 8 compared with baseline."

- Response rates at week 4 and 16 were also measured, along with "NRS, WOMAC, Patient Global Assessment, 12-item Short Form Health Survey (SF-12), and treatment credibility and expectancy."

Results

- Week 8: no significant differences in response rate between the TSWA and OSWA treatment groups (64.7% vs 50.0%; difference, 14.7 percentage points [95% CI, -10.1 to 39.4 percentage points], P = 0.435)
- Weeks 4 and 16: TSWA (acupuncture three times/week group) had significant differences in response rate compared with the OSWA (acupuncture once/week group) (week 4: difference, 44.7 percentage points [95% CI, 23.2-66.1 percentage points], P = 0.001) and (week 16: difference, 46.0 percentage points [95% CI, 24.4-67.6 percentage points], P < 0.001).
- TSWA group patients "experienced significantly greater improvements in NRS, WOMAC function, and Patient Global Assessment than those in the OSWA group."
- No significant differences were found between the treatment groups for WOMAC and SF-12.

Conclusions

- An acupuncture dose-response relationship for knee osteoarthritis pain and function clinical outcomes exists.
- "TSWA immediately improved knee pain and dysfunction compared with OSWA [and] the benefit of TSWA persist[ed] throughout follow-up."

Lele Z, Haixin Y, Lei Z, Jian L, Hongmei L. Effect of acupuncture therapies combined with usual medical care on knee osteoarthritis. *J Tradit Chin Med.* 2019; 39(1):103-110.

Objective

- To study the effect of acupuncture and electroacupuncture (EA) plus routine care for knee osteoarthritis (KOA) treatment

Methods

- 90 participants with knee osteoarthritis (KOA) were treated with either acupuncture or electroacupuncture (EA) combined with usual care.

- Participants were randomized into one of three groups: usual care (UC, n=30); acupuncture plus usual care (AP + UC, n = 30); and electroacupuncture plus usual care (EA + UC), n = 30). The UC group received NSAIDs and blood circulation activating drugs (Ds-ABC).
- Primary outcome assessments: pain visual analogue scale/score (VAS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC Index) and subscales. Secondary outcome assessments: 36-item Short Form Health Survey (AQoL-SF36) to determine quality of life.

Results

- End of week 1: both AP + UC and EA + UC groups had statistically significant primary outcome improvements (except for WOMAC stiffness) compared with UC ($P < 0.05$).
- AP + UC group had statistically significant improvements in the energy/fatigue aspect of AQoL-SF36 compared with UC ($P < 0.05$).
- End of week 2: both AP + UC and EA + UC groups had statistically significant improvements in all primary outcome assessment areas compared with UC ($P < 0.05$).
- AP + UC and EA + UC groups had statistically significant improvements in social functioning and general health AQoL-SF36 scores compared with UC ($P < 0.05$).
- EA + UC group had statistically significant improvements in the energy/fatigue and emotional wellbeing areas of AQoL-SF36 compared with UC ($P < 0.05$).

Conclusions

- Acupuncture plus usual care (AP + UC) and electroacupuncture plus usual care (EA + UC) was significantly more effective than usual care on its own for the treatment of knee osteoarthritis.
- EA "may improve more domains of AQoL-SF36 in KOA patients."

Sun N, TU JF, Lin LL, et al. Correlation between acupuncture dose and effectiveness in the treatment of knee osteoarthritis: a systematic review. *Acupunct Med*. 2019;37(5):261-267. https://doi.org/10.1136/acupmed-2017-011608

Objective

- To systematically review randomized controlled trials to determine if acupuncture treatment is dose dependent for knee osteoarthritis symptom management

Methods

- **S**even English and Chinese databases were searched through January 2017 for randomized controlled trials involving high dosage (HD), medium dosage (MD), and low dosage (LD) acupuncture for knee osteoarthritis.
- The Cochrane Collaboration tool was used to determine study quality and Slavin's qualitative best-evidence synthesis approach was used to ensure high methodological standards.
- Outcomes measured: correlation between dose and treatment effect.

Results

- Eight studies (1 LD, 1 MD, and 6 HD) were included for analysis involving 2,106 participants. The authors concluded that there was "strong evidence" of a "positive correlation between HD acupuncture treatment and positive outcomes."

Conclusion

- Higher doses of acupuncture may lead to improved clinical outcomes for pain reduction and function for knee osteoarthritis.

Chen N, Wang J, Mucelli A, et al. Electro-acupuncture is beneficial for knee osteoarthritis: the evidence from meta-analysis of randomized controlled trials. *Am J Chin Med*. 2017;45(5):965-985.

Objective

To study the effectiveness of electroacupuncture for knee osteoarthritis

Methods

- Eight databases **(**PubMed, Cochrane Library, Clinic trials, Foreign Medical Literature Retrial Service (FMRS), Science Direct, China National Knowledge Infrastructure (CNKI), Chinese Scientific Journal Database (VIP), and Wanfang Data) were searched through July 5, 2016, for studies involving electroacupuncture (EA) and knee osteoarthritis.
- Outcome assessments measured "effectiveness, pain and physical function."
- The Cochrane risk of bias tool was used to evaluate risk of bias.

Results

- Eleven randomized controlled trials including 695 participants were included in the analysis to assess the safety and effectiveness of electroacupuncture for knee osteoarthritis.
- EA was statistically more effective than pharmacological interventions (RR = 1.14; 95% CI = 1.01,1.28; P = 0.03).
- EA was statistically more effective than manual acupuncture (RR = 1.12; 95% CI = 1.02,1.22; P = 0.02).
- EA was statistically more effective at reducing pain intensity (SMD =−1.11; 95% CI = −1.33,−0.88; P<0.00001).
- EA was statistically more effective at improving physical function WOMAC scores (MD = -9.81;95% CI = -14.05; 5.56; P<0.00001) and Lysholm knee score (LKSS) (pharmacological treatment: MD =5.08; 95% CI =3.52, 6.64; P<0.00001).

Conclusions

- Electroacupuncture had significant clinical outcomes for improved pain and physical function when compared with pharmacological interventions and manual acupuncture and has "low risk of adverse reaction."
- "These studies implied that EA should be performed for at least 4 weeks.

Manheimer E., Cheng K, Linde K, et al. Acupuncture for peripheral joint osteoarthritis. *Cochrane Database Syst Rev.* 2010;(1):C0001977.

Objective

- To assess the effectiveness of acupuncture for peripheral joint osteoarthritis

Methods

- A systematic review of randomized controlled trials (RCTs) in any language comparing at least 6 weeks of acupuncture, sham acupuncture, other treatments, and wait list control groups in people with knee, hip, or hand osteoarthritis was performed.
- Studies had to report at least one of the following outcomes: pain, function, or symptom severity, and preference was given to WOMAC scores.

- The following databases were searched: Cochrane Central Register of Controlled Trials, MEDLINE (through December 2007), EMBASE (through December 2007), and databases of ongoing trials, and retrieved references from articles to locate additional sources.
- "All RCTs included in previous systematic reviews of acupuncture for OA (Ernst 1997; Ezzo 2001; Kwon 2006; White 2007; Manheimer 2007) were also reconsidered for inclusion." Two independent reviewers extracted data.
- Cochrane Reviewer's Handbook was used to assess bias.
- Standardized mean differences using the differences in improvements between groups were calculated.

Results

- Sixteen trials (12 knee OA; 3 hip OA; 1 hip and knee OA) involving 3,498 participants were included in the meta-analysis.
- Acupuncture versus sham yielded statistically significant "short-term improvements in *osteoarthritis pain* (standardized mean difference -0.28, 95% confidence interval -0.45 to -0.11; 0.9 point greater improvement than sham on 20 point scale; absolute percent change 4.59%; relative percent change 10.32%)."
- Acupuncture versus sham yielded statistically significant improvements in *function* (-0.28, -0.46 to -0.09; 2.7 point greater improvement on 68 point scale; absolute percent change 3.97%; relative percent change 8.63%).
- Neither of these results met the authors' "predefined thresholds for clinical relevance (i.e. 1.3 points for pain; 3.57 points for function)."
- The inclusion of sham acupuncture using a technique known to be physiologically active "predefined thresholds for clinical relevance (i.e. 1.3 points for pain; 3.57 points for function)."
- At 6 month follow-up "acupuncture showed borderline statistically significant, clinically irrelevant improvements in *osteoarthritis pain* (-0.10, -0.21 to 0.01; 0.4 point greater improvement than sham on 20 point scale; absolute percent change 1.81%; relative percent change 4.06%; 4 trials;1399 participants) and function (-0.11, -0.22 to 0.00; 1.2 point greater improvement than sham on 68 point scale; absolute percent change 1.79%; relative percent change 3.89%)."
- Acupuncture versus waitlist control showed statistically significant and clinically meaningful results for *osteoarthritis pain* (-0.96, -1.19 to -0.72; 14.5 point greater improvement than sham on 100 point scale; absolute

percent change 14.5%; relative percent change 29.14%; 4 trials; 884 participants) and function (-0.89, -1.18 to -0.60; 13.0 point greater improvement than sham on 100 point scale; absolute percent change 13.0%; relative percent change 25.21%).

- ➢ Acupuncture versus 'supervised osteoarthritis education' and 'physician consultation' control groups showed "clinically relevant short- and long-term *improvements in pain and function."*
- ➢ Acupuncture versus 'home exercises/advice leaflet' and 'supervised exercise' had similar outcomes as controls.
- ➢ Acupuncture added to an "exercise based physiotherapy program" had similar outcomes as the exercise program without acupuncture.

Conclusions

- ➢ Acupuncture shows statistically significant and clinically important benefits for *osteoarthritis pain and function* in sham-controlled and waitlist-controlled settings.
- ➢ The effect differences between acupuncture and sham-controlled acupuncture are small, "do not meet [the authors'] pre-defined thresholds for clinical relevance and indicate that the sham controls may have a treatment effect.

Cost Effectiveness of Acupuncture for Low Back Pain

Elton D (Optum Insurance). The National Academies of Science, Engineering, Medicine. Session 3 [Video]. YouTube. https://www.youtube.com/watch?v=vQO5CsuzfRM. Published Dec 7, 2018. Accessed January 22, 2022.

- ➢ Percentage of non-surgical low back pain patients' first provider seen:
  - specialists (38.3%)
  - chiropractors/physical therapists/acupuncturists (31.3%)
  - primary care physicians (30.4%)
- ➢ Total medical episode costs:
  - chiropractors/physical therapists/acupuncturists ($619)
  - primary care physician visits ($728)
  - specialist care ($1,728)
- ➢ Summary: non-surgical low back pain patients who see conservative integrative care providers (acupuncturists/chiropractors/physical therapists) first spend less/cost the system less overall ($619/medical

event) than patients who see primary care physicians ($728/event) or specialists ($1,728/event) as their first line of care.

Cost Effectiveness of Acupuncture for Knee osteoarthritis

Woods B, Manca A, Weatherly H, Saramago P, Sideris E, Giannopoulou C, Rice S, Corbett M, Vickers A, Bowes M, MacPherson H, Sculpher M. Cost-effectiveness of adjunct non- pharmacological interventions for osteoarthritis of the knee. *PLoS ONE*. March 7, 2017;12(3):1-18. DOI:10.1371/journal.pone.0172749

- 88 studies including 7,507 participants were selected for meta-analysis inclusion; analysis was done for all trials and then only for trials with "low risk of selection bias."
- TENS was the most cost-effective per quality-adjusted life-year (QALY) when all studies were considered; when studies were limited to those with low risk of selection bias, acupuncture emerged as the most cost-effective versus TENS. Effectiveness varied among interventions based on intensity modulation.

Cost-Effectiveness of Acupuncture as Opioid Pain Management Alternative - White Paper

Fan Y, Miller DW, Bolash B, Bauer M, McDonald J, Faggert S, He H, Ming Y, Matecki A, Camardella L, Koppelman ML, Stone JAM, 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.* October 17, 2017;15(6):411-425.

- "*Acupuncture can address the national opioid epidemic as a medically effective, evidence-based, safe, cost-effective, non-pharmacological pain-management intervention."*

Conclusions

Acupuncture is an effective option to treat many acute and chronic pain conditions, and can help prevent the use of opioid prescription drugs. Acupuncture can also be used to effectively treat opioid addiction. Acupuncture has been shown to be cost-effective and safe. Often, when acupuncture is paired with usual care, it is at least as effective and has fewer side effects.

Closing Remarks

There is an opioid crisis in the United States. Many organizations such as the NIH, FDA, and the USDVA have released statements calling for nonpharmacological pain management measures

such as acupuncture to be implemented. The pain research supports the use of acupuncture as one clinically effective, cost-effective nonpharmacological pain management strategy. Acupuncture is a safer and more effective option than prescription opioids for acute and chronic pain management and is a safe and effective way to treat opioid use detox. The OAA urges the CDC to consider adding acupuncture to its new opioid prescription guidelines as a nonpharmacologic opioid alternative and to allocate funding for research into nonpharmacologic pain management options.