Systematic Review on Treatments for Acute Pain: Surveillance Report 3

Literature Update Period: January 22, 2022, through May 6, 2022

Background and Purpose

This is the third and final surveillance report for the 2020 report *Treatments for Acute Pain: A Systematic Review (https://effectivehealthcare.ahrq.gov/products/treatments-acute-pain/research)*,[1] covering the period January 22, 2022, through May 6, 2022. The 2020 report addressed benefits and harms of opioid, nonopioid pharmacologic, and nonpharmacologic treatments for specific types of acute pain (low back pain, neck pain, other musculoskeletal pain, neuropathic pain, postoperative pain [excluding inpatient management of pain after major surgical procedures], dental pain, pain due to kidney stones, and pain due to sickle cell disease). Given the clinical and public health importance of this topic, it is important to identify new evidence that could impact practice or policy. The purpose of this update is to identify new evidence published since the last surveillance report, published in March 2022 (Surveillance Report 2), and to determine how the new evidence impacts the findings of the original 2020 report and Surveillance Reports 1 and 2. This is the final surveillance update planned for this topic.

Scope

The scope and eligibility criteria established at the time of the original report[1] were utilized for this surveillance report; no changes were made. The report addressed the following acute pain conditions:

- Acute back pain (including back pain with radiculopathy) (Key Question [KQ] 1)
- Acute neck pain (including neck pain with radiculopathy) (KQ 2)
- Musculoskeletal pain not otherwise included in KQ 1 or KQ 2 (including fractures) (KQ 3)
- Peripheral neuropathic pain (related to herpes zoster and trigeminal neuralgia) (KQ 4)
- Postoperative pain (excluding inpatient management of pain following major surgical procedures) (KQ 5)
- Dental pain (KQ 6)
- Kidney stones (including inpatient management) (KQ 7)
- Sickle cell crisis (episodic pain) (KQ 8)

For each of these acute pain conditions, the report addressed the effectiveness and comparative effectiveness (benefits and harms) for the following comparisons:

- Opioid therapy versus nonopioid pharmacologic therapy (acetaminophen, non-steroidal anti-inflammatory drugs [NSAIDs], skeletal muscle relaxants, benzodiazepines, antidepressants, anticonvulsants, cannabis) or nonpharmacologic therapy (exercise, cognitive behavioral therapy, meditation, relaxation, music therapy, virtual reality, acupuncture, massage, manipulation/mobilization, physical modalities).
- Nonopioid pharmacologic therapy versus other nonopioid pharmacologic treatments or nonpharmacologic therapy.
- Nonpharmacologic therapy versus inactive treatments or usual care.

The report also addressed how benefits and harms varied according to demographic, clinical, and medication factors; effects on short- and long-term opioid use of prescribing opioid therapy for acute pain conditions; and factors influencing opioid prescribing for acute pain conditions. The full protocol for the original report, including detailed inclusion criteria using the PICOTS (populations, interventions, comparisons, outcomes, timing, settings) framework (https://www.ncbi.nlm.nih.gov/books/NBK566503/table/appb.tab1/?report=objectonly) and full KQs (https://www.ncbi.nlm.nih.gov/books/NBK566501/#ch3.s2), is shown in the appendixes and is also available on the Agency for Healthcare Research and Quality website (https://effectivehealthcare.ahrq.gov/products/treatments-acute-pain/protocol) and on the PROSPERO systematic reviews registry (CRD42020165677).

Methods

Update searches were conducted to identify evidence published from January 22, 2022, through May 6, 2022. Search strategies from the original report were utilized[1] and we searched the same databases as in the original report (Ovid® MEDLINE®, PsycINFO®, Embase®, the Cochrane Central Register of Controlled Trials, and the Cochrane Database of Systematic Reviews). In addition, to capture articles not yet indexed in MEDLINE, we supplemented the original search strategies with an optimized (text-word only) search[2] in pre-MEDLINE to identify studies not yet indexed with Medical Subject Headings (MeSH). As in the original report, searches on electronic databases were for English-language studies and supplemented by review of reference lists of relevant articles. Search strategies are shown in Appendix A. Randomized controlled trials were included for all KQs. Controlled observational studies (cohort, case-control, and before-after studies) were also included for opioid prescribing and effects on long-term use, accuracy and effectiveness of risk prediction instruments, and factors influencing prescribing.

As in the original review, one investigator screened all citations identified through searches for eligibility for full-text review. (KQs and inclusion criteria are available in Appendix B.) In addition, a second investigator, utilizing the artificial intelligence function in Distiller SR (DistillerSR AI), provided another independent review. DistillerSR AI utilizes Natural Language Processing to train itself and make inclusion predictions using manually reviewed references. DistillerSR AI was trained using 2,132 abstracts identified in the searches conducted for Surveillance Report 1. The trained DistillerSR AI assigned a certainty score for each citation, indicating how likely it was to qualify for inclusion (from 0.0 to 1.0 probability of inclusion); the second investigator performed dual review on all studies assigned a DistillerSR AI certainty score of 0.40 or more. Any citation identified as potentially eligible by either reviewer underwent full-text review to determine final eligibility.

We utilized the same methods for data abstraction and quality assessment as the original report. We assessed the quality of individual controlled trials using the approach recommended in the chapter Assessing the Risk of Bias of Individual Studies When Comparing Medical Interventions in the *Methods Guide for Effectiveness and Comparative Effectiveness Reviews,* developed by the Agency for Healthcare Research and Quality,[3] in conjunction with criteria and methods developed by the Cochrane Back Review Group.[4] We excluded combination treatments except for an opioid plus NSAIDs or acetaminophen, as these combinations are commonly used in clinical practice and frequently evaluated in clinical trials. When possible, we stratified comparisons according to whether an opioid was administered alone or in combination with an NSAID or acetaminophen. We separately evaluated single dose trials and multidose trials (i.e., trials that evaluated a course of more than one dose of therapy).

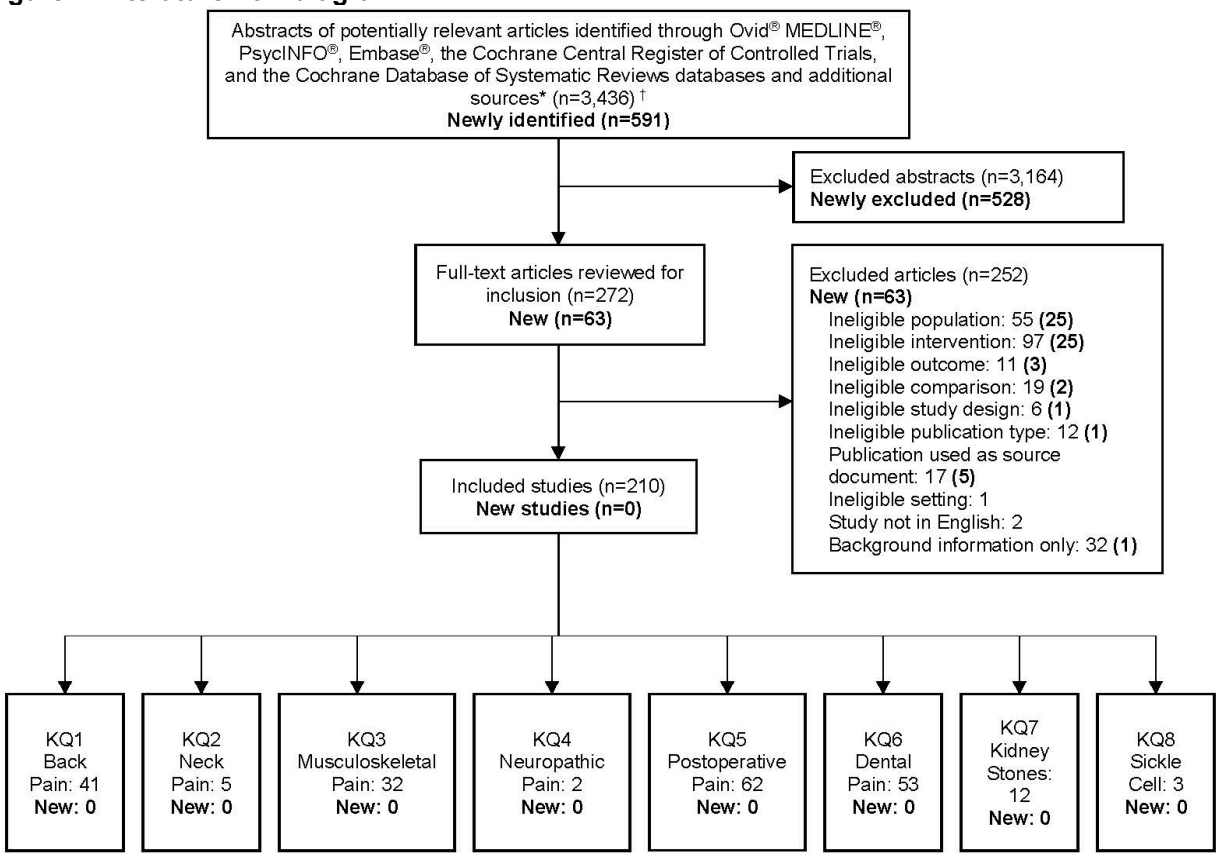
For Surveillance Updates 1 and 2, the decision to update meta-analyses from the original report was based on the number and sample sizes of new studies eligible for meta-analysis (meta-analysis performed if new evidence was large relative to the studies in the original meta-analysis); consistency in findings between the new studies and the original meta-analysis (meta-analysis performed if findings from new evidence appear inconsistent and new studies were appropriate for pooling based on similarity in populations, interventions, and comparisons, in order to determine whether new studies impact conclusions); or whether new evidence could impact the strength of evidence (SOE) (meta-analysis performed if the SOE based on the original meta-analysis was low or insufficient and new evidence could increase the SOE due to increased precision, high quality, or other factors). Because this is the final surveillance update, we updated all of the meta-analyses with new data identified in any of the surveillance updates (including meta-analyses not meeting the criteria for updating described above). The SOE was based on the totality of evidence (evidence in the original report plus new evidence) and determined using the methods described in the original report. We planned to describe changes in the SOE assessments resulting from Surveillance Report 3 separately from updated findings based on new evidence identified for Surveillance Reports 1 and 2, but no new studies were identified for Surveillance Report 3. To provide an overall summary of evidence, a table detailing updated SOE assessments with new evidence from all three surveillance reports is provided.

A comprehensive list of included studies identified for all three surveillance report periods is provided in Appendix C and a list of articles excluded at full text, along with reasons for exclusion, is available in Appendix D. Evidence tables providing data from included studies are available in Appendix E, quality assessments for each study are shown in Appendix F, forest plots for updated meta-analyses are shown in Appendix G, and an updated SOE table for outcomes with new evidence is available in Appendix H.

Results

The search for Surveillance Report 3 from January 22, 2022, to May 6, 2022, yielded 591 citations, and identified no new eligible studies (Figure 1). Surveillance Report 1 identified 13 randomized controlled trials (RCTs)[5-17] and Surveillance Report 2 identified 7 new trials (5 RCTs[18-22] and 2 pseudo-randomized [by birth year] trials).[23,24]

Figure 1. Literature flow diagram



Abbreviations: KQ = Key Question
*Additional sources include prior reports, reference lists of relevant articles, systematic reviews, etc.
†Search counts are for the surveillance report searches only. Included studies totals are from the original report and surveillance reports combined. ("New" indicates newly included in Surveillance Report 3.)

Summary of Findings

- No new studies were identified for this update.

Summary of New Evidence

Table 1 provides the conclusions from the 2020 report and the findings from studies identified in Surveillance Reports 1 and 2, focusing on KQs and comparisons/outcomes with any new evidence, including updated meta-analyses. A table showing SOE ratings updated for areas with new evidence is shown in Appendix H; the entire SOE table from the original 2020 review is available at https://www.ncbi.nlm.nih.gov/books/NBK566513/.

Table 1. Summary of conclusions and assessments informed by evidence from surveillance reports

Key Question	Conclusions From 2020 Report	Findings From Surveillance Reports	Updated Conclusions Following Surveillance Reports
1 (Low back pain): Traditional Chinese acupuncture vs. sham or usual care	**Pain at 2 to <4 weeks: decreased** (SOE: low, based on 1 RCT) with acupuncture vs. non-penetrating sham or usual care but not needle sham	1 RCT (n=167)[23,24] identified for Surveillance Report 1 found no difference between traditional Chinese acupuncture vs. usual care in pain, functional status, or quality of life at 2 to 4 weeks.	SOE: downgraded to insufficient due to inconsistency
3 (Musculoskeletal pain): Opioid plus acetaminophen vs. acetaminophen	No evidence	One RCT (n=154)[17] identified for Surveillance Report 1 found an opioid associated with small decrease in pain but increased likelihood of adverse events and drowsiness.	SOE: Low for pain and adverse events
3 (Musculoskeletal pain): Topical ibuprofen vs. capsaicin	No evidence	One RCT (n=119)[7] identified for Surveillance Report 1 was inconclusive due to poor quality.	SOE: Insufficient
5 (Postoperative pain): Opioid vs. NSAID, multidose	**Pain, 1 day to <1 week: Inconsistent findings** (SOE: insufficient, based on 4 RCTs) **Rescue medication use, 1 day to <1 week:** RR 1.22 to 2.04 (SOE: moderate, based on 4 RCTs)	One RCT (n=70)[8] identified for Surveillance Report 1 found opioid associated with a small increase in pain at day 1, with no difference at day 7.	SOE: Unchanged
5 (Postoperative pain): Opioid vs. acetaminophen, multidose	**Evidence limited and inconsistent for pain and other outcomes**; each RCT evaluated outcomes at a different time point (<1 day, 1 day to <1 week, and 2 to <4 weeks) (SOE: insufficient, based on 3 RCTs)	One RCT (n=80)[11] identified for Surveillance Report 1 found no difference between an opioid vs. acetaminophen in pain at day 7.	SOE: Unchanged
5 (Postoperative pain): Opioid vs. mixed agent	**Pain: No difference** at <1 day (1 RCT, SOE: low), 1 day to <1 week (6 RCTs, SOE: moderate), or 1 to <2 weeks (1 RCT, SOE: low)	One RCT (n=91)[11] identified for Surveillance Report 1 found no difference between an opioid vs. tapentadol in pain at 1 day to <1 week, 1 to <2 weeks, or ≥4 weeks.	SOE: Unchanged at <1 day and at 1 day to <1 week, upgraded to moderate for 1 to <2 weeks, and assessed as low for ≥4 weeks

Key Question	Conclusions From 2020 Report	Findings From Surveillance Reports	Updated Conclusions Following Surveillance Reports
5 (Postoperative pain): Cold therapy vs. sham or no cold therapy	**Pain, <1 week: No difference** (SOE: low, based on 3 RCTs) **Pain, function, QoL, 2 to <4 weeks and ≥4 weeks: No differences** (SOE: low, based on 1 RCT)	One RCT (n=100)[12] identified for Surveillance Report 1 found continuous cooling for 7 days associated with moderate decrease in pain versus usual care at 1 day to <1 week, with no differences at 1 to <2 weeks or ≥4 weeks in pain intensity, function, or QoL; two RCTs (n=100[10] and 137)[14] identified for Surveillance Report 1 reported inconsistent results for a cold pack vs. usual care in pain intensity at <1 day to 1 day.	SOE: Unchanged for cold therapy vs. sham therapy (no new RCTs) SOE: Insufficient (based on 2 RCTs) for cold therapy vs. usual care and pain intensity at <1 day due to inconsistency; low (based on 1 RCT) for moderate benefit at 1 day to <1 week; and low for no difference at 1 to <2 weeks and ≥4 weeks
5 (Postoperative pain): Music therapy vs. no music therapy	**Pain, <1 day and 1 day to <1 week: Small to moderate decrease** (SOE: low, based on 2 RCTs)	One RCT (n=47)[5] identified for Surveillance Report 1 found music therapy associated with a small decrease in pain intensity on day 1 that was not statistically significant; the difference was moderate and statistically significant on day 4.	SOE: Upgraded to moderate at 1 day to <1 week
5 (Postoperative pain): Abdominal binder vs. no binder	No evidence	One RCT (n=196)[5] identified for Surveillance Report 2 found an abdominal binder associated with small decrease in pain vs. no binder at 1 day to <1 week, but had serious methodological limitations.	SOE (no prior evidence): Insufficient (based on 1 new RCT)*
5 (Postoperative pain): TENS vs. sham TENS	**Pain, <1 day and 1 day to <1 week: Small to moderate decrease** (SOE: low, based on 1 RCT)	One RCT (n=80)[19] identified for Surveillance Report 2 found TENS associated with a small decrease in pain intensity vs. sham TENS at 1 day to <1 week.	SOE: Upgraded to moderate at 1 day to <1 week
5 (Postoperative pain): Preoperative education vs. no education	No evidence	Three RCTs (n=445)[22-24] identified for Surveillance Report 2 found preoperative education associated with decreased opioid use at 1 to 2 weeks vs. no preoperative education, with similar or decreased pain intensity.	SOE for opioid use (no prior evidence): Low (based on 3 new RCTs)*

Key Question	Conclusions From 2020 Report	Findings From Surveillance Reports	Updated Conclusions Following Surveillance Reports
6 (Dental pain): Opioid with or without acetaminophen or NSAID vs. NSAID, multidose	**Pain, <1 day and 1 day to <1 week: No difference** (SOE: low, based on 1 RCT [<1 day] and 3 RCTs [1 day to 1 week]) **Global improvement: No difference** (SOE: low, based on 2 RCTs; RR 0.76, 95% CI 0.57 to 1.00)	One RCT (n=825)[15] identified for Surveillance Report 1 found similar effects of a multidose course of an opioid plus NSAID vs. an NSAID on pain intensity at 6 and 24 hours and increased likelihood of a positive global assessment. One RCT (n=70)[18] identified for Surveillance Report 2 found an opioid plus NSAID versus NSAID associated with a small, non-statistically significant decrease in pain intensity at <1 day, with no difference at 1 day to 1 week. There was no difference in likelihood of a positive global assessment (an updated meta-analysis for likelihood of positive global assessment again found no difference: 4 trials, RR 1.08, 95% CI 0.87 to 1.34)	SOE: Unchanged
6 (Dental pain): Opioid vs. NSAID, multidose	**Pain, <1 day and 1 day to <1 week: No difference** (SOE: insufficient, based on 1 RCT)	One RCT (n=412)[18] identified for Surveillance Report 1 found similar effects of a multidose course of an opioid alone vs. NSAID on pain intensity and likelihood of a positive global assessment in patients with postoperative dental pain.	SOE: Upgraded to low
6 (Dental pain): Opioid with or without acetaminophen or NSAID vs. NSAID, single dose	**Pain, <1 day and 1 day to <1 week: Small to moderate increase at <1 day and no difference at 1 day to <1 week** (SOE: low, based on 12 RCTs [<1 day] and 3 RCTs [1 day to <1 week])	One RCT (n=60)[6] identified for Surveillance Report 1 found a single dose of an opioid plus acetaminophen associated with a small to moderate decrease in pain intensity versus an NSAID at <1 day and at 1 day to <1 week, but did not report statistical significance of findings. One RCT (n=169)[21] identified for Surveillance Report 2 found a single dose of an opioid plus acetaminophen associated with moderate increase in pain intensity versus an NSAID at <1 day, but did not report statistical significance of findings.	SOE: Unchanged

Key Question	Conclusions From 2020 Report	Findings From Surveillance Reports	Updated Conclusions Following Surveillance Reports
6 (Dental pain): Opioid (with or without acetaminophen or NSAID) vs. NSAID	**Opioid increased risk of:** **Any adverse event**: 11 trials, RR 1.72 (95% CI 1.29 to 2.28) **Nausea:** 12 trials, RR 2.72 (95% CI 1.84 to 4.01) **Dizziness:** 10 trials, RR 2.97 (95% CI 1.59 to 5.54) **Drowsiness:** 9 trials, RR 1.76 (95% CI 1.00 to 3.10) (SOE: moderate)	Two RCTs (n=825[15] and 60)[6] identified for Surveillance Report 1 found opioids associated with increased risk of any adverse event, nausea, dizziness, and drowsiness. Two RCTs (n=70[18] and 169)[21] identified for Surveillance Report 2 found opioids associated with increased risk of any adverse event, nausea, and dizziness. Updated meta-analysis **Opioid increased risk of:** **Any adverse event:** 14 trials, RR 1.85 (95% CI 1.47 to 2.33) **Nausea:** 15 trials, RR 3.64 (95% CI 2.44 to 5.43) **Dizziness:** 13 trials, RR 3.50 (95% CI 2.16 to 5.67) **Drowsiness:** 12 trials, RR 1.89 (95% CI 1.09 to 3.27)	SOE: Unchanged (moderate)
6 (Dental pain): Opioid plus acetaminophen vs. acetaminophen, multidose course	**Pain, <1 day:** One very small (n=20) RCT found opioid associated with large improvement (SOE: insufficient)	One RCT (n=39)[13] identified for Surveillance Report 1 found no differences in pain or rescue analgesic use among patients with nonoperative dental pain.	SOE: Unchanged (remained insufficient due to imprecision and inconsistency)
6 (Dental pain): Opioid plus acetaminophen vs. acetaminophen, single dose	**Pain, <1 day: Inconsistent effect** (SOE: moderate, based on 11 RCTs) **Rescue or repeat medication use, <1 day: RR 0.81 (95% CI 0.56 to 0.97)** (SOE: moderate, based on 7 RCTs)	One RCT (n=60)[6] identified for Surveillance Report 1 found an opioid associated with moderate to large decrease in pain intensity versus acetaminophen at <1 day and 1 day to <1 week, although statistical significance was not reported.	SOE: Unchanged
6 (Dental pain): Opioid plus acetaminophen vs. acetaminophen	**Opioids increased risk of:** **Nausea:** 8 trials, RR 1.55 (95% CI 0.75 to 3.18) **Drowsiness:** 6 trials, RR 2.03 (95% CI 0.70 to 5.93) **Dizziness:** 5 trials, RR 2.49 (95% CI 0.66 to 9.49) (SOE: low, based on 4 to 8 RCTs)	Two RCTs (n=39[13] and 60)[6] identified for Surveillance Report 1 found opioids associated with increased risk of drowsiness (2 RCTs, 26.6% vs. 0% and 35% vs. 16%), dizziness (1 RCT, 15% vs. 5%), nausea (1 RCT, 40% vs. 11%), and vomiting (1 RCT, 10% vs. 0%). Updated meta-analysis: **Nausea:** 9 trials, RR 1.86 (95% CI 0.98 to 3.54) **Drowsiness:** 8 trials, RR 2.36 (95% CI 0.99 to 5.63) **Dizziness:** 6 trials, RR 2.64 (95% CI 0.92 to 7.56)	SOE: Unchanged (low)

Key Question	Conclusions From 2020 Report	Findings From Surveillance Reports	Updated Conclusions Following Surveillance Reports
6 (Dental pain): NSAID vs. acetaminophen	**Pain intensity, rescue or repeat medication use: Moderate to large decrease** **Rescue or repeat medication use: decrease** (RR 0.64, 95% CI 0.58 to 0.71) (SOE: moderate, based on 11 to 15 RCTs)	One RCT (n=60)[6] identified for Surveillance Report 1 found an NSAID associated with small decrease in pain at <1 day (p-value not reported).	SOE: Unchanged

*Original report did not include a strength of evidence assessment for this comparison and outcome.
Abbreviations: CI = confidence interval; NSAID = nonsteroidal anti-inflammatory drug; QoL = quality of life; RCT = randomized controlled trial; RR = relative risk; SOE = strength of evidence; TENS = transcutaneous electrical nerve stimulation.

Evidence Details

No new studies meeting eligibility criteria were identified for Surveillance Report 3. For Key Question 6 (Dental Pain), new studies identified for Surveillance Reports 1 and 2 provided data to update meta-analyses for opioids versus NSAIDs (global improvement [Appendix Figure G-1], any adverse event [Appendix Figure G-2], nausea [Appendix Figure G-3], drowsiness [Appendix Figure G-4], and dizziness [Appendix Figure G-5]), and opioids versus acetaminophen (nausea [Appendix Figure G-6], drowsiness [Appendix Figure G-7], and dizziness [Appendix Figure G-8]). All updated meta-analyses were consistent with the pooled estimates and findings of the original report (Table 1). Meta-analyses were not conducted for the original report or surveillance updates on mean improvement in pain or function, because results for specific time points were estimated from graphs and variance information was missing. For pain conditions other than dental pain, new studies identified for Surveillance Reports 1 and 2 did not provide data to update meta-analyses.

Conclusions

No new studies were identified for Surveillance Report 3. The original report and Surveillance Reports 1 and 2 evaluated opioid therapy, nonopioid pharmacologic therapies, and nonpharmacologic therapies for selected acute pain conditions. For dental pain, updated meta-analyses based on randomized trials provided estimates and findings very similar to the original report (Appendix Table H-1). Opioid therapy was associated with decreased or similar effectiveness for pain versus an NSAID for surgical dental pain, kidney stone pain, and low back pain. Opioids and NSAIDs were more effective than acetaminophen for surgical dental pain and acute musculoskeletal pain, but opioids were less effective than acetaminophen for kidney stone pain. Opioids were associated with increased risk of short-term adverse events versus NSAIDs or acetaminophen, including any adverse event, nausea, dizziness, and somnolence. Serious adverse events were uncommon for all interventions, but studies were not designed to assess risk of overdose, opioid use disorder, or long-term harms. Being prescribed an opioid for acute low back pain or postoperative pain was associated with increased likelihood of use of opioids at long-term followup versus not being prescribed, based on observational studies, although potential confounding could have impacted findings. Evidence on nonpharmacologic therapies was limited, but heat therapy, spinal manipulation, massage, acupuncture, acupressure, a cervical collar, music therapy, transcutaneous electrical nerve stimulation (TENS), and exercise were effective for specific acute pain conditions. Evidence was limited on the comparative

effectiveness of therapies for sickle cell pain, acute neuropathic pain, neck pain, and management of postoperative pain following discharge; effects of therapies for acute pain on non-pain outcomes; effects of therapies on long-term outcomes, including long-term opioid use; and how benefits and harms of therapies vary in subgroups. A new finding from Surveillance Report 2 was that preoperative education is associated with decreased opioid use with similar or reduced pain intensity versus no preoperative education (no prior trials). As previously noted, more evidence is needed to determine whether effects of pharmacologic therapy differ for acute postsurgical and nonoperative dental pain; clarify benefits and harms of treatments for sickle cell pain, acute neuropathic pain, and neck pain; and determine the association between opioid use versus nonuse for specific acute pain conditions and short- or long-term opioid use.

References

1. Chou R, Wagner J, Ahmed AY, et al. Treatments for acute pain: a systematic review. Comparative Effectiveness Review No 240. (Prepared by the Pacific Northwest Evidence-based Practice Center under Contract No. 290- 2015-00009-I.) AHRQ Publication No. 20(21)-EHC006. Rockville, MD: Agency for Healthcare Research and Quality; December 2020.

2. Chou R, Dana T, Shetty KD. Testing a machine learning tool for facilitating living systematic reviews of chronic pain treatments. Methods Research Report. (Prepared by the Pacific Northwest Evidence-based Practice Center under Contract No. 290- 2015-00009-I and the Southern California Evidence-based Practice Center-RAND Corporation under Contract No. 290-2015-00010-I.) AHRQ Publication No. 21-EHC004. Rockville, MD: Agency for Healthcare Research and Quality November 2020.

3. Viswanathan M, Ansari MT, Berkman ND, et al. Assessing the risk of bias of individual studies in systematic reviews of health care interventions. AHRQ Methods Guide for Effectiveness and Comparative Effectiveness Reviews. AHRQ Publication No. 12-EHC047-EF. Rockville, MD: Agency for Healthcare Research and Quality; March 2012.

4. Furlan AD, Pennick V, Bombardier C, et al. 2009 updated method guidelines for systematic reviews in the Cochrane Back Review Group. Spine (Phila Pa 1976). 2009;34(18):1929-41. doi: 10.1097/BRS.0b013e3181b1c99f. PMID: 19680101.

5. Laframboise-Otto J, Horodyski M, Parvataneni H, et al. A randomized controlled trial of music for pain relief after arthroplasty surgery. Pain Manag Nurs. 2021;22(1):86-93. doi: 10.1016/j.pmn.2020.09.003. PMID: 33129705.

6. Thota L, Bansal R, Thota G, et al. Efficacy of routinely used analgesics in management of pulpal pain postoperatively a clinical study. J Pharm Bioallied Sci. 2021;13(Suppl 1):S684-S7. doi: 10.4103/jpbs.JPBS_782_20. PMID: 34447181.

7. Akgol Gur S, Dogruyol S, Kocak A, et al. Topical capsaicin versus topical ibuprofen in acute musculoskeletal injuries: a randomized, double-blind trial. Hong Kong Journal of Emergency Medicine. 2020;00(0):1-7. doi: 10.1177/1024907920975368.

8. Frants A, Garber D, Lafer M, et al. Prospective randomized trial comparing opioids versus nonsteroidal antiinflammatory drugs for postoperative analgesia in outpatient rhinoplasty. Plast Reconstr Surg. 2021;147(1):56-62. doi: 10.1097/PRS.0000000000007427. PMID: 33370050.

9. Rian T, Skogvoll E, Hofstad J, et al. Tapentadol vs oxycodone for postoperative pain treatment the first 7 days after total knee arthroplasty: a randomized clinical trial. Pain. 2021;162(2):396-404. doi: 10.1097/j.pain.0000000000002026. PMID: 32773594.

10. Suwannalert P, Chanthasenanont A, Pongrojpaw D. Effect of applying cold gel pack on reduction of postoperative pain in cesarean section, low midline skin incision: a randomized controlled trial. J Obstet Gynaecol Res. 2021;47(8):2653-8. doi: 10.1111/jog.14855. PMID: 34008228.

11. Bloom D, Kirby D, Thompson K, et al. Effect of acetaminophen on postoperative percocet use in hip arthroscopy: a randomized controlled trial. Arthroscopy. 2021;37(2):530-6. doi: 10.1016/j.arthro.2020.09.046. PMID: 33045334.

12. Brouwers H, de Vries A, van Zuilen M, et al. The role of computer-assisted cryotherapy in the postoperative treatment after total knee arthroplasty: positive effects on pain and opioid consumption. Knee Surg Sports Traumatol Arthrosc. 2021;Online ahead of print. doi: 10.1007/s00167-021-06568-x. PMID: 33903923.

13. da Silva P, Mendes A, Cardoso M, et al. Comparison between isolated and associated with codeine acetaminophen in pain control of acute apical abscess: a randomized clinical trial. Clin Oral Investig. 2021;25(3):875-82. doi: 10.1007/s00784-020-03374-6. PMID: 32651644.

14. Cope A, Wetzstein M, Mara K, et al. Abdominal ice after laparoscopic hysterectomy: a randomized controlled trial. J Minim Invasive Gynecol. 2021;28(2):342-50.e2. doi: 10.1016/j.jmig.2020.06.027. PMID: 32622918.

15. Desjardins P, Alvarado F, Gil M, et al. Efficacy and safety of two fixed-dose combinations of tramadol hydrochloride and diclofenac sodium in postoperative dental pain. Pain Med. 2020;21(10):2447-57. doi: 10.1093/pm/pnaa124. PMID: 32488263.

16. Skonnord T, Skjeie H, Brekke M, et al. Acupuncture for acute non-specific low back pain: a randomised, controlled, multicentre intervention study in general practice - the Acuback study. BMJ Open. 2020;10(8):e034157. doi: 10.1136/bmjopen-2019-034157. PMID: 32764081.

17. Friedman B, Irizarry E, Feliciano C, et al. A randomized controlled trial of oxycodone/acetaminophen versus acetaminophen alone for emergency department patients with musculoskeletal pain refractory to ibuprofen. Acad Emerg Med. 2021;28(8):859-65. doi: 10.1111/acem.14231. PMID: 33576545.

18. Vallecillo C, Vallecillo-Rivas M, Galvez R, et al. Analgesic efficacy of tramadol/dexketoprofen vs ibuprofen after impacted lower third molar extraction: a randomized controlled clinical trial. J Evid Based Dent Pract. 2021;21(4):101618. doi: 10.1016/j.jebdp.2021.101618. PMID: 34922724.

19. Parseliunas A, Paskauskas S, Kubiliute E, et al. Transcutaneous electric nerve stimulation reduces acute postoperative pain and analgesic use after open inguinal hernia surgery: a randomized, double-blind, placebo-controlled trial. J Pain. 2021;22(5):533-44. doi: 10.1016/j.jpain.2020.11.006. PMID: 33309784.

20. Hoskins C, Dempsey A, Brou L. A mixed-methods study of the effect of abdominal binders on opioid use and postoperative pain after cesarean birth. Nurs Womens Health. 2022;26(1):30-7. doi: 10.1016/j.nwh.2021.12.002. PMID: 35032465.

21. Cooper S, Desjardins P, Bertoch T, et al. Analgesic efficacy of naproxen sodium versus hydrocodone/acetaminophen in acute postsurgical dental pain: a randomized, double-blind, placebo-controlled trial. Postgrad Med. 2021;Online ahead of print:1-8. doi: 10.1080/00325481.2021.2008180. PMID: 34878953.

22. Zhu C, Schumm M, Hu T, et al. Patient-centered decision-making for postoperative narcotic-free endocrine surgery: a randomized clinical trial. JAMA Surg. 2021;156(11):e214287. doi: 10.1001/jamasurg.2021.4287. PMID: 34495283.

23. Paskey T, Vincent S, Critchlow E, et al. Prospective randomized study evaluating the effects of preoperative opioid counseling on postoperative opioid use after outpatient lower extremity orthopaedic surgery. J Surg Orthop Adv. 2021;30(1):2-6. PMID: 33851905.

24. Ilyas A, Chapman T, Zmistowski B, et al. The effect of preoperative opioid education on opioid consumption after outpatient orthopedic surgery: a prospective randomized trial. Orthopedics. 2021;44(2):123-7. doi: 10.3928/01477447-20210201-07. PMID: 33561870.

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Disclaimers

This report is based on research conducted by the Pacific Northwest Evidence-based Practice Center under contract to the Agency for Healthcare Research and Quality (AHRQ), Rockville, MD (Contract No. 75Q80120D00005). The findings and conclusions in this document are those of the authors, who are responsible for its contents; the findings and conclusions do not necessarily represent the views of AHRQ. Therefore, no statement in this report should be construed as an official position of AHRQ or of the U.S. Department of Health and Human Services.

None of the investigators have any affiliations or financial involvement that conflicts with the material presented in this report.

The information in this report is intended to help healthcare decision makers—patients and clinicians, health system leaders, and policymakers, among others—make well-informed decisions and thereby improve the quality of health care services. This report is not intended to be a substitute for the application of clinical judgment. Anyone who makes decisions concerning the provision of clinical care should consider this report in the same way as any medical reference and in conjunction with all other pertinent information, i.e., in the context of available resources and circumstances presented by individual patients.

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Afterword

The Agency for Healthcare Research and Quality (AHRQ), through its Evidence-based Practice Centers (EPCs), sponsors the development of systematic reviews to assist public- and private-sector organizations in their efforts to improve the quality of healthcare in the United States. These reviews provide comprehensive, science-based information on common, costly medical conditions, and new healthcare technologies and strategies.

Systematic reviews are the building blocks underlying evidence-based practice; they focus attention on the strength and limits of evidence from research studies about the effectiveness and safety of a clinical intervention. In the context of developing recommendations for practice, systematic reviews can help clarify whether assertions about the value of the intervention are based on strong evidence from clinical studies. For more information about AHRQ EPC systematic reviews, see https://effectivehealthcare.ahrq.gov/about/epc/evidence-synthesis.

This surveillance report provides up-to-date information about the evidence base to inform health plans, providers, purchasers, government programs, and the healthcare system as a whole on the state of the science. Transparency and stakeholder input are essential to the Effective Health Care Program. Please visit the website (www.effectivehealthcare.ahrq.gov) to see draft research questions and reports or to join an email list to learn about new program products and opportunities for input.

If you have comments on this report, they may be sent by mail to the Task Order Officer named below at: Agency for Healthcare Research and Quality, 5600 Fishers Lane, Rockville, MD 20857, or by email to epc@ahrq.hhs.gov.

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Appendixes

Appendix A. Literature Search Strategies

Ovid MEDLINE(R), All 1946 to May 6, 2022

1. Pain/
2. Acute Pain/
3. Pain Management/
4. (acute adj3 pain).ti,ab,kf.
5. exp back pain/ or exp musculoskeletal pain/ or neck pain/ or exp neuralgia/ or exp Facial Pain/ or exp Nephrolithiasis/ or exp Anemia, Sickle Cell/ or Pain, Postoperative/
6. (back or spine or spinal or radicular or neck or musculoskeletal or fracture* or neuropathic or neuralgia or neuropathy or sciatica or "dental pain" or "ondotogenic pain" or "kidney stone*" or urolithiasis or nephrolithiasis or "sickle cell" or "postoperative pain").ti,ab,kf.
7. treatment outcome/
8. exp Therapeutics/
9. (dh or dt or pc or rh or th).fs.
10. (treatment or therap* or intervention*).ti,ab,kf.
11. (or/1-4) and (5 or 6) and (or/7-10)
12. exp cohort studies/
13. cohort$.tw.
14. controlled clinical trial.pt.
15. epidemiologic methods/
16. limit 15 to yr=1966-1989
17. exp case-control studies/
18. (case$ and control$).tw.
19. or/12-14,16-18
20. randomized controlled trial.pt.
21. (random* or placebo* or control* or trial or blind*).ti,ab.
22. (animals not humans).sh.
23. (comment or editorial or meta-analysis or practice-guideline or review or letter).pt.
24. (20 or 21) not (22 or 23)
25. review.pt.
26. (medline or medlars or embase or pubmed or cochrane).tw,sh.
27. (scisearch or psychinfo or psycinfo).tw,sh.
28. (psychlit or psyclit).tw,sh.
29. cinahl.tw,sh.
30. ((hand adj2 search$) or (manual$ adj2 search$)).tw,sh.
31. (electronic database$ or bibliographic database$ or computeri?ed database$ or online database$).tw,sh.
32. (pooling or pooled or mantel haenszel).tw,sh.
33. (peto or dersimonian or der simonian or fixed effect).tw,sh.
34. or/26-33
35. 25 and 34

36. meta-analysis.pt.
37. meta-analysis.sh.
38. (meta-analys$ or meta analys$ or metaanalys$).tw,sh.
39. (systematic$ adj5 review$).tw,sh.
40. (systematic$ adj5 overview$).tw,sh.
41. (quantitativ$ adj5 review$).tw,sh.
42. (quantitativ$ adj5 overview$).tw,sh.
43. (quantitativ$ adj5 synthesis$).tw,sh.
44. (methodologic$ adj5 review$).tw,sh.
45. (methodologic$ adj5 overview$).tw,sh.
46. (integrative research review$ or research integration).tw.
47. or/36-46
48. 35 or 47
49. 19 or 24 or 48
50. 11 and 49
51. or/7-10
52. or/1-4
53. 51 and 52
54. (ultrasound or TENS or cold or cryotherapy).tw.
55. 53 and 54
56. ankle.tw.
57. 55 and 56
58. 57 not 50
59. limit 58 to english language
60. 49 and 59
61. musculoskeletal.tw.
62. 55 and 61
63. limit 62 to english language
64. 50 or 63
65. 60 or 64
66. (animal* or mouse or mice or rat* or dog* or canine or cow* or bovine or horse* or mare* or pig* or porcine or rabbit* or llama* or sheep or ewe*).ti.
67. 65 not 66
68. (202008$ or 202009$ or 20201$ or "2020 08 $" or "2020 09 $" or "2020 1$" or "2020 aug $" or "2020 sep $" or "2020 oct $" or "2020 nov $" or "2020 dec $").dp.
69. 67 and 68
70. limit 67 to yr="2021 -Current"
71. 69 or 70

Ovid MEDLINE(R), All 1946 to May 6, 2022

Key Question: Post operation pain supplemental search

1. treatment outcome/

2. exp Therapeutics/
3. (dh or dt or pc or rh or th).fs.
4. (treatment or therap* or intervention*).ti,ab,kf.
5. Pain, Postoperative/
6. "postoperative pain".ti,ab,kf.
7. 5 or 6
8. or/1-4
9. 7 and 8
10. (opioid* or hydrocodone or oxycodone or hydromorphone or fentanyl or buprenorphine or naltrexone or naloxone or tramadol or tapentadol).tw.
11. (acetaminophen or "nonsteroidal anti-inflammatory" or NSAID* or "skeletal muscle relaxant*" or SMR* or benzodiazepine* or antidepressant* or anticonvulsant* or cannabis or cannabinoid*).tw.
12. (exercise or "cognitive behavioral therapy" or CBT or meditation or relaxation or music or "virtual reality" or acupuncture or acupressure or electroacupuncture or massage or manipulation or mobilization or mobilisation or "physical modalit*" or "transcutaneous electrical nerve stimulation" or TENS or ultrasound or brace* or traction or heat or cold or cryo*).tw.
13. or/10-12
14. 9 and 13
15. and (random* or control* or placebo or sham or trial).ti,ab,kf.
16. randomized controlled trial.pt.
17. (random* or placebo* or control* or trial or blind*).ti,ab.
18. (animals not humans).sh.
19. (comment or editorial or meta-analysis or practice-guideline or review or letter).pt.
20. (16 or 17) not (18 or 19)
21. 14 and 20
22. 15 or 21
23. (pediatric* or preschool* or toddler* or infan* or child*).ti,ab.
24. 22 not 23
25. limit 24 to english language
26. (202008$ or 202009$ or 20201$ or "2020 08 $" or "2020 09 $" or "2020 1$" or "2020 aug $" or "2020 sep $" or "2020 oct $" or "2020 nov $" or "2020 dec $").dp.
27. 25 and 26
28. limit 25 to yr="2021 -Current"
29. 27 or 28

EBM Reviews - Cochrane Central Register of Controlled Trials, May 6, 2022

1. Pain/
2. Acute Pain/
3. Pain Management/
4. (acute adj3 pain).ti,ab.

5. exp back pain/ or exp musculoskeletal pain/ or neck pain/ or exp neuralgia/ or exp Facial Pain/ or exp Nephrolithiasis/ or exp Anemia, Sickle Cell/ or Pain, Postoperative/
6. (back or spine or spinal or radicular or neck or musculoskeletal or fracture* or neuropathic or neuralgia or neuropathy or sciatica or "dental pain" or "ondotogenic pain" or "kidney stone*" or urolithiasis or nephrolithiasis or "sickle cell" or "postoperative pain").ti,ab.
7. treatment outcome/
8. exp Therapeutics/
9. (dh or dt or pc or rh or th).fs.
10. (treatment or therap* or intervention*).ti,ab.
11. (or/1-4) and (5 or 6) and (or/7-10)
12. limit 11 to medline records
13. 11 not 12
14. conference abstract.pt.
15. "journal: conference abstract".pt.
16. "journal: conference review".pt.
17. or/14-16
18. 13 not 17
19. limit 18 to yr="2020 -Current"

EBM Reviews - Cochrane Database of Systematic Reviews, 2005 to May 6, 2022

1. (back or spine or spinal or radicular or neck or musculoskeletal or fracture* or neuropathic or neuralgia or neuropathy or sciatica or "dental pain" or "ondotogenic pain" or "kidney stone*" or urolithiasis or nephrolithiasis or "sickle cell" or "postoperative pain").ti.
2. (treatment or therap* or intervention*).ti,ab.
3. 1 and 2
4. limit 3 to full systematic reviews
5. 4 not chronic.ti.
6. 5 not children.ti.
7. 5 not 6
8. 7 and adult*.ti.
9. 6 or 8 (300)
10. ("2020" or "2021").so.
11. 9 and 10

Elsevier Embase, May 2022

('backache'/exp OR 'musculoskeletal pain'/exp OR 'neuropathic pain'/exp OR 'neuralgia'/exp OR 'tooth pain'/exp OR 'postoperative pain'/exp OR (('sickle cell anemia'/exp OR 'sickle cell crisis'/exp) AND ('pain'/exp OR pain:ti,ab,kw))) AND 'drug therapy'/exp AND ('article'/it OR 'review'/it) AND 'human'/de AND ('cohort analysis'/de OR 'comparative study'/de OR 'controlled study'/de OR 'meta analysis'/de OR 'randomized controlled trial'/de OR 'randomized controlled

trial (topic)'/de OR 'systematic review'/de) AND [english]/lim AND [embase]/lim NOT ([embase]/lim AND [medline]/lim)

PsycINFO, 1806 to May Week 1, 2021

1. exp Pain/
2. chronic pain/
3. 1 not 2
4. sickle cell disease/
5. exp Back Pain/
6. exp neuralgia/ or exp peripheral neuropathy/
7. Pain Management/
8. pain.ti,ab.
9. (back or spine or spinal or radicular or neck or musculoskeletal or fracture* or neuropathic or neuralgia or neuropathy or sciatica or dental or ondotogenic or kidney or urolithiasis or nephrolithiasis or "sickle cell" or postoperative).ti,ab.
10. (7 or 8) and 9
11. (acute adj3 pain).ti,ab.
12. 3 or 4 or 5 or 6 or 10 or 11
13. exp treatment outcomes/
14. treatment effectiveness evaluation/
15. 12 and (13 or 14)
16. exp clinical trials/
17. (random* or control* or placebo or sham or trial or blind*).ti,ab.
18. 15 and (16 or 17)
19. limit 18 to english language
20. limit 19 to human
21. limit 20 to (childhood <birth to 12 years> or adolescence <13 to 17 years>)
22. 20 not 21
23. 22 not chronic.ti.
24. limit 23 to yr="2020 -Current"

Ovid MEDLINE(R) ALL, 1946 to May 6, 2022

Acute Pain Risk

1. Pain/
2. Acute Pain/
3. Pain Management/
4. (acute adj3 pain).ti,ab,kf.
5. exp back pain/ or exp musculoskeletal pain/ or neck pain/ or exp neuralgia/ or exp Facial Pain/ or exp Nephrolithiasis/ or exp Anemia, Sickle Cell/ or Pain, Postoperative/

6. (back or spine or spinal or radicular or neck or musculoskeletal or fracture* or neuropathic or neuralgia or neuropathy or sciatica or "dental pain" or "ondotogenic pain" or "kidney stone*" or urolithiasis or nephrolithiasis or "sickle cell" or "postoperative pain").ti,ab,kf.
7. (or/1-4) and (5 or 6)
8. exp Analgesics, Opioid/
9. opioid*.ti,ab,kw.
10. (buprenorphine or codeine or fentanyl or hydrocodone or hydromorphone or methadone or morphine or oxycodone or oxymorphone or tapentadol or tramadol).ti,ab,kw,sh,hw.
11. or/8-10
12. exp Opioid-Related Disorders/
13. (opioid adj2 (abuse or addict* or misuse or diversion)).ti,ab,kf.
14. 12 or 13
15. 7 and (11 or 14)
16. Decision Support Techniques/
17. "Predictive Value of Tests"/
18. Prognosis/
19. Risk Assessment/
20. Risk Factors/
21. Proportional Hazards Models/
22. "Reproducibility of Results"/
23. "Sensitivity and Specificity"/
24. (sensitivity or specificity or accuracy).ti,ab,kf.
25. (risk and (predict$ or assess$)).ti,ab,kf.
26. or/16-25
27. Patient Compliance/
28. Health Services Misuse/
29. Substance Abuse Detection/
30. Drug Monitoring/
31. (urine adj7 (screen$ or test$ or detect$)).ti,ab,kf.
32. Contracts/
33. Patient Education as Topic/
34. Drug Overdose/
35. or/27-34
36. risk$.ti,ab,kf.
37. ("risk evaluation and mitigation" or "rems").ti,ab,kf.
38. Risk Reduction Behavior/ or Risk/
39. or/36-38
40. 26 or 35 or 39
41. 15 and 40
42. limit 41 to english language
43. (202008$ or 202009$ or 20201$ or "2020 08 $" or "2020 09 $" or "2020 1$" or "2020 aug $" or "2020 sep $" or "2020 oct $" or "2020 nov $" or "2020 dec $").dp.
44. 42 and 43

45. limit 42 to yr="2021 -Current"
46. 44 or 45

EBM Reviews - Cochrane Central Register of Controlled Trials, May 2022

Acute Pain Risk

1. Pain/
2. Acute Pain/
3. Pain Management/
4. (acute adj3 pain).ti,ab.
5. exp back pain/ or exp musculoskeletal pain/ or neck pain/ or exp neuralgia/ or exp Facial Pain/ or exp Nephrolithiasis/ or exp Anemia, Sickle Cell/ or Pain, Postoperative/
6. (back or spine or spinal or radicular or neck or musculoskeletal or fracture* or neuropathic or neuralgia or neuropathy or sciatica or "dental pain" or "ondotogenic pain" or "kidney stone*" or urolithiasis or nephrolithiasis or "sickle cell" or "postoperative pain").ti,ab.
7. (or/1-4) and (5 or 6)
8. exp Analgesics, Opioid/
9. opioid*.ti,ab,kw.
10. (buprenorphine or codeine or fentanyl or hydrocodone or hydromorphone or methadone or morphine or oxycodone or oxymorphone or tapentadol or tramadol).ti,ab,kw,sh,hw.
11. or/8-10
12. exp Opioid-Related Disorders/
13. (opioid adj2 (abuse or addict* or misuse or diversion)).ti,ab.
14. 12 or 13
15. 7 and (11 or 14)
16. Decision Support Techniques/
17. "Predictive Value of Tests"/
18. Prognosis/
19. Risk Assessment/
20. Risk Factors/
21. Proportional Hazards Models/
22. "Reproducibility of Results"/
23. "Sensitivity and Specificity"/
24. (sensitivity or specificity or accuracy).ti,ab.
25. (risk and (predict$ or assess$)).ti,ab.
26. or/16-25
27. Patient Compliance/
28. Health Services Misuse/
29. Substance Abuse Detection/
30. Drug Monitoring/
31. (urine adj7 (screen$ or test$ or detect$)).ti,ab.
32. Contracts/
33. Patient Education as Topic/

34. Drug Overdose/
35. or/27-34
36. risk$.ti,ab.
37. ("risk evaluation and mitigation" or "rems").ti,ab.
38. Risk Reduction Behavior/ or Risk/
39. or/36-38
40. 26 or 35 or 39
41. 15 and 40
42. limit 41 to english language
43. limit 42 to yr="2020 -Current"

Optimized PreMEDLINE Search:
Ovid MEDLINE(R) In-Process & In-Data-Review Citations, 1946 to May 6, 2022

1. (acute adj3 pain).ti,ab.
2. (((back or spine or spinal or radicular or neck or musculoskeletal or fracture*) adj3 pain) or neuropathic or neuralgia or neuropathy or sciatica or "dental pain" or "ondotogenic pain" or "kidney stone*" or urolithiasis or nephrolithiasis or "sickle cell" or "postoperative pain").ti.
3. (treatment or therap* or intervention*).ti,ab.
4. (random* or placebo* or control* or trial or blind*).ti,ab.
5. (1 or 2) and 3
6. 4 and 5
7. (202008$ or 202009$ or 20201$ or "2020 08 $" or "2020 09 $" or "2020 1$" or "2020 aug $" or "2020 sep $" or "2020 oct $" or "2020 nov $" or "2020 dec $").dp.
8. 6 and 7
9. limit 6 to yr="2021 -Current"
10. 8 or 9
11. limit 10 to english language
12. chronic.ti.
13. 11 not 12

Appendix B. Key Questions and Inclusion and Exclusion Criteria

Key Questions

Each Key Question (KQ) for this review focuses on a specific acute pain condition. The conditions and related subquestions are listed below:

KQ1: Acute back pain (including back pain with radiculopathy)

KQ2: Acute neck pain (including neck pain with radiculopathy)

KQ3: Musculoskeletal pain not otherwise included in KQ1 or KQ2 (including fractures)

KQ4: Peripheral neuropathic pain (related to herpes zoster and trigeminal neuralgia)

KQ5: Postoperative pain (excluding inpatient management of pain following major surgical procedures)

KQ6: Dental pain (surgical and nonsurgical)

KQ7: Kidney stones (including inpatient management)

KQ8: Sickle cell crisis (episodic pain)

For each condition above, we addressed the following subquestions:

Opioid Therapy

a. What is the comparative effectiveness of opioid therapy versus: (1) nonopioid pharmacologic therapy (e.g., acetaminophen, nonsteroidal anti-inflammatory drugs [NSAIDs], antidepressants, anticonvulsants) or (2) nonpharmacologic therapy (e.g., exercise, cognitive behavioral therapy, acupuncture) for outcomes related to pain, function, pain relief satisfaction, and quality of life and after followup at the following intervals: less than 1 day; 1 day to less than 1 week; 1 week to less than 2 weeks; 2 weeks to less than 4 weeks; 4 weeks or longer?

b. How does effectiveness of opioid therapy vary depending on: (1) patient demographics (e.g., age, race, ethnicity, gender); (2) patient medical or psychiatric comorbidities; (3) dose of opioids; (4) duration of opioid therapy, including number of opioid prescription refills and quantity of pills used; (5) opioid use history; (6) substance use history; (7) use of concomitant therapies?

c. What are the harms of opioid therapy versus nonopioid pharmacologic therapy, or nonpharmacologic therapy with respect to: (1) misuse, opioid use disorder, and related outcomes; (2) overdose; (3) other harms including gastrointestinal-related harms, falls, fractures, motor vehicle accidents, endocrinological harms, infections, cardiovascular events, cognitive harms, and psychological harms (e.g., depression)?

d. How do harms vary depending on: (1) patient demographics (e.g., age, gender); (2) patient medical or psychiatric comorbidities; (3) the dose of opioid used; (4) the duration of opioid therapy; (5) opioid use history; or (6) substance use history?

e. What are the effects of prescribing opioid therapy versus not prescribing opioid therapy for acute pain on 1) short-term (<3 months) continued need for prescription pain relief, such as need for opioid refills, and 2) long-term opioid use (3 months or greater)?

f. For patients with acute pain being considered for opioid therapy, what is the accuracy of instruments for predicting risk of opioid misuse, opioid use disorder, or overdose?

g. For patients with acute pain being considered for opioid therapy, what is the effectiveness of instruments for predicting risk of opioid misuse, opioid use disorder, or overdose?

h. For patients with acute pain being considered for opioid therapy, what is the effect of the following factors on the decision to prescribe opioids: (1) existing opioid management plans; (2) patient education; (3) clinician and patient values and preferences related to opioids; (4) urine drug screening; (5) use of prescription drug monitoring program data; (6) availability of close followup?

Nonopioid Pharmacologic Therapy

i. What is the comparative effectiveness of nonopioid pharmacologic therapy (e.g., acetaminophen, nonsteroidal anti-inflammatory drugs, antidepressants, anticonvulsants) versus: (1) other nonopioid pharmacologic treatments, such as those in a different medication class; or (2) nonpharmacologic therapy for outcomes related to pain, function, pain relief satisfaction, and quality of life after followup at the following intervals: <1 day; 1 day to <1 week; 1 week to <2 weeks; 2 weeks to less than 4 weeks; 4 weeks or longer?

j. How does effectiveness of nonopioid pharmacologic therapy vary depending on: (1) patient demographics (e.g., age, race, ethnicity, gender); (2) patient medical and psychiatric comorbidities; (3) the type of nonopioid medication; (4) dose of medication; (5) duration of treatment?

k. What are the harms of nonopioid pharmacologic therapy versus other nonopioid pharmacologic therapy or nonpharmacologic therapy with respect to: (1) misuse, (2) overdose; (3) other harms including gastrointestinal-related harms, cardiovascular-

related harms, kidney-related harms, falls, fractures, motor vehicle accidents, endocrinological harms, infections, cognitive harms, and psychological harms (e.g., depression)?

l. How do harms vary depending on: (1) patient demographics (e.g., age, gender); (2) patient medical comorbidities; (3) the type of nonopioid medication; (4) dose of medication; (5) the duration of therapy?

Nonpharmacologic Therapy

m. What is the comparative effectiveness of nonpharmacologic therapy versus sham treatment, waitlist, usual care, attention control, and no treatment after followup at the following intervals: less than 1 day; 1 day to less than 1 week; 1 week to less than 2 weeks; 2 weeks to less than 4 weeks; 4 weeks or longer?

n. What is the comparative effectiveness of nonpharmacologic treatments (e.g., exercise, cognitive behavioral therapy, acupuncture) for outcomes related to pain, function, pain relief satisfaction, and quality of life after followup at the following intervals: less than 1 day; 1 day to less than 1 week; 1 week to less than 2 weeks; 2 weeks to less than 4 weeks; 4 weeks or longer?

o. How does effectiveness of nonpharmacologic therapy vary depending on: (1) patient demographics (e.g., age, gender); (2) patient medical and psychiatric comorbidities?

p. How do harms vary depending on: (1) patient demographics (e.g., age, gender); (2) patient medical and psychiatric comorbidities; (3) the type of treatment used; (4) the frequency of therapy; (5) the duration of therapy?

Inclusion and Exclusion Criteria

Table B-1. PICOTS: Inclusion and exclusion criteria

Picots Element	Include	Exclude
Population	Adults with acute pain related to the following conditions: 1. Acute back pain (including back pain with radiculopathy) 2. Acute neck pain (including neck pain with radiculopathy) 3. Other musculoskeletal pain 4. Peripheral neuropathic pain (related to herpes zoster and, trigeminal neuralgia) 5. Postoperative pain after discharge 6. Dental pain 7. Kidney stones 8. Sickle cell crisis (episodic pain) Special populations: ▪ General adult ▪ Older populations >65 years ▪ Patients with history of substance use disorder ▪ Patients currently under treatment for opioid use disorder with opioid agonist therapy or naltrexone ▪ Patients with a history of psychiatric illness ▪ Patients with history of overdose ▪ Pregnant/breastfeeding women ▪ Patients with comorbidities (e.g., kidney disease, sleep disordered breathing)	Adults with chronic (>3 months) and subacute pain (6 to 12 weeks); pain not associated with one of the 8 conditions; perioperative pain; children and adolescents (<18 years); headache and cancer pain, diabetic neuropathic pain, TMJ-related pain Mixed chronic/acute or subacute/acute populations if study does not report separate results.

Picots Element	Include	Exclude
Interventions	**Opioid therapy:** a-e. Any systemic opioid, including agonists, partial agonists, and mixed mechanism opioids. f. Instruments, genetic/metabolic tests for predicting risk of misuse, opioid use disorder, and overdose g. Use of risk prediction instruments, genetic/metabolic tests h. The following factors: (1) existing opioid management plans; (2) patient education; (3) clinician and patient values and preferences related to opioids; (4) urine drug screening; (5) use of prescription drug monitoring program data; (6) availability of close followup **Nonopioid pharmacological therapy:** Oral, parenteral, or topical nonopioid pharmacological therapy used for acute pain (e.g., acetaminophen, nonsteroidal anti-inflammatory drugs, skeletal muscle relaxants, benzodiazepines, antidepressants, anticonvulsants, cannabis). **Noninvasive nonpharmacological therapy:** Noninvasive nonpharmacological therapies used for acute pain (exercise [and related therapies], cognitive behavioral therapy, meditation, relaxation, music therapy, virtual reality, acupuncture, massage, manipulation/mobilization, physical modalities [transcutaneous electrical nerve stimulation, ultrasound, braces, traction, heat, cold])	**Opioid therapy:** a-e. Transdermal patches, topical opioids f. Interventions to *treat* opioid use disorder, misuse, or overdose h. Studies assessing these factors for effects *outside* of the decision to prescribe opioids **Nonopioid pharm therapy:** IV lidocaine; IV ketamine or other IV therapies *not* likely to continue in outpatient setting; all blocks; intra-articular injections; corticosteroids **Noninvasive nonpharm therapy:** Other therapies not listed

Picots Element	Include	Exclude
Comparators	**Opioid therapy:** a-d. Usual care, another opioid, nonopioid drug, or noninvasive, nonpharmacological therapy e. Usual care, another opioid, nonopioid drug, or noninvasive, nonpharmacological therapy, no opioid/nothing prescribed f. Reference standard for misuse, opioid use disorder, or overdose; or other benchmarks g. Usual care h. Not utilizing the factors specified in interventions (h) above **Nonopioid pharmacological therapy:** Other nonopioid pharmacological therapy or noninvasive nonpharmacological therapy **NOTE:** Include oral vs. topical NSAID studies as well as aspirin vs. NSAID studies **Noninvasive nonpharmacological therapy:** Sham treatment, waitlist, usual care, attention control, and no treatment; or other noninvasive nonpharmacological therapy	**Opioid therapy:** a-d. other comparisons; placebo; included therapies vs. excluded therapies; dose ranging studies **Nonopioid pharm therapy:** placebo; included therapies vs. excluded therapies; dose ranging studies; NSAID vs. NSAID studies; selective NSAIDs vs. non-selective NSAIDs **Noninvasive nonpharm therapy:** historical controls; included therapies vs. excluded therapies
Outcomes	**Opioid therapy:** a-d, g, i. Pain, function, pain relief satisfaction, and quality of life, harms, adverse events (including withdrawal, risk of misuse, opioid, opioid use disorder, overdose). e. Persistent opioid use f. Measures of diagnostic accuracy h. Opioid prescribing rates **Nonopioid therapy:** pain, function, pain relief satisfaction, quality of life and quality of life, harms, adverse events, opioid use **Noninvasive nonpharmacological therapy:** pain, function, pain relief satisfaction, quality of life and quality of life, harms, adverse events, opioid use	Other outcomes; nonclinical outcomes (e.g., non-harm lab measures, ROM); measures of utilization (i.e., costs, procedures, length of stay, cost effectiveness/modeling)
Time of followup	At the following intervals: <1 day; 1 day to <1 week; 1 week to <2 weeks; 2 weeks to 4 weeks; ≥4 weeks **NOTE:** There will not be exclusion criteria for duration, unless duration is a matter of minutes.	
Setting	Emergency department (initiation of therapy and following discharge), physician's office, outpatient or inpatient surgical center, dental clinic or oral surgery center, inpatient (sickle cell only)	Other settings

Picots Element	Include	Exclude
Study design	All KQs: RCTs; in addition: e. cohort studies (for long-term opioid use) f. studies assessing diagnostic accuracy h. cohort studies and before-after studies assessing effects on prescribing rates	For all KQs, exclude uncontrolled observational studies, case series, and case reports; studies with historical controls

Abbreviations: IV = intravenous; KQ = Key Question; NSAID = nonsteroidal anti-inflammatory drug; PICOTS = population, interventions, comparators, outcomes, timing, setting, study design; RCT = randomized controlled trial; ROM = range of motion; TMJ = temporomandibular joints

Appendix C. Included Studies List

1. Akgol Gur ST, Dogruyol S, Kocak AO, et al. Topical capsaicin versus topical ibuprofen in acute musculoskeletal injuries: a randomized, double-blind trial. Hong Kong Journal of Emergency Medicine. 2020;00(0):1-7. doi: 10.1177/1024907920975368.
2. Bloom DA, Kirby DJ, Thompson K, et al. Effect of acetaminophen on postoperative percocet use in hip arthroscopy: a randomized controlled trial. Arthroscopy. 2021;37(2):530-6. doi: 10.1016/j.arthro.2020.09.046. PMID: 33045334.
3. Brouwers HFG, de Vries AJ, van Zuilen M, et al. The role of computer-assisted cryotherapy in the postoperative treatment after total knee arthroplasty: positive effects on pain and opioid consumption. Knee Surg Sports Traumatol Arthrosc. 2021 doi: 10.1007/s00167-021-06568-x. PMID: 33903923.
4. Cooper SA, Desjardins PJ, Bertoch T, et al. Analgesic efficacy of naproxen sodium versus hydrocodone/acetaminophen in acute postsurgical dental pain: a randomized, double-blind, placebo-controlled trial. Postgrad Med. 2021:1-8. doi: 10.1080/00325481.2021.2008180. PMID: 34878953.
5. Cope AG, Wetzstein MM, Mara KC, et al. Abdominal ice after laparoscopic hysterectomy: a randomized controlled trial. J Minim Invasive Gynecol. 2021;28(2):342-50.e2. doi: 10.1016/j.jmig.2020.06.027. PMID: 32622918.
6. da Silva PB, Mendes AT, Cardoso MBF, et al. Comparison between isolated and associated with codeine acetaminophen in pain control of acute apical abscess: a randomized clinical trial. Clin Oral Investig. 2021;25(3):875-82. doi: 10.1007/s00784-020-03374-6. PMID: 32651644.
7. Desjardins P, Alvarado F, Gil M, et al. Efficacy and safety of two fixed-dose combinations of tramadol hydrochloride and diclofenac sodium in postoperative dental pain. Pain Med. 2020;21(10):2447-57. doi: 10.1093/pm/pnaa124. PMID: 32488263.
8. Frants A, Garber D, Lafer MP, et al. Prospective randomized trial comparing opioids versus nonsteroidal antiinflammatory drugs for postoperative analgesia in outpatient rhinoplasty. Plast Reconstr Surg. 2021;147(1):56-62. doi: 10.1097/PRS.0000000000007427. PMID: 33370050.
9. Friedman BW, Irizarry E, Feliciano C, et al. A randomized controlled trial of oxycodone/acetaminophen versus acetaminophen alone for emergency department patients with musculoskeletal pain refractory to ibuprofen. Acad Emerg Med. 2021;28(8):859-65. doi: 10.1111/acem.14231. PMID: 33576545.
10. Hoskins C, Dempsey A, Brou L. A mixed-methods study of the effect of abdominal binders on opioid use and postoperative pain after cesarean birth. Nurs Womens Health. 2022;S1751-4851(21):00253-1. doi: 10.1016/j.nwh.2021.12.002. PMID: 35032465.
11. Ilyas AM, Chapman T, Zmistowski B, et al. The effect of preoperative opioid education on opioid consumption after outpatient orthopedic surgery: a prospective randomized trial. Orthopedics. 2021;44(2):123-7. doi: 10.3928/01477447-20210201-07. PMID: 33561870.
12. Laframboise-Otto JM, Horodyski M, Parvataneni HK, et al. A randomized controlled trial of music for pain relief after arthroplasty surgery. Pain Manag Nurs. 2021;22(1):86-93. doi: 10.1016/j.pmn.2020.09.003. PMID: 33129705.
13. Parseliunas A, Paskauskas S, Kubiliute E, et al. Transcutaneous electric nerve stimulation reduces acute postoperative pain and analgesic use after open inguinal hernia surgery: a randomized, double-blind, placebo-controlled trial. J Pain. 2021;22(5):533-44. doi: 10.1016/j.jpain.2020.11.006. PMID: 33309784.
14. Paskey T, Vincent S, Critchlow E, et al. Prospective randomized study evaluating the effects of preoperative opioid counseling on postoperative opioid use after outpatient lower extremity orthopaedic surgery. J Surg

Orthop Adv. 2021;30(1):2-6. PMID: 33851905.

15. Rian T, Skogvoll E, Hofstad J, et al. Tapentadol vs oxycodone for postoperative pain treatment the first 7 days after total knee arthroplasty: a randomized clinical trial. Pain. 2021;162(2):396-404. doi: 10.1097/j.pain.0000000000002026. PMID: 32773594.

16. Skonnord T, Skjeie H, Brekke M, et al. Acupuncture for acute non-specific low back pain: a randomised, controlled, multicentre intervention study in general practice - the Acuback study. BMJ Open. 2020;10(8):e034157. doi: 10.1136/bmjopen-2019-034157. PMID: 32764081.

17. Suwannalert P, Chanthasenanont A, Pongrojpaw D. Effect of applying cold gel pack on reduction of postoperative pain in cesarean section, low midline skin incision: a randomized controlled trial. J Obstet Gynaecol Res. 2021;47(8):2653-8. doi: 10.1111/jog.14855. PMID: 34008228.

18. Thota L, Bansal R, Thota G, et al. Efficacy of routinely used analgesics in management of pulpal pain postoperatively a clinical study. J Pharm Bioallied Sci. 2021;13(Suppl 1):S684-S7. doi: 10.4103/jpbs.JPBS_782_20. PMID: 34447181.

19. Vallecillo C, Vallecillo-Rivas M, Galvez R, et al. Analgesic efficacy of tramadol/dexketoprofen vs ibuprofen after impacted lower third molar extraction: a randomized controlled clinical trial. J Evid Based Dent Pract. 2021;21(4):101618. doi: 10.1016/j.jebdp.2021.101618. PMID: 34922724.

20. Zhu CY, Schumm MA, Hu TX, et al. Patient-centered decision-making for postoperative narcotic-free endocrine surgery: a randomized clinical trial. JAMA Surg. 2021:e214287. doi: 10.1001/jamasurg.2021.4287. PMID: 34495283.

Appendix D. Excluded Studies List

1. Abdel Shaheed C, Awal W, Zhang G, et al. Efficacy, safety, and dose-dependence of the analgesic effects of opioid therapy for people with osteoarthritis: systematic review and meta-analysis. Medical Journal of Australia. 2022;09:09. doi: https://dx.doi.org/10.5694/mja2.51392. PMID: 35137418. **Exclusion reason**: Background
2. Abo Elfadl GM, Osman AM, Ghalyoom MF, et al. Preoperative duloxetine to prevent postoperative shoulder pain after gynecologic laparoscopy: a randomized controlled trial. Braz J Anesthesiol. 2021 doi: 10.1016/j.bjane.2021.07.035. PMID: 34411629. **Exclusion reason:** Ineligible population
3. Abushanab D, Al-Badriyeh D. Efficacy and safety of ibuprofen plus paracetamol in a fixed-dose combination for acute postoperative pain in adults: meta-analysis and a trial sequential analysis. CNS Drugs. 2021;35(1):105-20. doi: 10.1007/s40263-020-00777-7. PMID: 33428176. **Exclusion reason:** Paper pulled for background
4. A comparison of clinic-delivered and telehealth-delivered post-operative rehabilitation and functional assessment following total knee arthroplasty. http://www.who.int/trialsearch/Trial2.aspx?TrialID=ACTRN12620001168943. 2020. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)
5. Akdogan M, Utebey G, Atilla HA, et al. Effects of preoperative pregabalin on postoperative pain control in total knee arthroplasty surgery. J Invest Surg. 2021;34(8):848-52. doi: 10.1080/08941939.2019.1704317. PMID: 31913778. **Exclusion reason:** Ineligible intervention
6. Akpinar KE, Kaya F. Effect of different clinical practices on postoperative pain in permanent mandibular molar teeth with symptomatic apical periodontitis: a randomized controlled clinical trial. Niger J Clin Pract. 2021;24(1):8-16. doi: 10.4103/njcp.njcp_16_20. PMID: 33473019. **Exclusion reason:** Ineligible intervention
7. Almasri M, Simunovic N, Heels-Ansdell D, et al. Femoroacetabular impingement surgery leads to early pain relief but minimal functional gains past 6 months: experience from the FIRST trial. Knee Surg Sports Traumatol Arthrosc. 2021;29(5):1362-9. doi: 10.1007/s00167-020-06401-x. PMID: 33386426. **Exclusion reason:** Ineligible intervention
8. Al-Nahlawi T, Hatab T, Alrazak M, et al. Effect of intracanal cryotherapy and negative irrigation technique on postendodontic pain. J Contemp Dent Pract. 2016;17(12):990-6. PMID: 27965485. **Exclusion reason**: Wrong comparator
9. Alshahrani M, Alghamdi M. Ketamine for sickle cell vaso-occlusive crises: a systematic review. Saudi J Med Med Sci. 2021;9(1):3-9. doi: 10.4103/sjmms.sjmms_218_20. PMID: 33519337. **Exclusion reason:** Paper pulled for background
10. Alzahrani H, Mackey M, Stamatakis E, et al. Wearables-based walking program in addition to usual physiotherapy care for the management of patients with low back pain at medium or high risk of chronicity: a pilot randomized controlled trial. PLoS One. 2021;16(8):e0256459. doi: 10.1371/journal.pone.0256459. PMID: 34437607. **Exclusion reason:** Ineligible population
11. Anger M, Valovska T, Beloeil H, et al. PROSPECT guideline for total hip arthroplasty: a systematic review and procedure-specific postoperative pain management recommendations. Anaesthesia. 2021;76(8):1082-97. doi: 10.1111/anae.15498. PMID: 34015859. **Exclusion reason:** Inadequate duration
12. Ansari A, Nayab M, Saleem S, et al. Effect of soft and prolonged Graeco-Arabic massage in low back pain - a randomized controlled clinical trial. J Bodyw Mov Ther. 2022;29:232-8. doi: 10.1016/j.jbmt.2021.10.007. PMID:

35248276. **Exclusion reason**: Wrong population

13. Ansari AH, Shooshtari Z, Alipour M, et al. What is the effect of pre-emptive oral montelukast on postoperative pain following bimaxillary orthognathic surgery? A triple-blind randomized clinical trial. J Oral Maxillofac Surg. 2021;20:20. doi: 10.1016/j.joms.2021.08.151. PMID: 34547261. **Exclusion reason:** Ineligible intervention

14. Antony KM, Adams JH, Jacques L, et al. Lidocaine patches for postcesarean pain control in obese women: a pilot randomized controlled trial. Am J Obstet Gynecol MFM. 2021;3(1):100281. doi: 10.1016/j.ajogmf.2020.100281. PMID: 33451596. **Exclusion reason:** Ineligible comparator

15. Anusitviwat C, Suwanno P, Suwannaphisit S. The effects of vitamin D supplementation in carpal tunnel syndrome treatment outcomes: a systematic review. J Exp Orthop. 2021;8(1)doi: 10.1186/s40634-021-00393-4. **Exclusion reason:** Ineligible intervention

16. Ariel E, Levkovitz Y, Goor-Aryeh I, et al. The effects of TENS, interferential stimulation, and combined interferential stimulation and pulsed ultrasound on patients with disc herniation-induced radicular pain. J Back Musculoskeletal Rehabil. 2022;35(2):363-71. doi: 10.3233/BMR-200302. PMID: 34180407. **Exclusion reason**: Wrong intervention

17. Attaar A, Curran M, Meyenburg L, et al. Perioperative pain management and outcomes in patients who -discontinued or continued pre-existing buprenorphine therapy. J Opioid Manag. 2021;17(7):33-41. doi: 10.5055/jom.2021.0640. PMID: 34520024. **Exclusion reason:** Ineligible intervention

18. Bastiaenen C, de Bie R, Wolters P, et al. Effectiveness of a tailor-made intervention for pregnancy-related pelvic girdle and/or low back pain after delivery: short-term results of a randomized clinical trial [ISRCTN08477490]. BMC Musculoskelet Disord. 2006;7:19. doi: 10.1186/1471-2474-7-19. PMID: 16504165. **Exclusion reason**: Wrong intervention

19. Bebee B, Taylor DM, Bourke E, et al. The CANBACK trial: a randomised, controlled clinical trial of oral cannabidiol for people presenting to the emergency department with acute low back pain. Med J Aust. 2021;214(8):370-5. doi: 10.5694/mja2.51014. PMID: 33846971. **Exclusion reason:** Ineligible population

20. Bigalke S, Maesen TV, Schnabel K, et al. Assessing outcome in postoperative pain trials: are we missing the point? A systematic review of pain-related outcome domains reported in studies early after total knee arthroplasty. Pain. 2021;162(7):1914-34. doi: 10.1097/j.pain.0000000000002209. PMID: 33492036. **Exclusion reason:** Ineligible intervention

21. Bijur PE, Friedman BW, Irizarry E, et al. A randomized trial comparing the efficacy of five oral analgesics for treatment of acute musculoskeletal extremity pain in the emergency department. Ann Emerg Med. 2021;77(3):345-56. doi: 10.1016/j.annemergmed.2020.10.004. PMID: 33358232. **Exclusion reason:** Ineligible intervention

22. Bloom DA, Baron SL, Luthringer TA, et al. Preoperative opioid education has no effect on opioid use in patients undergoing arthroscopic rotator cuff repair: a prospective, randomized clinical trial. J Am Acad Orthop Surg 2021;29(19):e961-e8. doi: 10.5435/JAAOS-D-20-00594. PMID: 33306558. **Exclusion reason:** Ineligible outcome

23. Bloom DA, Manjunath AK, Gotlin MJ, et al. Institutional reductions in opioid prescribing do not change patient satisfaction on Press Ganey surveys after total shoulder arthroplasty. J Shoulder Elbow Surg. 2021;30(4):858-64. doi: 10.1016/j.jse.2020.07.016. PMID: 32712454. **Exclusion reason:** Ineligible outcome

24. Bloom DA, Manjunath AK, Gualtieri AP, et al. Patient satisfaction after total hip arthroplasty is not influenced by reductions in opioid prescribing. J Arthroplasty. 2021;36(7S):S250-S7. doi: 10.1016/j.arth.2021.02.009. PMID: 33640183. **Exclusion reason:** Ineligible comparator

25. Bloom DA, Manjunath AK, Kaplan DJ, et al. Reduced opioid prescribing following arthroscopic meniscectomy does not negatively impact patient satisfaction. Knee. 2021;29:216-21. doi: 10.1016/j.knee.2021.01.020. PMID: 33640620. **Exclusion reason:** Ineligible comparator

26. Bergman J, Casiano R, Perez A, et al. Opiate vs non-opiate prescription medication for pain control after endoscopic sinus surgery for chronic rhinosinusitis. Am J Otolaryngol. 2022;43(1):103214. doi: 10.1016/j.amjoto.2021.103214. PMID: 34607277. **Exclusion reason**: Wrong outcome

27. Blitzer D, Blackshear C, Stuckey J, et al. Enhanced recovery after surgery multimodality pain regimen performs similar to PRN narcotics on outcomes and pain control after cardiac surgery: a quality improvement project. J Card Surg. 2022;37(6):1520-7. doi: 10.1111/jocs.16458. PMID: 35352395. **Exclusion reason**: Wrong intervention

28. Bojaxhi E, Louie C, ReFaey K, et al. Reduced pain and opioid use in the early postoperative period in patients undergoing a frontotemporal craniotomy under regional vs general anesthesia. World Neurosurg. 2021;150:e31-e7. doi: 10.1016/j.wneu.2021.02.009. PMID: 33684585. **Exclusion reason:** Ineligible population

29. Bordeleau M, Stamenkovic A, Tardif P, et al. The use of virtual reality in back pain rehabilitation: a systematic review and meta-analysis. J Pain. 2022;23(2):175-95. doi: 10.1016/j.jpain.2021.08.001. PMID: 34425250. **Exclusion reason**: Wrong population

30. Bornstein E, Husk G, Lenchner E, et al. Implementation of a standardized post-cesarean delivery order set with multimodal combination analgesia reduces inpatient opioid usage. J Clin Med. 2021;10(1):1-10. doi: 10.3390/jcm10010007. **Exclusion reason:** Ineligible comparator

31. Brady JT, Dreimiller A, Miller-Spalding S, et al. Are narcotic pain medications necessary after discharge following thyroidectomy and parathyroidectomy? Surgery. 2021;169(1):202-8. doi: 10.1016/j.surg.2020.03.027. PMID: 32416981. **Exclusion reason:** Ineligible intervention

32. Burns KA, Robbins LM, LeMarr AR, et al. Celecoxib significantly reduces opioid use after shoulder arthroplasty. J Shoulder Elbow Surg. 2021;30(1):1-8. doi: 10.1016/j.jse.2020.08.025. PMID: 32919045. **Exclusion reason:** Ineligible comparator

33. Buys MJ, Bayless K, Romesser J, et al. Opioid use among veterans undergoing major joint surgery managed by a multidisciplinary transitional pain service. Reg Anesth Pain Med. 2020;45(11):847-52. doi: 10.1136/rapm-2020-101797. PMID: 32848086. **Exclusion reason:** Ineligible intervention

34. Cashin AG, Folly T, Bagg MK, et al. Efficacy, acceptability, and safety of muscle relaxants for adults with non-specific low back pain: systematic review and meta-analysis. BMJ. 2021;374:n1446. doi: 10.1136/bmj.n1446. PMID: 34233900. **Exclusion reason:** Paper pulled for background

35. Chalub L, Nunes G, Ferrisse T, et al. Postoperative pain in root canal treatment with ultrasonic versus conventional irrigation: a systematic review and meta-analysis of randomized controlled trials. Clin Oral Investig. 2022;26(4):3343-56. doi: 10.1007/s00784-022-04386-0. PMID: 35091819. **Exclusion reason**: Inadequate duration

36. Chen W, Sun JN, Hu ZH, et al. Cognitive behavioral therapy cannot relieve postoperative pain and improve joint function after total knee arthroplasty in patients aged 70 years and older. Aging Clin Exp Res. 2021 doi: 10.1007/s40520-021-01870-7. PMID: 33991330. **Exclusion reason:** Ineligible population

37. Cheng X, Wang Z, Zhang Y, et al. Oral administration of prednisone effectively reduces subacute pain after total knee arthroplasty. Orthop Traumatol Surgery Res. 2021;107(3):102770. doi: 10.1016/j.otsr.2020.102770. PMID: 33333285. **Exclusion reason:** Ineligible intervention

38. A multicenter, randomized, double-blind, placebo-controlled parallel clinical trial to evaluate the efficacy and safety of ibuprofen injection in the treatment of postoperative acute pain. http://www.who.int/trialsearch/Trial2.aspx?TrialID=ChiCTR2100042038. 2021. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)

39. Chou R, Dana T, Shetty KD. Testing a machine learning tool for facilitating living systematic reviews of chronic pain treatments. Methods Research Report. (Prepared by the Pacific Northwest Evidence-based Practice Center under Contract No. 290- 2015-00009-I and the Southern California Evidence-based Practice Center-RAND Corporation under Contract No. 290-2015-00010-I.) AHRQ Publication No. 21-EHC004. Rockville, MD: Agency for Healthcare Research and Quality November 2020. **Exclusion reason:** Paper pulled for background

40. Chou R, Wagner J, Ahmed AY, et al. Treatments for acute pain: a systematic review. Comparative Effectiveness Review No 240. (Prepared by the Pacific Northwest Evidence-based Practice Center under Contract No. 290- 2015-00009-I.) AHRQ Publication No. 20(21)-EHC006. Rockville, MD: Agency for Healthcare Research and Quality; December 2020. **Exclusion reason:** Paper pulled for background

41. Choudhry NK, Fontanet CP, Ghazinouri R, et al. Design of the spine pain intervention to enhance care quality and reduce expenditure trial (SPINE CARE) study: methods and lessons from a multi-site pragmatic cluster randomized controlled trial. Contemp Clin Trials. 2021;111:106602. doi: 10.1016/j.cct.2021.106602. PMID: 34688915. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)

42. Chuaychoosakoon C, Parinyakhup W, Wiwatboworn A, et al. Comparing post-operative pain between single bundle and double bundle anterior cruciate ligament reconstruction: a retrospective study. BMC Musculoskelet Disord. 2021;22(1):753. doi: 10.1186/s12891-021-04635-5. PMID: 34479511. **Exclusion reason:** Ineligible intervention

43. Comelon M, Raeder J, Draegni T, et al. Tapentadol versus oxycodone analgesia and side effects after laparoscopic hysterectomy: a randomised controlled trial. Eur J Anaesthesiol. 2021;38(9):995-1002. doi: 10.1097/EJA.0000000000001425. PMID: 33428347. **Exclusion reason:** Ineligible population

44. Cooper TE, Hambleton IR, Ballas SK, et al. Pharmacological interventions for painful sickle cell vaso-occlusive crises in adults. Cochrane Database Syst Rev. 2019;2019(11):CD012187. doi: 10.1002/14651858.CD012187.pub2. PMID: 31742673. **Exclusion reason:** Paper pulled for background

45. Electro acupuncture therapy on carpal tunnel syndrome. http://www.who.int/trialsearch/Trial2.aspx?TrialID=CTRI. 2020. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)

46. Dahm V, Lui J, Chen J, et al. Pain management following otological surgery: a prospective study of different strategies. Laryngoscope. 2022;132(1):204-11. doi: 10.1002/lary.29845. PMID: 34495556. **Exclusion reason:** Ineligible intervention

47. Dalton MK, Chaudhary MA, Andriotti T, et al. Patterns and predictors of opioid prescribing and use after rib fractures. Surgery. 2020;168(4):684-9. doi: 10.1016/j.surg.2020.05.015. PMID: 32653204. **Exclusion reason:** Ineligible intervention

48. Davey MS, Hurley ET, Anil U, et al. Pain management strategies after anterior cruciate ligament reconstruction: a systematic review with network meta-analysis. Arthroscopy. 2021;37(4):1290-300.e6. doi: 10.1016/j.arthro.2021.01.023. PMID: 33515736. **Exclusion reason:** Ineligible intervention

49. Davidson ERW, Paraiso MFR, Walters MD, et al. A randomized controlled noninferiority trial of reduced vs routine opioid prescription after prolapse repair. Am J Obstet Gynecol. 2020;223(4):547.e1-.e12. doi: 10.1016/j.ajog.2020.03.017. PMID:

32199926. **Exclusion reason:** Paper pulled for background

50. Dbeis R, Assani K, Fadaee N, et al. An anti-inflammatory bundle may help avoid opioids for low-risk outpatient procedures. J Perioper Pract. 2022;Online ahead of print:17504589211031069. doi: 10.1177/17504589211031069. PMID: 35322707. **Exclusion reason**: Wrong outcome

51. Deer T, Wilson D, Schultz D, et al. Ultra-low energy cycled burst spinal cord stimulation yields robust outcomes in pain, function, and affective domains: a subanalysis from two prospective, multicenter, international clinical trials. Neuromodulation. 2022;25(1):137-44. doi: 10.1111/ner.13507. PMID: 35041583. **Exclusion reason**: Wrong population

52. de Oliveira Lima L, Saragiotto BT, Costa LOP, et al. Self-guided web-based pain education for people with musculoskeletal pain: a systematic review and meta-analysis. Phys Ther. 2021;101(10):01. doi: 10.1093/ptj/pzab167. PMID: 34174081. **Exclusion reason:** Ineligible population

53. de Queiroz VKP, da Nobrega Marinho AM, de Barros GAM. Analgesic effects of a 5% lidocaine patch after cesarean section: a randomized placebo-controlled double-blind clinical trial. J Clin Anesth. 2021;73:110328. doi: 10.1016/j.jclinane.2021.110328. PMID: 33975094. **Exclusion reason:** Ineligible comparator

54. Delavar P, Foroughian M, Vakilzadeh AK, et al. Effect of acupuncture on the pain of patients with acute low back pain: a randomized double-blind clinical trial study. Koomesh. 2021;23(3):338-46. doi: 10.29252/koomesh.23.3.338. **Exclusion reason:** Study covered in included systematic review

55. Derefinko KJ, Gong Z, Bursac Z, et al. Opioid use patterns after primary total knee replacement. Orthop Clin North Am. 2021;52(2):103-10. doi: 10.1016/j.ocl.2020.12.003. PMID: 33752831. **Exclusion reason:** Ineligible intervention

56. Di Stefano G, Di Lionardo A, Di Pietro G, et al. Pharmacotherapeutic options for managing neuropathic pain: a systematic review and meta-analysis. Pain Res Manag. 2021;2021:6656863. doi: 10.1155/2021/6656863. PMID: 33986899. **Exclusion reason:** Ineligible population

57. Dogan C, Yilmaz A, Ozen M, et al. Comparative evaluation of the effectiveness of intravenous paracetamol, dexketoprofen and ibuprofen in acute low back pain. Am J Emerg Med. 2022;56:223-7. doi: 10.1016/j.ajem.2022.04.017. PMID: 35461026. **Exclusion reason:** Ineligible intervention

58. Dusek J, Kallenberg G, Hughes R, et al. Acupuncture in the emergency department for pain management: a BraveNet multi-center feasibility study. Medicine (Baltimore). 2022;101(9):e28961. doi: 10.1097/MD.0000000000028961. PMID: 35244059. **Exclusion reason**: Wrong publication type/not a study (letter, editorial, non-systematic review article, no original data)

59. Ehsani F, Sahebi N, Shanbehzadeh S, et al. Stabilization exercise affects function of transverse abdominis and pelvic floor muscles in women with postpartum lumbo-pelvic pain: a double-blinded randomized clinical trial study. Int Urogynecol J. 2020;31(1):197-204. doi: 10.1007/s00192-019-03877-1. PMID: 31016337. **Exclusion reason**: Wrong population

60. ElDeeb A, Abd-Ghafar K, Ayad W, et al. Effect of segmental stabilizing exercises augmented by pelvic floor muscles training on women with postpartum pelvic girdle pain: a randomized controlled trial. J Back Musculoskelet Rehabil. 2019;32(5):693-700. doi: 10.3233/bmr-181258. PMID: 30636728. **Exclusion reason**: Wrong population

61. Ende H, Bauchat J, Sorabella L, et al. Post-cesarean gabapentin is not associated with lower opioid consumption or pain scores in women on chronic buprenorphine therapy: a 10-year retrospective cohort study. J Clin Anesth. 2022;77:110600. doi: 10.1016/j.jclinane.2021.110600. PMID: 34847491. **Exclusion reason**: Wrong population

62. Erkan E, Gundogar M, Uslu G, et al. Postoperative pain after SWEEPS, PIPS, sonic and ultrasonic-assisted irrigation

activation techniques: a randomized clinical trial. Odontology. 2022;Online ahead of printdoi: 10.1007/s10266-022-00700-0. PMID: 35267110. **Exclusion reason**: Wrong intervention

63. Etemadifar S, Dehghan M, Jazayeri T, et al. A comparative study into the effects of topical hot salt and hot sand on patients' perception of low back pain. J Educ Health Promot. 2022;11:27. doi: 10.4103/jehp.jehp_296_21. PMID: 35281384. **Exclusion reason**: Wrong population

64. Fedrigon D, Faris A, Kachroo N, et al. SKOPE-Study of ketorolac vs opioid for pain after endoscopy: a double-blinded randomized control trial in patients undergoing ureteroscopy. J Urol. 2021;206(2):373-81. doi: 10.1097/JU.0000000000001772. PMID: 33819072. **Exclusion reason:** Ineligible population

65. Fei Y, Huang B, Deng J, et al. Efficacy of dorsal root ganglion pulsed radiofrequency combined with paravertebral injection of recombinant human interferon-α2b in herpetic neuralgia. J Pain Res. 2021;14:711-9. doi: 10.2147/JPR.S290852. PMID: 33732017. **Exclusion reason:** Ineligible intervention

66. Feldman C, Fredericks-Younger J, Lu S, et al. The Opioid Analgesic Reduction Study (OARS)-a comparison of opioid vs. non-opioid combination analgesics for management of post-surgical pain: a double-blind randomized clinical trial. Trials. 2022;23(1):160. doi: 10.1186/s13063-022-06064-8. PMID: 35177108. **Exclusion reason**: Wrong study design

67. Ferguson MC, Schumann R, Gallagher S, et al. Single-dose intravenous ibuprofen for acute postoperative pain in adults. Cochrane Database Syst Rev. 2021;9:CD013264. doi: 10.1002/14651858.CD013264.pub2. PMID: 34499349. **Exclusion reason:** Inadequate duration

68. Flowers KM, Patton ME, Hruschak VJ, et al. Conditioned open-label placebo for opioid reduction after spine surgery: a randomized controlled trial. Pain. 2021;162(6):1828-39. doi: 10.1097/j.pain.0000000000002185. PMID: 33449503. **Exclusion reason:** Ineligible intervention

69. Forlenza EM, Lavoie-Gagne O, Lu Y, et al. Preoperative opioid use predicts prolonged postoperative opioid use and inferior patient outcomes following anterior cruciate ligament reconstruction. Arthroscopy. 2020;36(10):2681-8.e1. doi: 10.1016/j.arthro.2020.06.014. PMID: 32574617. **Exclusion reason:** Ineligible intervention

70. Fritz JM, Lane E, McFadden M, et al. Physical therapy referral from primary care for acute back pain with sciatica : a randomized controlled trial. Ann Intern Med. 2021;174(1):8-17. doi: 10.7326/M20-4187. PMID: 33017565. **Exclusion reason:** Ineligible intervention

71. Furlan AD, Pennick V, Bombardier C, et al. 2009 updated method guidelines for systematic reviews in the Cochrane Back Review Group. Spine (Phila Pa 1976). 2009;34(18):1929-41. doi: 10.1097/BRS.0b013e3181b1c99f. PMID: 19680101. **Exclusion reason:** Paper pulled for background

72. Gallo G, Grossi U, Di Tanna GL, et al. Short-term outcomes of polycarbophil and propionibacterium acnes lysate gel after open hemorrhoidectomy: a prospective cohort study. J Clin Med. 2020;9(12):3996. doi: 10.3390/jcm9123996. PMID: 33321707. **Exclusion reason:** Ineligible intervention

73. Garzonio S, Arbasetti C, Geri T, et al. Effectiveness of specific exercise for deep cervical muscles in nonspecific neck pain: a systematic review and meta-analysis. Phys Ther. 2022;102(5):pzac001. doi: 10.1093/ptj/pzac001. PMID: 35079832. **Exclusion reason**: Wrong population

74. Gasbjerg K, Hagi-Pedersen D, Lunn T, et al. Effect of dexamethasone as an analgesic adjuvant to multimodal pain treatment after total knee arthroplasty: randomised clinical trial. BMJ. 2022;376:e067325. doi: 10.1136/bmj-2021-067325. PMID: 34983775. **Exclusion reason**: Wrong intervention

75. Geiler K, Schulze M, Inhestern J, et al. The effect of adjuvant oral application of honey in the management of postoperative pain

after tonsillectomy in adults: a pilot study. PloS One. 2020;15(2):e0228481. doi: 10.1371/journal.pone.0228481. PMID: 32040956. **Exclusion reason:** Ineligible intervention

76. Gianola S, Bargeri S, Del Castillo G, et al. Effectiveness of treatments for acute and subacute mechanical non-specific low back pain: a systematic review with network meta-analysis. Br J Sports Med. 2022;56(1):41-50. doi: 10.1136/bjsports-2020-103596. PMID: 33849907. **Exclusion reason:** Paper pulled for background

77. Gierthmuehlen M, Jarc N, Plachta DTT, et al. Mastication after craniotomy: pilot assessment of postoperative oral health-related quality of life. Acta Neurochir. 2021;19:19. doi: 10.1007/s00701-021-05020-w. PMID: 34668078. **Exclusion reason:** Ineligible population

78. Gorenkov RV, Dadasheva MN, Zolotovskaya IA, et al. Comparative efficacy and tolerance of centrally acting muscle relaxants in elderly patients with nonspecific musculoskeletal pain. Nevrologiya, neiropsikhiatriya, psikhosomatika. 2020;12(1):39-44. doi: 10.14412/2074-2711-2020-1-39-44. **Exclusion reason:** Ineligible comparator

79. Gundogdu E, Arslan H. Effects of various cryotherapy applications on postoperative pain in molar teeth with symptomatic apical periodontitis: a preliminary randomized prospective clinical trial. J Endod. 2018;44(3):349-54. doi: 10.1016/j.joen.2017.11.002. PMID: 29398090. **Exclusion reason**: Wrong intervention

80. Hadad H, Santos AFP, de Jesus LK, et al. Photobiomodulation therapy improves postoperative pain and edema in third molar surgeries: a randomized, comparative, double-blind, and prospective clinical trial. J Oral Maxillofac Surg. 2021;06:06. doi: 10.1016/j.joms.2021.08.267. PMID: 34656515. **Exclusion reason:** Ineligible intervention

81. Haines KL, Fuller M, Vaughan JG, et al. The impact of nonsteroidal anti-inflammatory drugs on older adult trauma patients with hip fractures. J Surg Res. 2020;255:583-93. doi: 10.1016/j.jss.2020.05.064. PMID: 32650142. **Exclusion reason:** Ineligible intervention

82. Hall M, Dobson F, Plinsinga M, et al. Effect of exercise on pain processing and motor output in people with knee osteoarthritis: a systematic review and meta-analysis. Osteoarthritis Cartilage. 2020;28(12):1501-13. doi: 10.1016/j.joca.2020.07.009. PMID: 32783909. **Exclusion reason:** Ineligible population

83. Halvachizadeh S, Stalder AL, Bellut D, et al. Systematic review and meta-analysis of 3 treatment arms for vertebral compression fractures: a comparison of improvement in pain, adjacent-level fractures, and quality of life between vertebroplasty, kyphoplasty, and nonoperative management. JBJS Reviews. 2021;9(10):25. doi: 10.2106/JBJS.RVW.21.00045. PMID: 34695056. **Exclusion reason:** Ineligible intervention

84. Hamilton DF, Beard DJ, Barker KL, et al. Targeting rehabilitation to improve outcomes after total knee arthroplasty in patients at risk of poor outcomes: randomised controlled trial. BMJ. 2020;371:m3576. doi: 10.1136/bmj.m3576. PMID: 33051212. **Exclusion reason:** Ineligible population

85. Hamilton T, Knight R, Stokes J, et al. Efficacy of liposomal bupivacaine and bupivacaine hydrochloride vs bupivacaine hydrochloride alone as a periarticular anesthetic for patients undergoing knee replacement: a randomized clinical trial. JAMA Surg. 2022;Online ahead of print:e220713. doi: 10.1001/jamasurg.2022.0713. PMID: 35385072. **Exclusion reason**: Wrong intervention

86. Hanley AW, Gililland J, Erickson J, et al. Brief preoperative mind-body therapies for total joint arthroplasty patients: a randomized controlled trial. Pain. 2021;162(6):1749-57. doi: 10.1097/j.pain.0000000000002195. PMID: 33449510. **Exclusion reason:** Ineligible intervention

87. Hanley AW, Gililland J, Garland EL. To be mindful of the breath or pain: comparing two brief preoperative mindfulness techniques for total joint arthroplasty patients. J Consult Clin Psychol.

2021;89(7):590-600. doi: 10.1037/ccp0000657. PMID: 34165999. **Exclusion reason:** Ineligible intervention

88. Hannon CP, Fillingham YA, Browne JA, et al. The efficacy and safety of gabapentinoids in total joint arthroplasty: systematic review and direct meta-analysis. J Arthroplasty. 2020;35(10):2730-8.e6. doi: 10.1016/j.arth.2020.05.033. PMID: 32586656. **Exclusion reason:** Inadequate duration

89. Hannon CP, Fillingham YA, Nam D, et al. The efficacy and safety of opioids in total joint arthroplasty: systematic review and direct meta-analysis. J Arthroplasty. 2020;35(10):2759-71.e13. doi: 10.1016/j.arth.2020.05.032. PMID: 32571589. **Exclusion reason:** Inadequate duration

90. Hartwell MJ, Selley RS, Alvandi BA, et al. Reduced opioid prescription after anterior cruciate ligament reconstruction does not affect postoperative pain or prescription refills: a prospective, surgeon-blinded, randomized, controlled trial. Arthrosc Sports Med Rehabil. 2021;3(3):e651-e8. doi: 10.1016/j.asmr.2020.12.012. PMID: 34195628. **Exclusion reason:** Paper pulled for background

91. Hays R, Shannon Z, Long C, et al. Health-related quality of life among United States service members with low back pain receiving usual care plus chiropractic care plus usual care vs usual care alone: secondary outcomes of a pragmatic clinical trial. Pain Med. 2022;Online ahead of print:pnac009. doi: 10.1093/pm/pnac009. PMID: 35060609. **Exclusion reason**: Wrong population

92. Hendawy HA, Abuelnaga ME. Postoperative analgesic efficacy of ear acupuncture in patients undergoing abdominal hysterectomy: a randomized controlled trial. BMC Anesthesiol. 2020;20(1):279. doi: 10.1186/s12871-020-01187-4. PMID: 33167893. **Exclusion reason:** Ineligible intervention

93. Hosomi K, Sugiyama K, Nakamura Y, et al. A randomized controlled trial of 5 daily sessions and continuous trial of 4 weekly sessions of repetitive transcranial magnetic stimulation for neuropathic pain. Pain. 2020;161(2):351-60. doi: 10.1097/j.pain.0000000000001712. PMID: 31593002. **Exclusion reason:** Ineligible population

94. Huang Q, Lin J, Han R, et al. Using virtual reality exposure therapy in pain management: a systematic review and meta-analysis of randomized controlled trials. Value Health. 2022;25(2):288-301. doi: 10.1016/j.jval.2021.04.1285. PMID: 35094802. **Exclusion reason**: Wrong population

95. Ibrahim M, Elnabtity A, Hegab A, et al. Combined opioid free and loco-regional anaesthesia enhances the quality of recovery in sleeve gastrectomy done under ERAS protocol: a randomized controlled trial. BMC Anesthesiol. 2022;22(1):29. doi: 10.1186/s12871-021-01561-w. PMID: 35062872. **Exclusion reason**: Wrong outcome

96. Ilfeld BM, Plunkett A, Vijjeswarapu AM, et al. Percutaneous peripheral nerve stimulation (neuromodulation) for postoperative pain: a randomized, sham-controlled pilot study. Anesthesiology. 2021;135(1):95-110. doi: 10.1097/ALN.0000000000003776. PMID: 33856424. **Exclusion reason:** Ineligible intervention

97. In T-S, Jung J-H, Jung K-S, et al. Effects of the multidimensional treatment on pain, disability, and sitting posture in patients with low back pain: a randomized controlled trial. Pain Res Manag. 2021;2021:5581491. doi: 10.1155/2021/5581491. PMID: 34306274. **Exclusion reason:** Ineligible population

98. Ince I, Chiu A, Sagir A, et al. Association of pain with atrial fibrillation and delirium after cardiac surgery: a DECADE sub-study. J Cardiothorac Vasc Anesth. 2021;35(10):3021-6. doi: 10.1053/j.jvca.2021.05.013. PMID: 34148803. **Exclusion reason:** Ineligible intervention

99. Irct20171009036661N. Management of the patients with hip fracture: a comparative study. http://www.who.int/trialsearch/Trial2.aspx?TrialID=IRCT20171009036661N4. 2020. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)

100. Irct20190719044276N. The comparison of effect of pregabalin and duloxetine on post-op pain. http://www.who.int/trialsearch/Trial2.aspx?TrialID=IRCT20190719044276N1. 2020. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)

101. Irizarry E, Restivo A, Salama M, et al. A randomized controlled trial of ibuprofen versus ketorolac versus diclofenac for acute, nonradicular low back pain. Acad Emerg Med. 2021;16:16. doi: 10.1111/acem.14321. PMID: 34133820. **Exclusion reason:** Ineligible comparator

102. Jacobs BL, Rogers D, Yabes JG, et al. Large reduction in opioid prescribing by a multipronged behavioral intervention after major urologic surgery. Cancer. 2021;127(2):257-65. doi: 10.1002/cncr.33200. PMID: 33002197. **Exclusion reason:** Ineligible study design

103. Jacobus D, Mehr S, Ziccardi V. Liposomal bupivacaine use in exploratory lingual nerve microsurgery: does liposomal bupivacaine use decrease postoperative pain and opioid consumption compared to bupivacaine hydrochloride? A pilot study. Quintessence Int. 2021;52(9):812-8. doi: 10.3290/j.qi.b1763651. PMID: 34269041. **Exclusion reason:** Ineligible intervention

104. Jarecki J, Sobiech M, Turzanska K, et al. A kinesio taping method applied in the treatment of postsurgical knee swelling after primary total knee arthroplasty. J Clin Med. 2021;10(13):2992. doi: 10.3390/jcm10132992. PMID: 34279474. **Exclusion reason:** Ineligible study design

105. Javaid S, Shafi M, Lodhi Y. Comparison of postoperative pain in photorefractive keratectomy using topical versus oral nonsteroidal anti–inflammatory drugs. Anaesth Pain Intensive Care. 2021;25(3):324-8. doi: 10.35975/apic.v25i3.1527. **Exclusion reason:** Ineligible intervention

106. Jiang Z, Zhou G, Song Q, et al. Effect of intravenous oxycodone in combination with different doses of dexmedetomdine on sleep quality and visceral pain in patients after abdominal surgery: a randomized study. Clin J Pain. 2018;34(12):1126-32. doi: 10.1097/AJP.0000000000000645. PMID: 30134283. **Exclusion reason**: Wrong intervention

107. Jildeh TR, Okoroha KR, Kuhlmann N, et al. Multimodal nonopioid pain protocol provides equivalent pain versus opioid control following meniscus surgery: a prospective randomized controlled trial. Arthroscopy. 2021;37(7):2237-45. doi: 10.1016/j.arthro.2021.02.043. PMID: 33713756. **Exclusion reason:** Ineligible intervention

108. Jones C, Lin C, Day R, et al. OPAL: a randomised, placebo-controlled trial of opioid analgesia for the reduction of pain severity in people with acute spinal pain-a statistical analysis plan. Trials. 2022;23(1):212. doi: 10.1186/s13063-022-06028-y. PMID: 35287698. **Exclusion reason**: Wrong comparator

109. Joseph A, Moman R, Barman R, et al. Effects of slow deep breathing on acute clinical pain in adults: a systematic review and meta-analysis of randomized controlled trials. J Evid Based Integr Med. 2022;27:2515690X221078006. doi: 10.1177/2515690X221078006. PMID: 35225720. **Exclusion reason**: Wrong population

110. Kano K, Kawamura K, Miyake T. Effects of preemptive analgesia with intravenous acetaminophen on postoperative pain relief in patients undergoing third molar surgery: a prospective, single-blind, randomized controlled trial. Med Oral Patol Oral Cir Bucal. 2021;26(1):e64-e70. doi: 10.4317/medoral.23983. PMID: 33037803. **Exclusion reason:** Ineligible intervention

111. Karlsson M, Bergenheim A, Larsson MEH, et al. Effects of exercise therapy in patients with acute low back pain: a systematic review of systematic reviews. Syst Rev. 2020;9(1):182. doi: 10.1186/s13643-020-01412-8. PMID: 32795336. **Exclusion reason:** Inadequate duration

112. Khandelwal A, Jose J, Teja K, et al. Comparative evaluation of postoperative pain and periapical healing after root canal treatment using three different base endodontic sealers - a randomized control clinical trial. J Clin Exp Dent. 2022;14(2):e144-e52. doi: 10.4317/jced.59034. PMID: 35173897. **Exclusion reason**: Wrong intervention

113. Khaw D, Bucknall T, Considine J, et al. Six-year trends in postoperative prescribing and use of multimodal analgesics following total hip and knee arthroplasty: a single-site observational study of pain management. Eur J Pain. 2021;25(1):107-21. doi: 10.1002/ejp.1652. PMID: 32969139. **Exclusion reason:** Ineligible intervention

114. Kim D, Lee YJ, Park KS, et al. The effectiveness and cost-effectiveness of motion style acupuncture treatment (MSAT) for acute neck pain: a multi-center randomized controlled trial. Medicine (Baltimore). 2020;99(44):e22871. doi: 10.1097/MD.0000000000022871. PMID: 33126334. **Exclusion reason:** Ineligible study design

115. Kim MG, Kim MY. Effects of kinesiology tape after enucleation of mandibular dentigerous cysts. J Korean Assoc Oral Maxillofac Surg. 2020;46(2):108-15. doi: 10.5125/JKAOMS.2020.46.2.108. PMID: 32364350. **Exclusion reason:** Ineligible intervention

116. Kim MS, Koh IJ, Choi KY, et al. Efficacy of duloxetine compared with opioid for postoperative pain control following total knee arthroplasty. PLoS One 2021;16(7):e0253641. doi: 10.1371/journal.pone.0253641. PMID: 34214098. **Exclusion reason:** Ineligible outcome

117. Kim MS, Koh IJ, Sung YG, et al. Preemptive duloxetine relieves postoperative pain and lowers wound temperature in centrally sensitized patients undergoing total knee arthroplasty: a randomized, double-blind, placebo-controlled trial. J Clin Med. 2021;10(13):2809. doi: 10.3390/jcm10132809. PMID: 34202314. **Exclusion reason:** Ineligible intervention

118. Kondo Y, Yoshida Y, Iioka T, et al. Short-term effects of isometric quadriceps muscle exercise with auditory and visual feedback on pain, physical function, and performance after total knee arthroplasty: a randomized controlled trial. J Knee Surg. 2020 doi: 10.1055/s-0040-1721035. PMID: 33241542. **Exclusion reason:** Ineligible intervention

119. Kong M, Li X, Shen J, et al. The effectiveness of preemptive analgesia for relieving postoperative pain after video-assisted thoracoscopic surgery (VATS): a prospective, non-randomized controlled trial. J Thorac Dis. 2020;12(9):4930-40. doi: 10.21037/jtd-20-2500. PMID: 33145067. **Exclusion reason:** Ineligible intervention

120. Koppenaal T, Pisters M, Kloek C, et al. The 3-month effectiveness of a stratified blended physiotherapy intervention in patients with nonspecific low back pain: cluster randomized controlled trial. J Med Internet Res. 2022;24(2):e31675. doi: 10.2196/31675. PMID: 35212635. **Exclusion reason**: Wrong population

121. Koppenhaver SL, Weaver AM, Randall TL, et al. Effect of dry needling on lumbar muscle stiffness in patients with low back pain: a double blind, randomized controlled trial using shear wave elastography. J Man Manip Ther. 2021:1-11. doi: 10.1080/10669817.2021.1977069. PMID: 34525901. **Exclusion reason:** Ineligible population

122. Koyuncu O, Hakimoglu S, Ugur M, et al. Acetaminophen reduces acute and persistent incisional pain after hysterectomy. Ann Ital Chir. 2018;89(4):357-66. PMID: 30337510. **Exclusion reason**: Wrong intervention

123. Kumar V, Reddy ED, Shekhar C, et al. Open cholecystectomy versus laparoscopic cholecystectomy: a comparative study at north Indian based teaching hospital. Eur J Mol Clin Med. 2021;8(4):586-91. **Exclusion reason:** Ineligible intervention

124. Kunze KN, Polce EM, Lilly DT, et al. Adjunct analgesia reduces pain and opioid consumption after hip arthroscopy: a systematic review of randomized controlled trials. Am J Sports Med. 2020;48(14):3638-51. doi: 10.1177/0363546520905884. PMID: 32119562. **Exclusion reason:** Inadequate duration

125. Lam L, Richardson MG, Zhao Z, et al. Enhanced discharge counseling to reduce outpatient opioid use after cesarean delivery: a randomized clinical trial. Am J Obstet Gynecol MFM. 2021;3(1):100286. doi: 10.1016/j.ajogmf.2020.100286. PMID: 33451618. **Exclusion reason:** Paper pulled for background

126. Lanzkron S, Little J, Wang H, et al. Treatment of acute pain in adults with sickle cell disease in an infusion center versus the

emergency department: a multicenter prospective cohort study. Ann Intern Med. 2021;174(9):1207-13. doi: 10.7326/M20-7171. PMID: 34224261. **Exclusion reason:** Ineligible intervention

127. Le H, Huynh N, Nguyen-Ho Q, et al. Effect of photobiomodulation therapy on reducing acute pain and inflammation following surgical removal of impacted mandibular third molars: a randomized, split-mouth clinical trial. Photobiomodul Photomed Laser Surg. 2022;40(4):245-51. doi: 10.1089/photob.2021.0110. PMID: 35353636. **Exclusion reason**: Wrong intervention

128. Lee CW, Lo YT, Devi S, et al. Gender differences in preoperative opioid use in spine surgery patients: a systematic review and meta-analysis. Pain Med. 2020;21(12):3292-300. doi: 10.1093/pm/pnaa266. PMID: 32989460. **Exclusion reason:** Ineligible population

129. Lee Y, Kim K. Factors related to the consumption of patient-controlled postoperative analgesics in Korea: a retrospective study. Pain Manag Nurs. 2020;21(5):449-55. doi: 10.1016/j.pmn.2019.09.006. PMID: 31859054. **Exclusion reason:** Ineligible intervention

130. Leroux EJ, Kaufman EA, Kontaxis CN, et al. Intensive cryotherapy in the emergency department (ICED): a randomized controlled trial. West J Emerg Med. 2021;22(2):445-9. doi: 10.5811/westjem.2020.10.48831. PMID: 33856337. **Exclusion reason:** Ineligible intervention

131. Li T, Wang S, Cheng K, et al. Comparing the efficacy of two different temperature stimulation in warm acupuncture on acute low back pain: a randomized controlled trial. Integr Med Res. 2022;11(1):100748. doi: 10.1016/j.imr.2021.100748. PMID: 34189032. **Exclusion reason**: Wrong intervention

132. Li WT, Bell KL, Yayac M, et al. A postdischarge multimodal pain management cocktail following total knee arthroplasty reduces opioid consumption in the 30-day postoperative period: a group-randomized trial. J Arthroplasty. 2021;36(1):164-72.e2. doi: 10.1016/j.arth.2020.07.060. PMID: 33036845. **Exclusion reason:** Ineligible intervention

133. Liampas A, Rekatsina M, Vadalouca A, et al. Pharmacological management of painful peripheral neuropathies: a systematic review. Pain Ther. 2021;10(1):55-68. doi: 10.1007/s40122-020-00210-3. PMID: 33145709. **Exclusion reason:** Ineligible population

134. Liu C, Abdel Shaheed C, Braten LC, et al. Antibiotic treatment for low back pain or radicular pain, or both. Cochrane Database Syst Rev. 2021;2021(9)doi: 10.1002/14651858.CD014221. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)

135. Liu M, Tong Y, Chai L, et al. Effects of auricular point acupressure on pain relief: a systematic review. Pain Manag Nurs. 2021;22(3):268-80. doi: 10.1016/j.pmn.2020.07.007. PMID: 32950391. **Exclusion reason:** Paper pulled for background

136. Liu X, Wei L, Zeng Q, et al. The treatment of topical drugs for postherpetic neuralgia: a network meta-analysis. Pain Physician. 2020;23(6):541-51. PMID: 33185370. **Exclusion reason:** Ineligible population

137. Llamas-Ramos I, Cortes-Rodriguez M, Llamas-Ramos R. Kinesiotape effectiveness in mechanical low back pain: a randomized clinical trial. Work. 2022;Online ahead of printdoi: 10.3233/WOR-210693. PMID: 35253707. **Exclusion reason**: Wrong population

138. MacFater W, Xia W, Barazanchi A, et al. Intravenous local anesthetic compared with intraperitoneal local anesthetic in laparoscopic colectomy: a double-blind randomized controlled trial. Ann Surg. 2022;275(1):e30-e6. doi: 10.1097/SLA.0000000000004758. PMID: 33630453. **Exclusion reason**: Wrong intervention

139. Mammoto T, Fujie K, Taguchi N, et al. Short-term effects of early postoperative celecoxib administration for pain, sleep quality, and range of motion after total knee arthroplasty: a randomized controlled trial. J Arthroplasty. 2021;36(2):526-31. doi: 10.1016/j.arth.2020.08.018. PMID:

32900564. **Exclusion reason:** Ineligible intervention

140. Marchand DK, Argaez C. CADTH health technology review. Codeine for acute extremity pain. Can J Health Technol. 2021;1(1):1-39. PMID: 34185448. **Exclusion reason:** Paper pulled for background

141. Martins-de-Barros AV, Barros AM, Siqueira AK, et al. Is dexamethasone superior to ketorolac in reducing pain, swelling and trismus following mandibular third molar removal? A split mouth triple-blind randomized clinical trial. Med Oral Patol Oral Cir Bucal. 2021;26(2):e141-e50. doi: 10.4317/medoral.24088. PMID: 33247572. **Exclusion reason:** Ineligible intervention

142. Massie L, Gunaseelan V, Waljee J, et al. Relationship between initial opioid prescription size and likelihood of refill after spine surgery. Spine J. 2021;21(5):772-8. doi: 10.1016/j.spinee.2021.01.016. PMID: 33460812. **Exclusion reason:** Ineligible comparator

143. McNicol ED, Ferguson MC, Schumann R. Single-dose intravenous ketorolac for acute postoperative pain in adults. Cochrane Database Syst Rev. 2021;5:CD013263. doi: 10.1002/14651858.CD013263.pub2. PMID: 33998669. **Exclusion reason:** Inadequate duration

144. Mei L, Wang Y, Chen Y, et al. Subxiphoid versus intercostal video-assisted thoracic surgery for lung resection: a meta-analysis. Minim Invasive Ther Allied Technol. 2022;31(3):359-69. doi: 10.1080/13645706.2020.1816555. PMID: 32930019. **Exclusion reason**: Wrong intervention

145. Meng D, Mao Y, Song Q, et al. Efficacy and safety of transcutaneous electrical acupoint stimulation (TEAS) for postoperative pain in laparoscopy: a systematic review and meta-analysis of randomized controlled trials. Evid Based Complement Alternat Med. 2022;2022:9922879. doi: 10.1155/2022/9922879. PMID: 35075367. **Exclusion reason**: Wrong intervention

146. Miranda JP, Silva WT, Silva HJ, et al. Effectiveness of cryotherapy on pain intensity, swelling, range of motion, function and recurrence in acute ankle sprain: a systematic review of randomized controlled trials. Phys Ther Sport. 2021;49:243-9. doi: 10.1016/j.ptsp.2021.03.011. PMID: 33813154. **Exclusion reason:** Paper pulled for background

147. Mohajerani H, Tabeie F, Alirezaei A, et al. Does combined low-level laser and light-emitting diode light irradiation reduce pain, swelling, and trismus after surgical extraction of mandibular third molars? A randomized double-blinded crossover study. J Oral Maxillofac Surg. 2021;79(8):1621-8. doi: 10.1016/j.joms.2020.07.017. PMID: 32780994. **Exclusion reason:** Ineligible comparator

148. Moheboleslam Z, Mohammad Rahimi N, Aminzadeh R. A systematic review and meta-analysis of randomized controlled trials of stabilizing exercises for lumbopelvic region impact in postpartum women with low back and pelvic pain. Biol Res Nurs. 2022;Online ahead of print:10998004221081083. doi: 10.1177/10998004221081083. PMID: 35343270. **Exclusion reason**: Inadequate duration

149. Monteiro LPB, Guerreiro MYR, de Castro Valino R, et al. Effect of intracanal cryotherapy application on postoperative endodontic pain: a systematic review and metaanalysis. Clin Oral Investig. 2021;25(1):23-35. doi: 10.1007/s00784-020-03693-8. PMID: 33222053. **Exclusion reason:** Systematic review or meta-analysis used as a source document

150. Moore AR, Derry S, Aldington D, et al. Adverse events associated with single dose oral analgesics for acute postoperative pain in adults - an overview of Cochrane reviews. Cochrane Database Syst Rev. 2015;2015(10):CD011407. doi: 10.1002/14651858.CD011407.pub2. PMID: 26461263. **Exclusion reason:** Paper pulled for background

151. Moore L, Norwood C, Stackhouse R, et al. Gabapentin reduces postoperative pain and opioid consumption in patients who underwent lumbar laminectomy. J Am Pharm Assoc (2003). 2021;61(5):e78-e83. doi: 10.1016/j.japh.2021.05.002. PMID: 34024754. **Exclusion reason:** Ineligible population

152. Moutzouros V, Jildeh TR, Tramer JS, et al. Can we eliminate opioids after anterior cruciate ligament reconstruction? A prospective, randomized controlled trial. Am J Sports Med. 2021 doi: 10.1177/03635465211045394. PMID: 34668795. **Exclusion reason:** Ineligible intervention

153. Muaddi H, Lillie E, Silva S, et al. The effect of cryotherapy application on post-operative pain: a systematic review and meta-analysis. Ann Surg. 2021 doi: 10.1097/SLA.0000000000004987. PMID: 34856580. **Exclusion reason:** Paper pulled for background

154. Murillo C, Treleaven J, Cagnie B, et al. Effects of dry needling of the obliquus capitis inferior on sensorimotor control and cervical mobility in people with neck pain: A double-blind, randomized sham-controlled trial. Braz J Phys Ther. 2021;05:05. doi: 10.1016/j.bjpt.2021.07.005. PMID: 34535409. **Exclusion reason:** Ineligible population

155. Myrick R, Blakemore S, Waite E, et al. Outpatient pain clinic and intranasal fentanyl to improve sickle cell disease outcomes. Pediatr Blood Cancer. 2020;67(10):e28648. doi: 10.1002/pbc.28648. PMID: 32798305. **Exclusion reason:** Ineligible intervention

156. Nabata K, Guo R, Nguyen A, et al. Superiority of non-opioid postoperative pain management after thyroid and parathyroid operations: a systematic review and meta-analysis. Surg Oncol. 2022;41:101731. doi: 10.1016/j.suronc.2022.101731. PMID: 35287097. **Exclusion reason**: Inadequate duration

157. Nalamachu S, Pergolizzi J, Kaye R. Tolperisone for the treatment of acute muscle spasm of the back: results from the dose-ranging phase 2 STAR Study (NCT03802565). J Pain Res. 3059;13:3059-69. doi: 10.2147/JPR.S278857. PMID: 33262641. **Exclusion reason:** Ineligible comparator

158. Nikolakopoulou E, Tzefronis D, Kanavos K, et al. Evaluation of oral use of dexketoprofen/tramadol in acute postoperative pain in patients undergoing total hip replacement with a minimally invasive anterior approach (amis). Pain Pract. 2020;20(SUPPL 1):51. **Exclusion reason:** Ineligible comparator

159. Noori A, Sprague S, Bzovsky S, et al. Predictors of long-term pain after hip arthroplasty in patients with femoral neck fractures: a cohort study. J Orthop Trauma. 2020;34 Suppl 3:S55-S63. doi: 10.1097/BOT.0000000000001929. PMID: 33027167. **Exclusion reason:** Ineligible intervention

160. Olausson A, Svensson J, Andrell P, et al. Total opioid-free general anaesthesia can improve postoperative outcomes after surgery, without evidence of adverse effects on patient safety and pain management: a systematic review and meta-analysis. Acta Anaesthesiol Scand. 2021;01:01. doi: 10.1111/aas.13994. PMID: 34724195. **Exclusion reason:** Ineligible intervention

161. Otao G, Maruta T, Tsuneyoshi I. Comparison of opioid local anesthetic combination regimens using the number of self-administrated boluses in patient-controlled epidural analgesia after cesarean section: a retrospective single-center study. Medicine (Baltimore). 2021;100(17):e25560. doi: 10.1097/MD.0000000000025560. PMID: 33907103. **Exclusion reason:** Ineligible intervention

162. Pace M, Gannon K, Friedland M, et al. Influence of inpatient opioid consumption on persistent use following total knee arthroplasty. Reg Anesth Pain Med. 2021;46(2):99-103. doi: 10.1136/rapm-2020-101582. PMID: 33172905. **Exclusion reason:** Ineligible intervention

163. Pal S, Dixit R, Moe S, et al. Transcutaneous electrical nerve stimulation (TENS) for pain management in sickle cell disease. Cochrane Database Syst Rev. 2020;3(3):CD012762. doi: 10.1002/14651858.CD012762.pub2. PMID: 32124977. **Exclusion reason:** Paper pulled for background

164. Park S, Nahm FS, Han WK, et al. The 5% lidocaine patch for decreasing postoperative pain and rescue opioid use in sternotomy: a prospective, randomized, double-blind trial. Clin Ther. 2020;42(12):2311-20. doi: 10.1016/j.clinthera.2020.10.011. PMID: 33223228. **Exclusion reason:** Ineligible population

165. Parseliunas A, Paskauskas S, Kubiliute E, et al. Transcutaneous electric nerve stimulation reduces acute postoperative pain and analgesic use after open inguinal hernia surgery: a randomized, double-blind, placebo-controlled trial. J Pain. 2021;22(5):533-44. doi: 10.1016/j.jpain.2020.11.006. PMID: 33309784. **Exclusion reason:** Ineligible intervention

166. Patel H, Uppin R, Naidu A, et al. Efficacy and safety of combination of NSAIDs and muscle relaxants in the management of acute low back pain. Pain Ther. 2019;8(1):121-32. doi: 10.1007/s40122-019-0112-6. PMID: 30652262. **Exclusion reason**: Wrong intervention

167. Patel AA, Walker CT, Prendergast V, et al. Patient-controlled analgesia following lumbar spinal fusion surgery is associated with increased opioid consumption and opioid-related adverse events. Neurosurgery. 2020;87(3):592-601. doi: 10.1093/neuros/nyaa111. PMID: 32357244. **Exclusion reason:** Ineligible population

168. Pawloski K, Sevilimedu V, Twersky R, et al. Association between local anesthetic dosing, postoperative opioid requirement, and pain scores after lumpectomy and sentinel lymph node biopsy with multimodal analgesia. Ann Surg Oncol. 2022;29(3):1737-45. doi: 10.1245/s10434-021-10981-4. PMID: 34694521. **Exclusion reason**: Wrong intervention

169. Pereira VBP, Torriceli AAM, Garcia R, et al. Codeine plus acetaminophen improve sleep quality, daily activity level, and food intake in the early postoperative period after photorefractive keratectomy: a secondary analysis. Arq Bras Oftalmol. 2021;84(1):45-50. doi: 10.5935/0004-2749.20210008. PMID: 33470341. **Exclusion reason:** Ineligible comparator

170. Pergolizzi JV, Magnusson P, LeQuang JA, et al. Can NSAIDs and acetaminophen effectively replace opioid treatment options for acute pain? Expert opinion on pharmacotherapy. Expert Opinion on Pharmacotherapy. 2021;22(9):1119-26. doi: 10.1080/14656566.2021.1901885. PMID: 33689517. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)

171. Pius AK, Jones E, Bonnell LN, et al. Patients' experience with opioid pain medication after discharge from surgery: a mixed-methods study. J Surg Res. 2020;256:328-37. doi: 10.1016/j.jss.2020.06.026. PMID: 32731094. **Exclusion reason:** Ineligible intervention

172. Plewniak KM, Kintzer E, Eisenberg R, et al. Examining reduced opioid prescriptions after gynecologic laparoscopy: a randomized controlled trial. J Minim Invasive Gynecol. 2021;28(2):366-73. doi: 10.1016/j.jmig.2020.07.001. PMID: 32652243. **Exclusion reason:** Paper pulled for background

173. Potnuru PP, Patel SD, Birnbach DJ, et al. Effects of state law limiting postoperative opioid prescription in patients after cesarean delivery. Anesth Analg. 2021;132(3):752-60. doi: 10.1213/ANE.0000000000004993. PMID: 32639388. **Exclusion reason:** Ineligible outcome

174. Price R, Charlot K, Frieler S, et al. The efficacy of cannabis in reducing back pain: a systematic review. Global Spine J. 2022;12(2):343-52. doi: 10.1177/21925682211065411. PMID: 35128969. **Exclusion reason**: Wrong population

175. Pritchard KT, Baillargeon J, Raji MA, et al. Association of occupational and physical therapy with duration of prescription opioid use after hip or knee arthroplasty: a retrospective cohort study of Medicare enrollees. Arch Phys Med Rehabil. 2021;102(7):1257-66. doi: 10.1016/j.apmr.2021.01.086. PMID: 33617862. **Exclusion reason:** Ineligible intervention

176. Qi T, Lan H, Zhong C, et al. Systematic review and meta-analysis: the effectiveness and safety of acupuncture in the treatment of herpes zoster. Ann Palliat Med. 2022;11(2):756-65. doi: 10.21037/apm-22-109. PMID: 35249352. **Exclusion reason**: Wrong intervention

177. Rhon DI, Mayhew RJ, Greenlee TA, et al. The influence of a MOBile-based video Instruction for Low back pain (MOBIL) on

initial care decisions made by primary care providers: a randomized controlled trial. BMC Fam Pract. 2021;22(1):200. doi: 10.1186/s12875-021-01549-y. PMID: 34627152. **Exclusion reason:** Ineligible population

178. Roofthooft E, Joshi GP, Rawal N, et al. PROSPECT guideline for elective caesarean section: updated systematic review and procedure-specific postoperative pain management recommendations. Anaesthesia. 2021;76(5):665-80. doi: 10.1111/anae.15339. PMID: 33370462. **Exclusion reason:** Inadequate duration

179. Rubin MA, Stark NF, Harsmar SJC, et al. Pre-operative epidural analgesia in hip fracture patients - a systematic review and meta-analysis. Acta Anaesthesiol Scand. 2021;65(5):578-89. doi: 10.1111/aas.13760. PMID: 33296497. **Exclusion reason:** Ineligible intervention

180. Ruddell JH, Reid DBC, Shah KN, et al. Larger initial opioid prescriptions following total joint arthroplasty are associated with greater risk of prolonged use. J Bone Joint Surg Am. 2021;103(2):106-14. doi: 10.2106/JBJS.20.00732. PMID: 33074953. **Exclusion reason:** Ineligible outcome

181. Said AM, Zubovic E, Ha AY, et al. Effects of single-dose preoperative pregabalin on postoperative pain and opioid consumption in cleft orthognathic surgery. J Craniofac Surg. 2021;32(2):517-20. doi: 10.1097/SCS.0000000000007109. PMID: 33704973. **Exclusion reason:** Ineligible intervention

182. Saleh C, Ilia T, Jaszczuk P, et al. Is transcranial magnetic stimulation as treatment for neuropathic pain in patients with spinal cord injury efficient? A systematic review. Neurol Sci. 2022;43(5):3007-18. doi: 10.1007/s10072-022-05978-0. PMID: 35239053. **Exclusion reason**: Wrong population

183. Saleh M, Botla A, Elbehary N. Effect of core stability exercises on postpartum lumbopelvic pain: a randomized controlled trial. J Back Musculoskelet Rehabil. 2019;32(2):205-13. doi: 10.3233/bmr-181259. PMID: 30282349. **Exclusion reason**: Wrong population

184. Santini M, Da Rosa RA, Ferreira MB, et al. Medications used for prevention and treatment of postoperative endodontic pain: a systematic review. Eur Endod J. 2021;6(1):15-24. doi: 10.14744/eej.2020.85856. PMID: 33609020. **Exclusion reason:** Paper pulled for background

185. Sbardella S, La Russa C, Bernetti A, et al. Muscle energy technique in the rehabilitative treatment for acute and chronic non-specific neck pain: a systematic review. Healthcare (Basel). 2021;9(6):746. doi: 10.3390/healthcare9060746. PMID: 34204590. **Exclusion reason:** Ineligible intervention

186. Scott G, Gong J, Kirkpatrick C, et al. Systematic review and meta-analysis of oral paracetamol versus combination oral analgesics for acute musculoskeletal injuries. Emerg Med Australas. 2021;33(1):107-13. doi: 10.1111/1742-6723.13596. PMID: 32864884. **Exclusion reason:** Paper pulled for background

187. Sellbrant I, Blomstrand J, Karlsson J, et al. Brace versus cast following surgical treatment of distal radial fracture: a prospective randomised study comparing quality of recovery. F1000Res. 2021;10(336)doi: 10.12688/f1000research.52046.2. PMID: 35211291. **Exclusion reason**: Wrong intervention

188. Selley RS, Hartwell MJ, Alvandi BA, et al. Risk factors for increased consumption of narcotics after hip arthroscopy: a prospective, randomized control trial. J Am Acad Orthop Surg. 2021;29(12):527-36. doi: 10.5435/JAAOS-D-20-00122. PMID: 33252549. **Exclusion reason:** Paper pulled for background

189. Seppanen SM, Kuuskoski R, Makela KT, et al. Intranasal dexmedetomidine reduces postoperative opioid requirement in patients undergoing total knee arthroplasty under general anesthesia. J Arthroplasty. 2021;36(3):978-85.e1. doi: 10.1016/j.arth.2020.09.032. PMID: 33046329. **Exclusion reason:** Ineligible intervention

190. Sethi PM, Mandava NK, Liddy N, et al. Narcotic requirements after shoulder arthroplasty are low using a multimodal

approach to pain. JSES Int. 2021;5(4):722-8. doi: 10.1016/j.jseint.2021.02.005. PMID: 34223421. **Exclusion reason:** Ineligible intervention

191. Shacklock M, Rade M, Poznic S, et al. Treatment of sciatica and lumbar radiculopathy with an intervertebral foramen opening protocol: pilot study in a hospital emergency and in-patient setting. Physiother Theory Pract. 2022;Online ahead of print:1-11. doi: 10.1080/09593985.2022.2037797. PMID: 35253599. **Exclusion reason**: Wrong population

192. Shah NM, Andriani LA, Mofidi JL, et al. Therapeutic suggestion in postoperative pain control: a randomized controlled trial. Female Pelvic Med Reconstr Surg. 2021;27(7):409-14. doi: 10.1097/SPV.0000000000000906. PMID: 32541300. **Exclusion reason:** Ineligible intervention

193. Sharma NK, Aoyagi K, Crouch Young MK, et al. Protocol for testing yoga to reduce post-lumbar spine surgery pain: a methodology article. Int J Yoga Therap. 2021 doi: 10.17761/2021-D-20-00016. PMID: 34280297. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)

194. Sharma TH, Vasudeva V, Patil K, et al. An observational study to compare epidural tramadol and epidural fentanyl for postoperative analgesia in lower limb orthopaedic replacement surgeries. Indian J Forensic Med Toxicol. 2021;15(3):557-66. doi: 10.37506/ijfmt.v15i3.15363. **Exclusion reason:** Ineligible intervention

195. Singh A, Zai CC, Freeman N, et al. Supporting pharmacogenetic-guided opioid prescriptions for post-operative pain: the design, protocol and preliminary results of the OTP Study. J Psychiatr Res. 2021;138:24-33. doi: 10.1016/j.jpsychires.2021.03.040. PMID: 33812277. **Exclusion reason:** Paper pulled for background

196. Singh T, Kathuria S, Jain R, et al. Premedication with pregabalin 150mg versus 300mg for postoperative pain relief after laparoscopic cholecystectomy. J Anaesthesiol Clin Pharmacol. 2020;36(4):518-23. doi: 10.4103/joacp.JOACP_440_19. PMID: 33840934. **Exclusion reason:** Ineligible intervention

197. Singla N, Bertoch T, Shenoy S, et al. Efficacy and safety of single-dose DFN-15 for treatment of acute postsurgical dental pain: a randomized, double-blind, placebo-controlled study. Pain. 2021 doi: 10.1097/j.pain.0000000000002312. PMID: 34252915. **Exclusion reason:** Ineligible comparator

198. Sisco-Taylor BL, Magel JS, McFadden M, et al. Changes in pain catastrophizing and fear-avoidance beliefs as mediators of early physical therapy on disability and pain in acute low-back pain: a secondary analysis of a clinical trial. Pain Medicine. 2021;06:06. doi: 10.1093/pm/pnab292. PMID: 34613379. **Exclusion reason:** Ineligible intervention

199. Smith WR, Ataga KI, Saraf SL, et al. The effect of crizanlizumab on the number of days requiring opioid use for management of pain associated with vaso-occlusive crises in patients with sickle cell disease: results from the sustain trial. Blood. 2020;136(SUPPL 1):32-3. doi: 10.1182/blood-2020-140428. PMID: CN-02271432 NEW. **Exclusion reason:** Ineligible comparator

200. Soares LO, Ferreira GE, Costa LOP, et al. Meditation for adults with non-specific low back pain: a systematic review and meta-analysis. Scand J Pain. 2021;13:13. doi: 10.1515/sjpain-2021-0096. PMID: 34516731. **Exclusion reason:** Inadequate duration

201. Solanki SL, Thota RS, Rajan J, et al. Multimodal opioid sparing onco-anesthesia: a consensus practice guideline from Society of Onco-Anesthesia and Perioperative Care (SOAPC). J Opioid Manag. 2021;17(5):417-37. doi: 10.5055/jom.2021.0675. PMID: 34714542. **Exclusion reason:** Paper pulled for background

202. Stryder BT, Szakiel PM, Kelly M, et al. Reduced opioid use among patients who received liposomal bupivacaine for ACL reconstruction. Orthopedics. 2021;44(2):e229-e35. doi: 10.3928/01477447-20210104-03. PMID: 33416897. **Exclusion reason:** Ineligible intervention

203. Su X, Qian H, Chen B, et al. Acupuncture for acute low back pain: a systematic review and meta-analysis. Ann Palliat Med. 2021;10(4):3924-36. doi: 10.21037/apm-20-1998. PMID: 33894708. **Exclusion reason:** Paper pulled for background

204. Sun X, Huang L, Wang L, et al. Efficacy of pulsed electromagnetic field on pain and physical function in patients with low back pain: a systematic review and meta-analysis. Clin Rehabil. 2022;36(5):636-49. doi: 10.1177/02692155221074052. PMID: 35077249. **Exclusion reason**: Wrong intervention

205. Tamartash H, Bahrpeyma F, Mokhtari Dizaji M. Comparative effect of lumbar myofascial release with electrotherapy on the elastic modulus of lumbar fascia and pain in patients with non-specific low back pain. J Bodyw Mov Ther. 2022;29:174-9. doi: 10.1016/j.jbmt.2021.10.008. PMID: 35248268. **Exclusion reason**: Wrong population

206. Tamboli M, Mariano ER, Gustafson KE, et al. A multidisciplinary patient-specific opioid prescribing and tapering protocol is associated with a decrease in total opioid dose prescribed for six weeks after total hip arthroplasty. Pain Med. 2020;21(7):1474-81. doi: 10.1093/pm/pnz260. PMID: 31710680. **Exclusion reason:** Ineligible outcome

207. Tangtiphaiboontana J, Figoni AM, Luke A, et al. The effects of nonsteroidal anti-inflammatory medications after rotator cuff surgery: a randomized, double-blind, placebo-controlled trial. J Shoulder Elbow Surg. 2021;30(9):1990-7. doi: 10.1016/j.jse.2021.05.018. PMID: 34174448. **Exclusion reason:** Ineligible intervention

208. Tay HP, Wang X, Narayan SW, et al. Persistent postoperative opioid use after total hip or knee arthroplasty: a systematic review and meta-analysis. Am J Health Syst Pharm. 2021;19:19. doi: 10.1093/ajhp/zxab367. PMID: 34537828. **Exclusion reason:** Inadequate duration

209. Tctr. Intranasal ketamine versus intravenous morphine for older adults with musculoskeletal pain in the emergency department: a randomized controlled trial. http://www.who.int/trialsearch/Trial2.aspx?TrialID=TCTR20201229004. 2020. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)

210. Theosmy EG, Bradian AK, Cheesman QT, et al. Opioid-free arthroscopic rotator cuff repair. Orthopedics. 2021;44(2):e301-e5. doi: 10.3928/01477447-20201216-03. PMID: 33373466. **Exclusion reason:** Ineligible study design

211. Thompson W, Howe S, Pitkeathley C, et al. Outcomes to evaluate care for adults with acute dental pain and infection: a systematic narrative review. BMJ Open. 2022;12(2):e057934. doi: 10.1136/bmjopen-2021-057934. PMID: 35190445. **Exclusion reason**: Inadequate duration

212. Tobias AF, Moura EC, Honda CA, et al. Evaluation of the efficacy of prolonged pregabalin administration before and after surgery in patients undergoing arthroscopic anterior cruciate ligament repair: a prospective, randomized, double-blind study. Clin J Pain. 2020;36(8):584-8. doi: 10.1097/AJP.0000000000000841. PMID: 32398443. **Exclusion reason:** Ineligible intervention

213. Tongbua S, Sri-On J, Thong-On K, et al. Non-inferiority of intranasal ketamine compared to intravenous morphine for musculoskeletal pain relief among older adults in an emergency department: a randomised controlled trial. Age Ageing. 2022;51(3):afac073. doi: 10.1093/ageing/afac073. PMID: 35348606. **Exclusion reason**: Wrong intervention

214. Topdemir EA, Saritas S. The effect of acupressure and Reiki application on patient's pain and comfort level after laparoscopic cholecystectomy: a randomized controlled trial. Complement Ther Clin Pract. 2021;43:101385. doi: 10.1016/j.ctcp.2021.101385. PMID: 33836405. **Exclusion reason:** Ineligible population

215. Torabi J, Kaban JM, Lewis E, et al. Ketorolac use for pain management in trauma patients with rib fractures does not increase of acute kidney injury or incidence of bleeding. Am Surg. 2021;87(5):790-5. doi: 10.1177/0003134820954835. PMID: 33231476. **Exclusion reason:** Ineligible intervention

216. Traeger A, Lee H, Hubscher M, et al. Effect of intensive patient education vs placebo patient education on outcomes in patients with acute low back pain: a randomized clinical trial. JAMA Neurol. 2019;76(2):161-9. doi: 10.1001/jamaneurol.2018.3376. PMID: 30398542. **Exclusion reason**: Wrong intervention

217. Tran KK, VanDaele MA, Tran S, et al. Evaluation of acute postoperative pain management during an injectable opioid shortage. Ann Pharmacother. 2021;55(5):611-7. doi: 10.1177/1060028020962037. PMID: 32959671. **Exclusion reason:** Ineligible comparator

218. Turner NJ, Long DA, Bongiorno JR, et al. Comparing two doses of intramuscular ketorolac for treatment of acute musculoskeletal pain in a military emergency department. Am J Emerg Med. 2021;50:142-7. doi: 10.1016/j.ajem.2021.07.054. PMID: 34365063. **Exclusion reason:** Ineligible intervention

219. van der Gaag WH, Roelofs DDMP, Enthoven TMW, et al. Non-steroidal anti-inflammatory drugs for acute low back pain. Cochrane Database Syst Rev. 2020;4(4):CD013581. doi: 10.1002/14651858.CD013581. PMID: 32297973. **Exclusion reason:** Paper pulled for background

220. Vasilopoulos T, Wardhan R, Rashidi P, et al. Patient and procedural determinants of postoperative pain trajectories. Anesthesiology. 2021;134(3):421-34. doi: 10.1097/ALN.0000000000003681. PMID: 33449996. **Exclusion reason:** Ineligible intervention

221. Vaughan SA, Torres K, Kaye R. RESUME-1: a Phase III study of tolperisone in the treatment of painful, acute muscle spasms of the back. Pain Manag. 2021 doi: 10.2217/pmt-2021-0041. PMID: 34192885. **Exclusion reason:** Ineligible publication type/not a study (letter, editorial, non-systematic review article, no original data)

222. Velayos M, Alonso M, Delgado-Miguel C, et al. Percutaneous cryoanalgesia: a new strategy for pain management in pectus excavatum surgery. Eur J Pediatr Surg. 2022;32(1):73-9. doi: 10.1055/s-0041-1740555. PMID: 34942673. **Exclusion reason**: Wrong population

223. Vera J, Ochoa J, Romero M, et al. Intracanal cryotherapy reduces postoperative pain in teeth with symptomatic apical periodontitis: a randomized multicenter clinical trial. J Endod. 2018;44(1):4-8. doi: 10.1016/j.joen.2017.08.038. PMID: 29079057. **Exclusion reason**: Wrong intervention

224. Viel E, Eerdekens M, Kandaswamy P. Treatment impact on patient-reported outcomes in peripheral neuropathic pain: comparing single intervention with topical high-concentration capsaicin to daily oral pregabalin. Pain Physician. 2021;24(6):453-63. PMID: 34554688. **Exclusion reason:** Ineligible population

225. Villanueva-Ruiz I, Falla D, Lascurain-Aguirrebena I. Effectiveness of specific neck exercise for nonspecific neck pain; usefulness of strategies for patient selection and tailored exercise - a systematic review with meta-analysis. Phys Ther. 2022;102(2):pzab259. doi: 10.1093/ptj/pzab259. PMID: 34935963. **Exclusion reason**: Wrong population

226. Viswanathan M, Ansari MT, Berkman ND, et al. Assessing the risk of bias of individual studies in systematic reviews of health care interventions. AHRQ Methods Guide for Effectiveness and Comparative Effectiveness Reviews. AHRQ Publication No.12-EHC047-EF. Rockville, MD: Agency for Healthcare Research and Quality; March 2012. **Exclusion reason:** Paper pulled for background

227. Wallen GR, Middleton KR, Kazmi NB, et al. A randomized clinical hypnosis pilot study: improvements in self-reported pain impact in adults with sickle cell disease. Evid Based Complement Alternat Med. 2021;2021:5539004. doi: 10.1155/2021/5539004. PMID: 34457024. **Exclusion reason:** Ineligible population

228. Wang J, Zhao G, Song G, et al. The efficacy and safety of local anesthetic techniques for postoperative analgesia after cesarean section: a Bayesian network meta-analysis of randomized controlled trials. J Pain Res. 2021;14:1559-72. doi: 10.2147/JPR.S313972. PMID: 34103981.

Exclusion reason: Paper pulled for background

229. Wang X, Narayan SW, Penm J, et al. Gastrointestinal adverse events in hospitalized patients following orthopedic surgery: tapentadol immediate release versus oxycodone immediate release. Pain Physician. 2021;24(3):E309-E15. PMID: 33988952. **Exclusion reason:** Ineligible population

230. Wentz AE, Wang RC, Marshall BDL, et al. Opioid analgesics and persistent pain after an acute pain emergency department visit: evidence from a cohort of suspected urolithiasis patients. J Emerg Med. 2021;21:21. doi: 10.1016/j.jemermed.2021.09.002. PMID: 34690022. **Exclusion reason:** Ineligible outcome

231. Wilt ZT, Tan TL, Rondon AJ, et al. Preoperative sedative use and other risk factors for continued narcotic use after total knee arthroplasty: a comprehensive analysis of a mandatory database. Orthopedics. 2021;44(1):e50-e4. doi: 10.3928/01477447-20201026-01. PMID: 33141227. **Exclusion reason:** Ineligible intervention

232. Wladis EJ, Rothschild MI, Rubinstein TJ. Management of postoperative pain in ophthalmic plastic surgery: a major review. Orbit. 2021;40(4):269-73. doi: 10.1080/01676830.2020.1793373. PMID: 32669009. **Exclusion reason:** Ineligible study design

233. Wolf SJ, Byyny R, Carpenter CR, et al. Clinical policy: critical issues related to opioids in adult patients presenting to the emergency department. Ann Emerg Med. 2020;76(3):e13-e39. doi: 10.1016/j.annemergmed.2020.06.049. PMID: 32828340. **Exclusion reason:** Paper pulled for background

234. Wouters RM, Porsius JT, van der Oest MJW, et al. Psychological characteristics, female sex, and opioid use predict acute postoperative pain in patients surgically treated for thumb base osteoarthritis: a cohort study. Plast Reconstr Surg. 2020;146(6):1307-16. doi: 10.1097/PRS.0000000000007337. PMID: 33234961. **Exclusion reason:** Ineligible outcome

235. Wu B, Yang L, Fu C, et al. Efficacy and safety of acupuncture in treating acute low back pain: a systematic review and bayesian network meta-analysis. Ann Palliat Med. 2021;10(6):6156-67. doi: 10.21037/apm-21-551. PMID: 34118845. **Exclusion reason:** Paper pulled for background

236. Xiao M, Cohen SA, Cheung EV, et al. Pain management in shoulder arthroplasty: a systematic review and network meta-analysis of randomized controlled trials. J Shoulder Elbow Surg. 2021;30(11):2638-47. doi: 10.1016/j.jse.2021.06.008. PMID: 34284094. **Exclusion reason:** Paper pulled for background

237. Xuan C, Yan W, Wang D, et al. Effect of preemptive acetaminophen on opioid consumption: a meta-analysis. Pain Physician. 2021;24(2):E153-E60. PMID: 33740343. **Exclusion reason:** Paper pulled for background

238. Yalcin I, Ergun A. Effects on Turkish ice cream employees' musculoskeletal pain of a physical activity and ergonomics improvement program in the workplace. Int J Occup Saf Ergon. 2022:1-7. doi: 10.1080/10803548.2021.2020581. PMID: 34927554. **Exclusion reason:** Ineligible population

239. Yildirim P, Gultekin A. The effect of a stretch and strength-based yoga exercise program on patients with neuropathic pain due to lumbar disc herniation. Spine. 2022 doi: 10.1097/BRS.0000000000004316. PMID: 35019882. **Exclusion reason:** Ineligible population

240. Yin X, Wang X, He C. Comparative efficacy of therapeutics for traumatic musculoskeletal pain in the emergency setting: a network meta-analysis. Am J Emerg Med. 2021;46:424-9. doi: 10.1016/j.ajem.2020.10.038. PMID: 33131973. **Exclusion reason:** Inadequate duration

241. Yoon Y, Ko M, Cho I, et al. Effects of personal low-frequency stimulation device on myalgia: a randomized controlled trial. Int J Environ Res Public Health. 2022;19(2):735. doi: 10.3390/ijerph19020735. PMID: 35055558. **Exclusion reason**: Wrong population

242. Young JC, Dasgupta N, Chidgey BA, et al. Impacts of initial prescription length and prescribing limits on risk of prolonged postsurgical opioid use. Med Care. 2022;60(1):75-82. doi: 10.1097/MLR.0000000000001663. PMID: 34812786. **Exclusion reason:** Ineligible comparator

243. Yu R, Zhuo Y, Feng E, et al. The effect of musical interventions in improving short-term pain outcomes following total knee replacement: a meta-analysis and systematic review. J Orthop Surg Res. 2020;15(1):465. doi: 10.1186/s13018-020-01995-x. PMID: 33036637. **Exclusion reason:** Inadequate duration

244. Yu XJ, Zhang L, Lu WY, et al. [Effect of electroacupuncture combined with caudal epidural injection on functional rehabilitation of patients with lumbar hernia]. Zhen Ci Yan Jiu. 2021;46(7):605-9. doi: 10.13702/j.1000-0607.200383. PMID: 34369682. **Exclusion reason:** Study covered in included systematic review

245. Zamora FJ, Madduri RP, Philips AA, et al. Evaluation of the efficacy of liposomal bupivacaine in total joint arthroplasty. J Pharm Pract. 2021;34(3):403-6. doi: 10.1177/0897190019872577. PMID: 31526058. **Exclusion reason:** Ineligible intervention

246. Zeng D, Yan X, Deng H, et al. Placebo response varies between different types of sham acupuncture: a randomized double-blind trial in neck pain patients. Eur J Pain. 2022;26(5):1006-20. doi: 10.1002/ejp.1924. PMID: 35129852. **Exclusion reason**: Wrong population

247. Zhang F, Zhao J, Jiang N, et al. Meta-analysis of Tai Chi Chuan in treating lumbar spondylosis and back pain. Appl Bionics Biomech. 2022;2022:2759977. doi: 10.1155/2022/2759977. PMID: 35178121. **Exclusion reason**: Wrong population

248. Zhang J, Yu L, Mei J, et al. Effect of auricular acupressure on acute pain in nursing home residents with mild dementia: a single-blind, randomized, sham-controlled study. Evid Based Complement Alternat Med. 2022;2022:6406383. doi: 10.1155/2022/6406383. PMID: 35310034. **Exclusion reason**: Wrong population

249. Zhang M, Zhang SQ, Ma S, et al. Collateral-pricking and blood-letting cupping combined with electroacupuncture for post-herpetic neuralgia. World J Acupunct Moxibustion. 2021;31(3):172-5. doi: 10.1016/j.wjam.2021.05.010. **Exclusion reason:** Ineligible population

250. Zhang S, Yang Y, Gu M, et al. Effects of low back pain exercises on pain symptoms and activities of daily living: a systematic review and meta-analysis. Percept Mot Skills. 2022;129(1):63-89. doi: 10.1177/00315125211059407. PMID: 34911404. **Exclusion reason**: Wrong population

251. Zhao W, Huang H, Liu K, et al. Acupuncture and moxibustion for peripheral neuropathic pain: a frequentist network meta-analysis and cost-effectiveness evaluation. Evid Based Complement Alternat Med. 2022;2022:6886465. doi: 10.1155/2022/6886465. PMID: 35341147. **Exclusion reason**: Inadequate duration

252. Zhu L, Li L, Yin B, et al. Effect of continuous nursing combined with salcatonin on postoperative pains in elderly patients after hip replacement. Am J Transl Res. 2021;13(5):5264-71. PMID: 34150117. **Exclusion reason:** Ineligible intervention

Appendix E. Evidence Tables

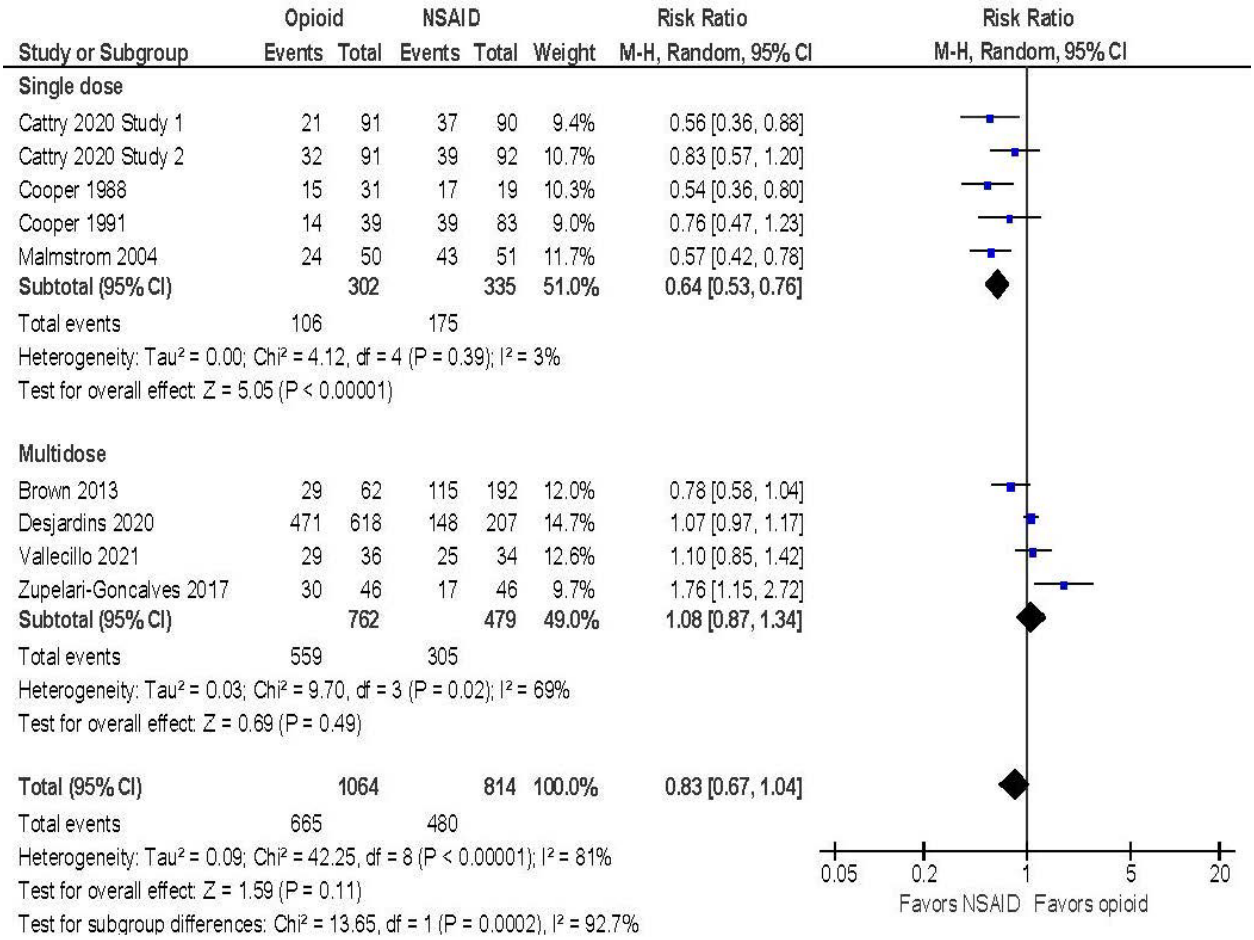
Shown in associated Excel file for Surveillance Report 3 at https://effectivehealthcare.ahrq.gov/products/treatments-acute-pain/research.

Appendix F. Quality Assessment

Shown in associated Excel file for Surveillance Report 3 at https://effectivehealthcare.ahrq.gov/products/treatments-acute-pain/research.

Appendix G. Meta-analysis Results

Figure G-1. Dental pain meta-analysis: Opioid versus NSAID for global improvement (medication rated very good or excellent)



Abbreviations: NSAID = nonsteroidal anti-inflammatory drug

Figure G-2. Dental pain meta-analysis: Opioid versus NSAID for any adverse event

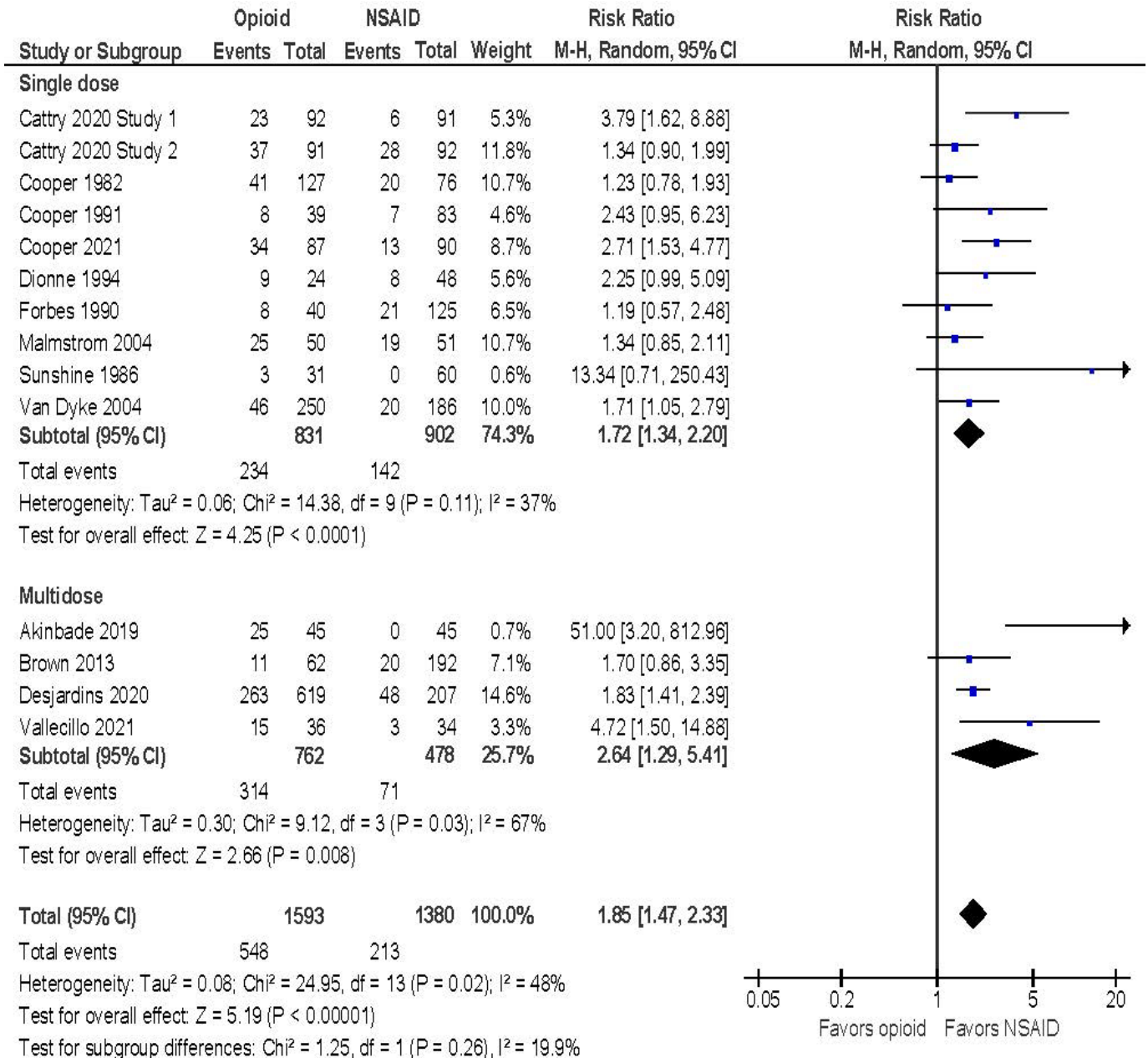


Figure G-3. Dental pain meta-analysis: Opioid versus NSAID for nausea

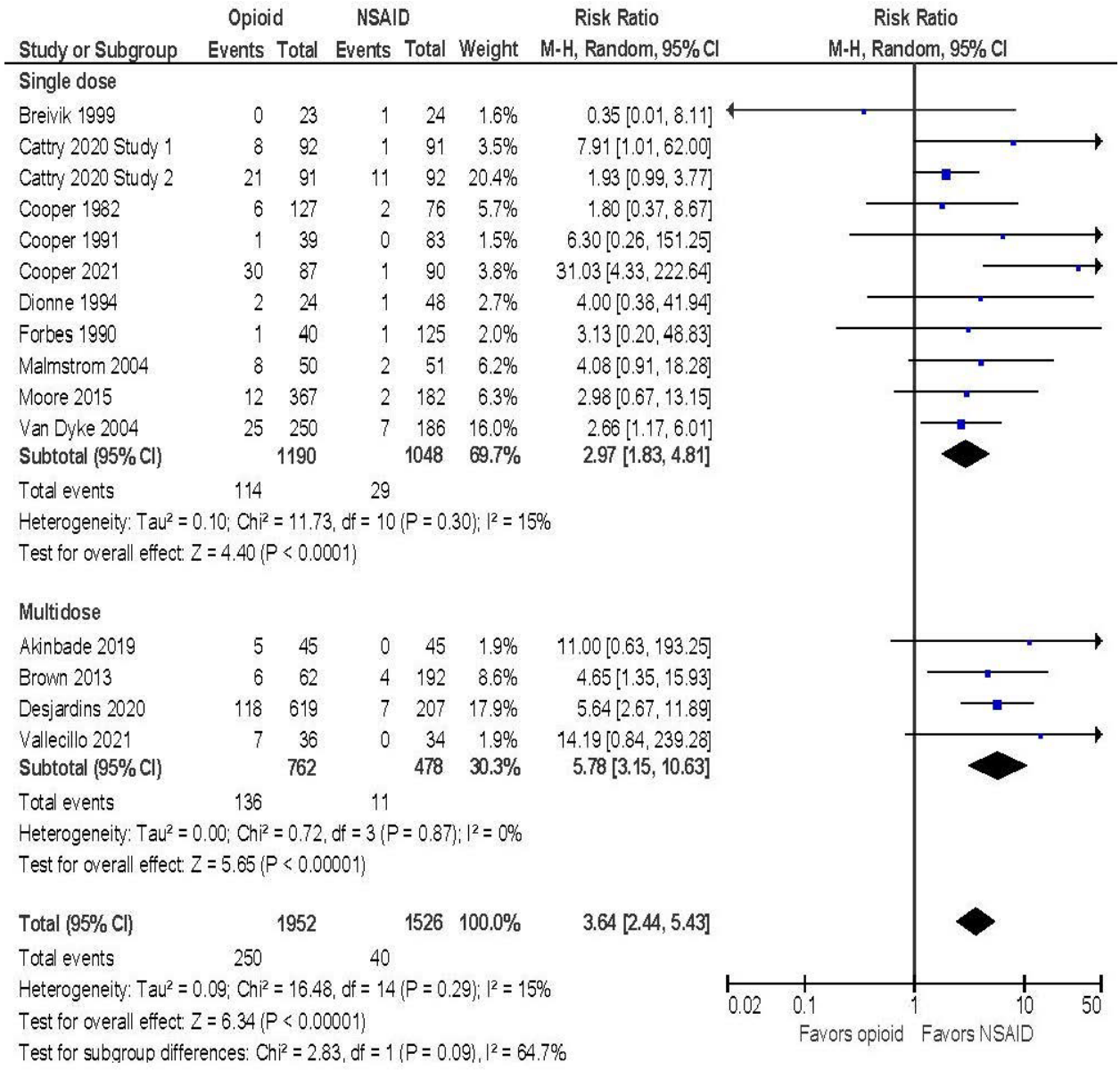


Figure G-4. Dental pain meta-analysis: Opioid versus NSAID for drowsiness

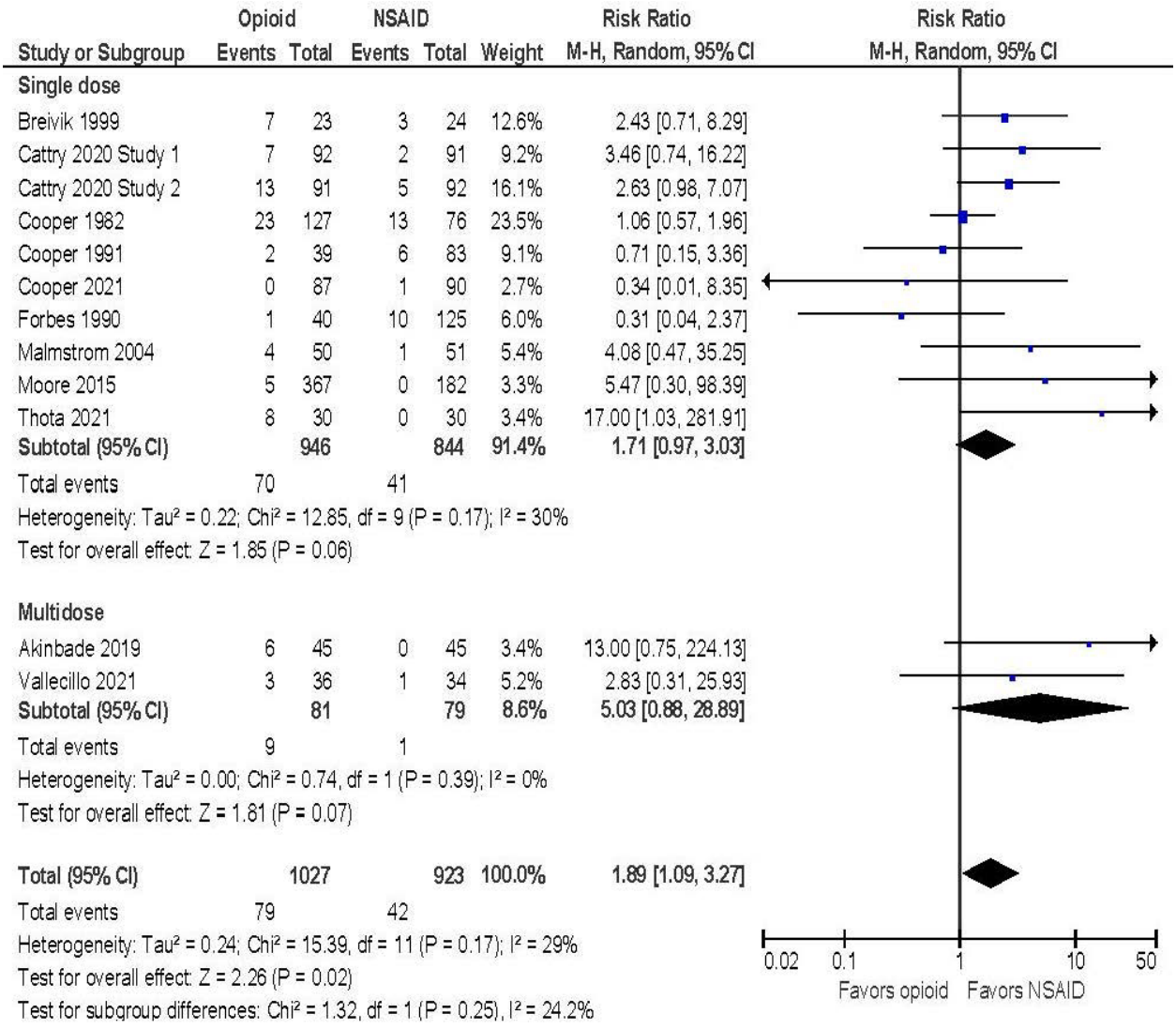


Figure G-5. Dental pain meta-analysis: Opioid versus NSAID for dizziness

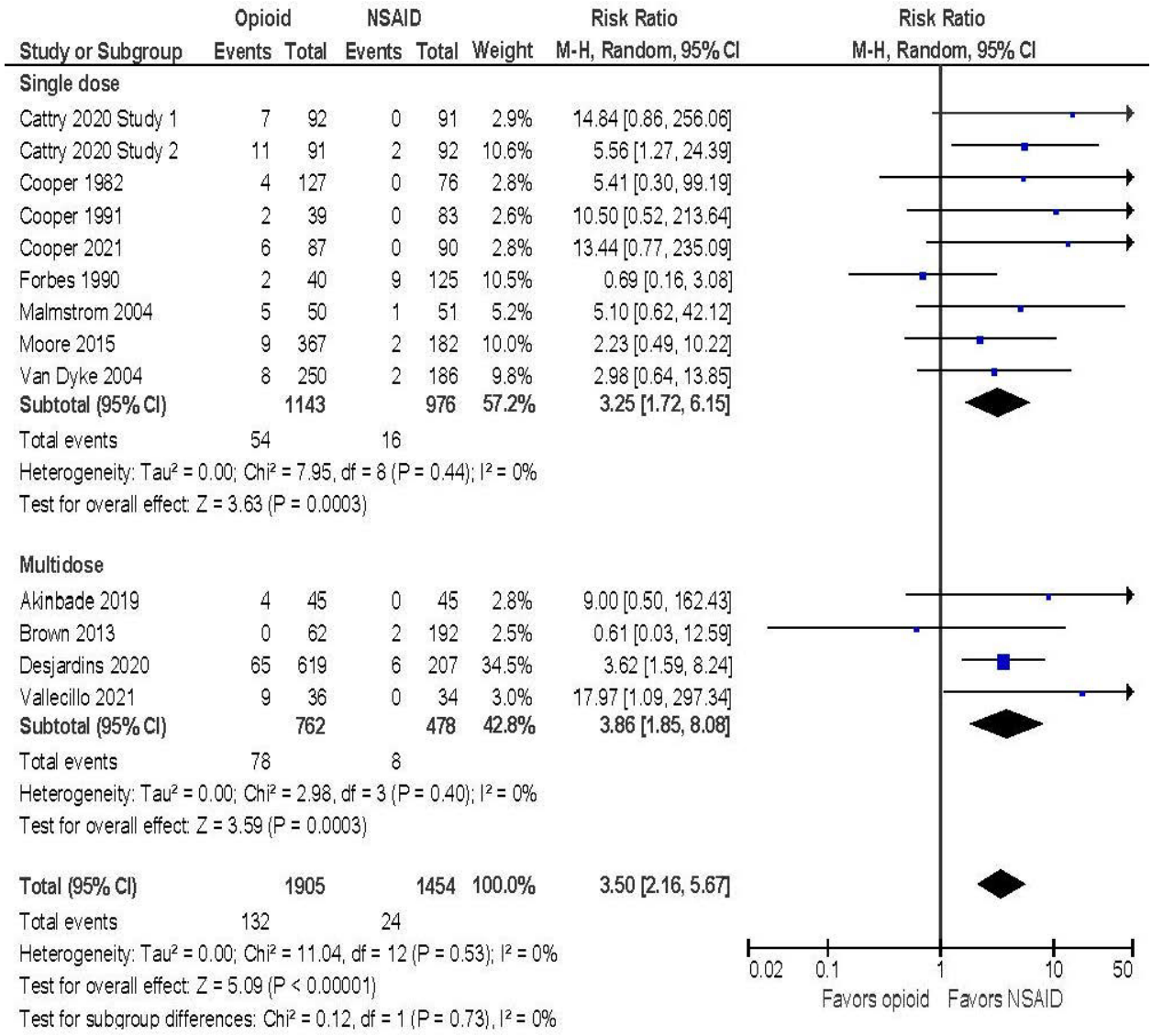


Figure G-6. Dental pain meta-analysis: Opioid versus acetaminophen for nausea

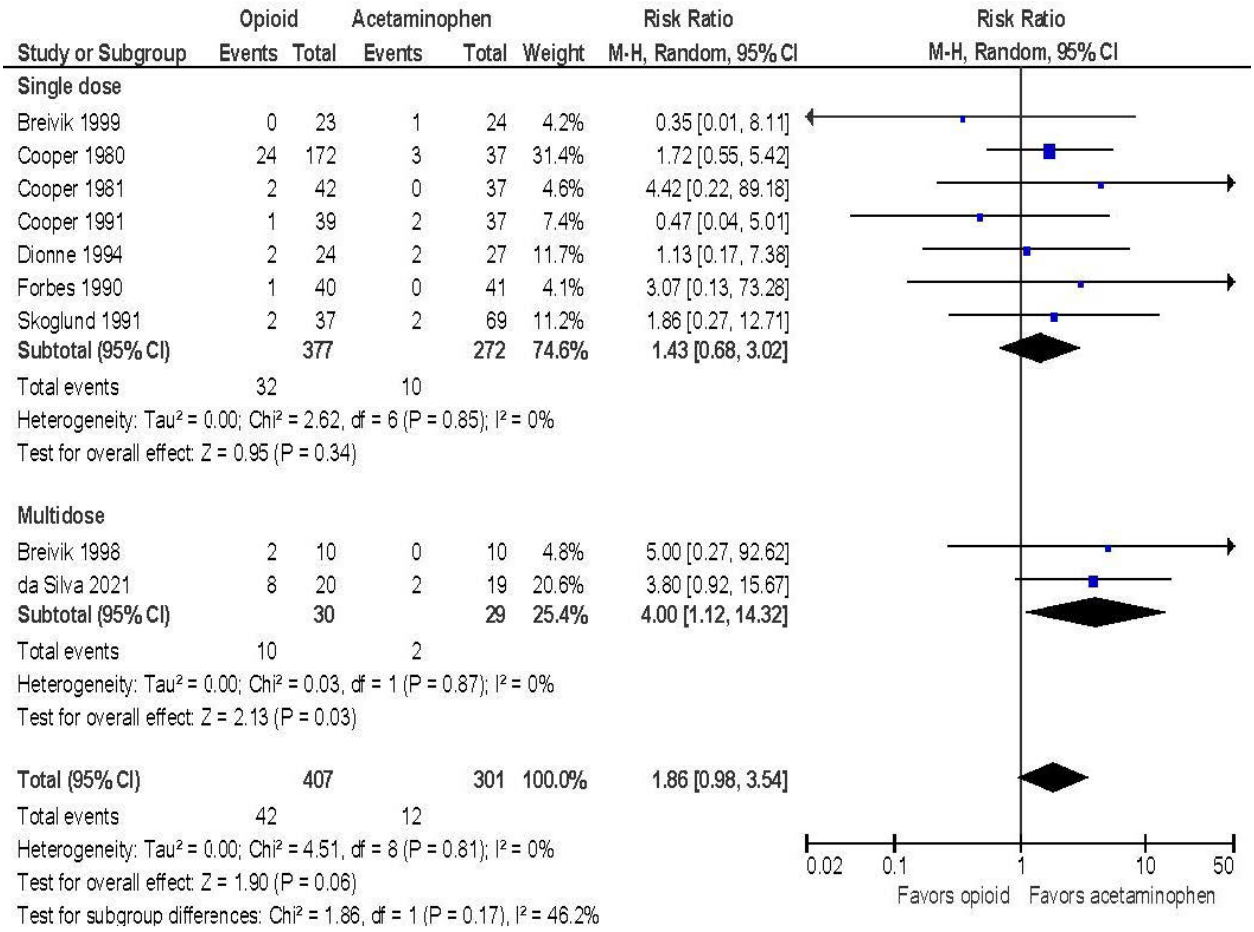


Figure G-7. Dental pain meta-analysis: Opioid versus acetaminophen for drowsiness

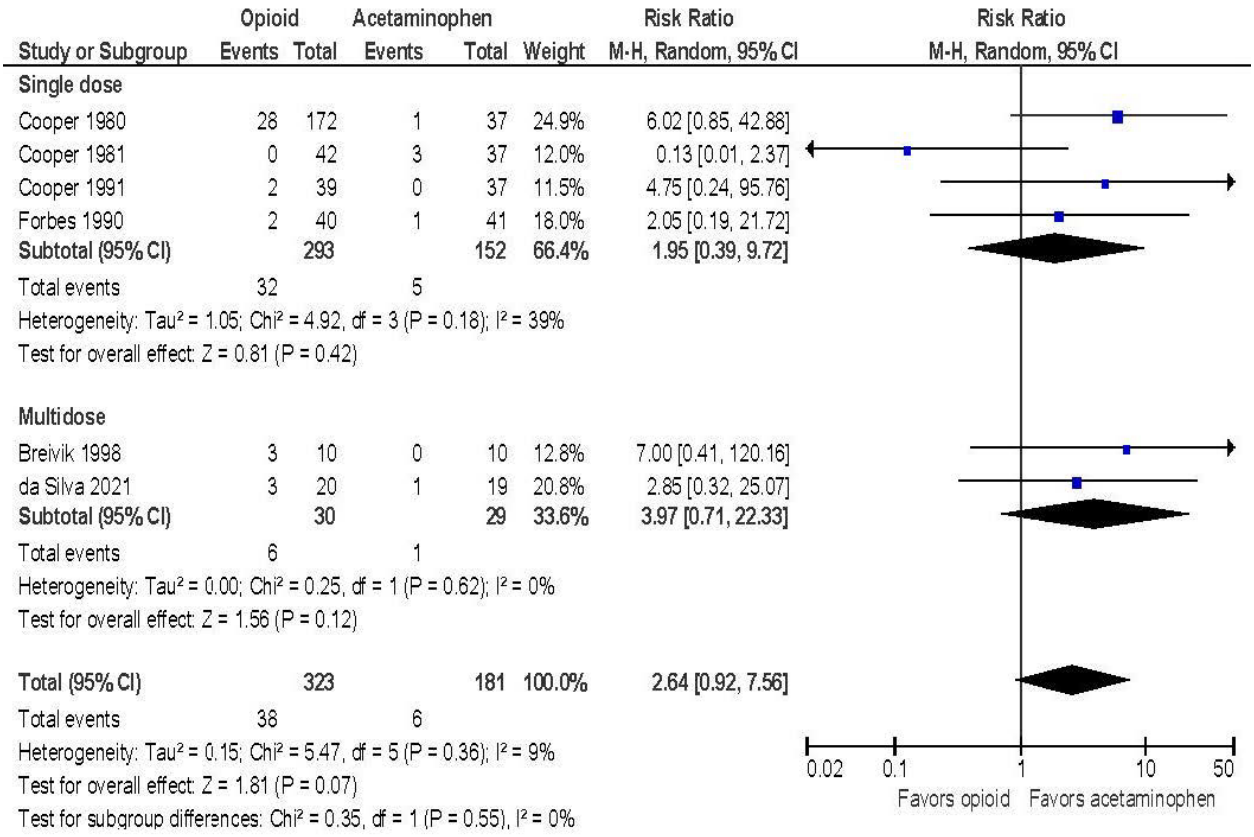
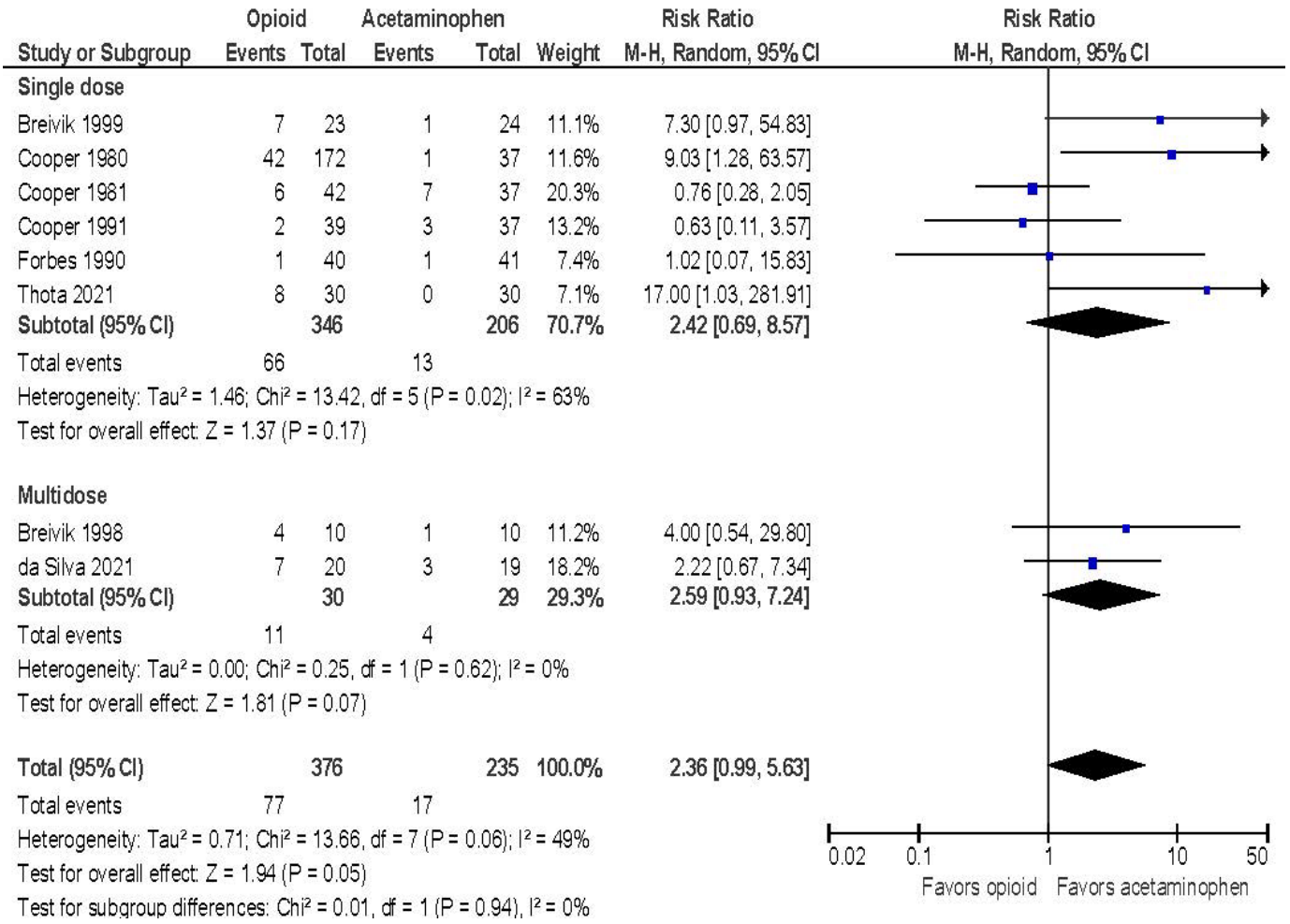


Figure G-8. Dental pain meta-analysis: Opioid versus acetaminophen for dizziness



Appendix H. Strength of Evidence Table

Table H-1. Strength of evidence and key findings for new evidence*

Intervention	Outcomes	Timing of Outcomes	Number of Studies	Number of Subjects	Directness	Precision	Quality	Consistency	Findings	SOE
KQ 1: Acute low back pain **Traditional Chinese acupuncture vs. sham or usual care**	Pain, function	2 to <4 w	2 (1 new)	428 (179 added)	Direct	Imprecise	Fair	Inconsistent	Effects on pain and function inconsistent	Insufficient (previously low)
KQ 3: Other musculoskeletal pain **Opioid plus acetaminophen vs. acetaminophen**	Pain	<1 day	1 (new)	154	Direct	Imprecise	Good	Unable to assess (1 study)	Opioid associated with small decrease in pain intensity	Low*
	Adverse events (any adverse event, drowsiness)	<1 day	1 (new)	154	Direct	Imprecise	Good	Unable to assess (1 study)	Opioid associated with increased likelihood of adverse events and drowsiness	Low*
KQ 3: Other musculoskeletal pain **Topical ibuprofen vs. capsaicin**	Pain	<1 day, 1 day to <1 week	1 (new)	119	Direct	Imprecise	Poor	Unable to assess (1 study)	Inconclusive due to poor quality	Insufficient*
KQ 5: Postoperative pain **Opioid vs. NSAID, multidose course, various surgeries**	Pain	1 d to <1 w	5 (1 new)	900 (70 added)	Direct	Imprecise	Fair	Inconsistent	Unable to determine due to inconsistency	Insufficient
	Rescue medication use	1 d to <1 w	5 (1 new)	930 (70 added)	Direct	Imprecise	Fair	Consistent	RR 1.22 to 2.04	Moderate

Intervention	Outcomes	Timing of Outcomes	Number of Studies	Number of Subjects	Directness	Precision	Quality	Consistency	Findings	SOE
KQ 5: Postoperative pain **Opioid vs. mixed agent**	Pain	<1 d, 1 d to <1 w, 1 to <2 w	2 (1 new) for <1 d and 1 to <2 w; 7 (1 new) for 1 d to <1 w	1,553 (91 added)	Direct	Imprecise (<1 d and 1 to <2 w); precise (1 d to <1 w)	Fair	Unable to assess (<1 d and 1 d to <1 w); consistent (1 to <2 w)	No difference	Low (<1 day and 1 to <2 w); moderate (1 d to <1 w, previously low)
KQ 5: Postoperative pain **Cold therapy vs. sham or usual care, various surgeries**	Pain intensity	1 w	6 (3 new)	505 (337 added)	Direct	Imprecise	Fair	Inconsistent (<1 day); unable to assess (1 d to <1 w, 1 study)	Unable to determine at <1 day (inconsistently); low for moderate benefit at 1 day to <1 weeks	Insufficient (<1 d); low (1 d to <1 w)
	Pain intensity; function, QoL	≥4 w	2 (1 new)	160 (100 added)	Direct	Imprecise	Fair	Consistent	No difference	Low
KQ 5: Postoperative pain **Music therapy vs. no music therapy**	Pain	<1 d, 1 d to <1 w	3 (1 new)	195 (47 added)	Direct	Imprecise	Fair	Consistent	Small to moderate decrease in pain intensity	Moderate (previously low)
KQ 5: Postoperative pain **TENS vs. sham TENS**	Pain intensity, analgesic use	1 d to <1 w	2 (1 new)	122 (80 added)	Direct	Imprecise	Fair	Consistent	Small to moderate decrease at 1 d to <1 w	Moderate (previously low)
KQ 5: Postoperative pain **Abdominal binder vs. no abdominal binder**	Pain	1 d to <1 w	1 (new)	196	Direct	Precise	Poor	Unable to assess (1 study)	Unable to determine due to serious methodological limitations	Insufficient*

Intervention	Outcomes	Timing of Outcomes	Number of Studies	Number of Subjects	Directness	Precision	Quality	Consistency	Findings	SOE
KQ 5: Postoperative pain **Preoperative education vs. no education**	Pain, opioid use	1 w to 2 w	3 (new)	445	Direct	Precise	Fair	Consistent	Decreased opioid use at 1 to 2 weeks, with similar or decreased pain intensity	Low*
KQ 6: Dental pain **Opioid + acetaminophen vs. acetaminophen, multidose**	Pain rescue medication use	<1 d	2 (1 new)	59 (39 added)	Direct	Imprecise	Fair	Inconsistent	Unable to assess, due to imprecision and inconsistency	Insufficient
KQ 6: Dental pain **Opioid + acetaminophen vs. acetaminophen, single dose**	Pain	<1 d	12 (1 new)	888 (60 added)	Direct	Precise	Fair	Inconsistent	Opioids associated larger sum of pain intensity differences than acetaminophen, though magnitude varied	Moderate (for sum of pain intensity differences)
KQ 6: Dental pain **Opioid (with or without acetaminophen) vs. acetaminophen**	Nausea, drowsiness, dizziness	<1 d	6 to 9 (1 to 2 new)	504 to 708 (39 to 60 added)	Direct	Imprecise	Fair	Consistent	Increased risk with opioid **Nausea:** 9 trials, RR 1.86 (95% CI 0.98 to 3.54) **Drowsiness:** 8 trials, RR 2.36 (95% CI 0.99 to 5.63) **Dizziness:** 6 trials, RR 2.64 (95% CI 0.92 to 7.56)	Low

Intervention	Outcomes	Timing of Outcomes	Number of Studies	Number of Subjects	Directness	Precision	Quality	Consistency	Findings	SOE
KQ 6: Dental pain **Opioid (with or without acetaminophen or NSAID) vs. NSAID, single dose**	Pain	<1 d, 1 d to <1 w	14 (<1 d, 2 new); 4 (1 d to <1 w, 1 new)	926 to 2,021 986 to 2,250 (60 to 229 added)	Direct	Precise	Fair	Inconsistent	Small to moderate increase in pain intensity with opioids	Low
KQ 6: Dental pain **Opioid (with or without acetaminophen or NSAID) vs. NSAID**	Any AE, nausea, dizziness, drowsiness	<1 d, 1 d to <1 w	12 to 15 (4 new)	1,950 to 3,478 (1,073 to 1,133 added)	Direct	Precise	Fair	Consistent	Increased risk with opioids **Any adverse event:** 14 trials, RR 1.85 (95% CI 1.47 to 2.33) **Nausea:** 15 trials, RR 3.64 (95% CI 2.44 to 5.43) **Dizziness:** 13 trials, RR 3.50 (95% CI 2.16 to 5.67) **Drowsiness:** 12 trials, RR 1.89 (95% CI 1.09 to 3.27)	Moderate
KQ 6: Dental pain **Opioid vs. NSAID, multidose**	Pain	<1 d, 1 d to <1 w	2 (1 new)	449 (412 added)	Direct	Precise	Fair	Consistent	No difference	Low (previously insufficient)
KQ 6: Dental pain **NSAID vs. acetaminophen, single dose**	Pain intensity	<1 d	15 (1 new)	2,563	Direct	Precise	Fair	Consistent	Moderate to large decrease in pain with NSAID	Moderate

*New strength of evidence assessment in Surveillance Report, no evidence in original review.