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**CADTH RAPID RESPONSE REPORT:**
**SUMMARY WITH CRITICAL APPRAISAL**

# Yoga for Chronic Non-Malignant Pain Management: A Review of Clinical Effectiveness, Cost-Effectiveness and Guidelines


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## Abbreviations

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| ACP | American College of Physicians |
| AGREE II | Appraisal of Guidelines for Research and Evaluation |
| AMSTAR | A MeaSurement Tool to Assess systematic Reviews |
| CCGI | Canadian Chiropractic Guideline Initiative |
| CINAHL | Cumulative Index to Nursing and Allied Health Literature |
| CRD | Centre for Reviews and Dissemination |
| DoD | Department of Defense |
| IDSA | Infectious Disease Society of America |
| MeSH | Medical Subject Headings |
| OPTIMa | Ontario Protocol for Traffic Injury Management |
| PEDro | Physiotherapy Evidence Database |
| RoB 2 | revised Cochrane Risk of Bias tool for randomized studies of interventions |
| VA | Veterans Affairs |

## Context and Policy Issues

Chronic pain serves no biological purpose in contrast with acute pain, which warns of disease or injury, and is characterized by significant emotional distress or functional disability.[1] Definitions of chronic pain vary across classification systems.[1] The World Health Organization defines recurrent or persistent pain as chronic if it lasts longer than three months in duration,[2] whereas the American Psychological Association considers pain lasting longer than six months as chronic.[3]

Chronic pain affects millions of Canadians. The prevalence of chronic pain not associated with cancer (also called non-malignant) among Canadian adults has been estimated between 19% and 29%.[1] Treatments for chronic pain tend to be only partially effective, and unrelieved pain costs Canada approximately $43 to $60 billion dollars per year in health care expenditures and lost productivity.[4]

In Canada, opioids are commonly prescribed to treat chronic non-malignant pain. Alternative strategies are being sought due to the side effects of opioids (e.g., nausea, constipation, respiratory depression), potential for addiction and misuse, and uncertain long-term effectiveness for the treatment of chronic non-cancer pain.[5] Complementary and alternative medicine therapies are commonly sought to overcome the limitations of pharmacological treatments.[6] Yoga, which consists of physical postures, breathing techniques, relaxation, and meditation, has been proposed as a potential intervention for chronic non-malignant pain in adults as it is thought to target the physical and psychological aspects of pain.[6]

The objective of this report is to summarize the evidence concerning the clinical effectiveness, cost-effectiveness, and guidelines regarding yoga for chronic non-malignant pain in adults.

## Research Questions

1. What is the clinical effectiveness of yoga for chronic non-malignant pain in adults?
2. What is the cost-effectiveness of yoga for chronic non-malignant pain in adults?

3. What are the evidence-based guidelines regarding the use of yoga for chronic non-malignant pain in adults?

## Key Findings

Evidence of limited quality from one randomized study suggested that yoga plus conventional treatment with analgesics was effective for reducing chronic pelvic pain, while conventional treatment with analgesics alone was not. One high-quality systematic review did not identify any studies of relevance to this report. No evidence regarding the cost-effectiveness of yoga compared with pharmacological treatments was identified. Seven guidelines (one of which was included in a systematic review) of moderate- to-high methodological quality included recommendations in favour of yoga for the treatment of non-malignant chronic pain.

## Methods

### Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including Medline, Cumulative Index to Nursing and Allied Health Literature (CINAHL), PsycINFO, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were mindfulness and adults with chronic pain. No filters were applied to limit the retrieval by study type. The search was also limited to English language documents published between January 1, 2014 and June 6, 2019.

### Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

**Table 1: Selection Criteria**

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| **Population** | Adults with chronic non-malignant pain |
| **Intervention** | Yoga (with or without pharmacotherapy) |
| **Comparator** | Q1-2: Pharmacotherapy alone (e.g., opioid, non-steroidal anti-inflammatory drugs, acetaminophens)<br>Q3: No comparator |
| **Outcomes** | Q1: Clinical effectiveness (e.g., pain management, reduction in pain medication use, return to work, quality of life, functioning)<br>Q2: Cost-effectiveness<br>Q3: Guidelines |
| **Study Designs** | Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, economic evaluations, guidelines |

### Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2014. Guidelines with unclear methodology were also excluded.

### Critical Appraisal of Individual Studies

The included systematic reviews were critically appraised by one reviewer using A MeaSurement Tool to Assess systematic Reviews (AMSTAR 2),[7] randomized studies were critically appraised using the revised Cochrane Risk of Bias tool for randomized studies of interventions (RoB 2),[8] and guidelines were assessed with the Appraisal of Guidelines for Research and Evaluation (AGREE II) Instrument.[9] Summary scores were not calculated for the included studies; rather, a review of the strengths and limitations of each included study were described narratively.

## Summary of Evidence

### Quantity of Research Available

A total of 555 citations were identified in the literature search. Following screening of titles and abstracts, 529 citations were excluded and 26 potentially relevant reports from the electronic search were retrieved for full-text review. Seven potentially relevant publications were retrieved from the grey literature search for full-text review. Of these potentially relevant articles, 24 publications were excluded for various reasons, and nine publications met the inclusion criteria and were included in this report. These comprised two systematic reviews, one randomized controlled trial (RCT), and six evidence-based guidelines. No relevant economic evaluations were identified. Appendix 1 presents the PRISMA[7] flow diagram of the study selection process. Additional references of potential interest are provided in Appendix 5.

### Summary of Study Characteristics

Study characteristics are summarized below and details are available in Appendix 2.

#### *Study Design*

Two systematic reviews,[10,11] one randomized study,[12] and six evidence-based guidelines[13-18] were included in this review. The systematic reviews were published in 2016[10] and 2015,[11] the randomized study was published in 2017,[12] and the guidelines were published in 2017[13-16] and 2016.[17,18]

The systematic review by Chou et al.[10] had a broader focus than that of this report; studies that included adults with low back pain of any duration were included, whereas only those with chronic pain (defined as pain lasting 12 or more weeks) were of interest in the current report. The review by the Institute for Quality and Efficiency in Health Care[11] examined evidence-based guidelines developed for patients with chronic back pain specifically, which was defined as pain without a suggestion of a specific cause, and without radiation to other areas. Guidelines needed to be applicable to the German health care system to be included in the review; one guideline was relevant for this report.[11] There was no overlap in the included publications between the systematic reviews.

The risk of bias in individual studies included in the review by Chou et al. was assessed using the Cochrane Risk of Bias tool for randomized studies, the U.S. Preventive Services Task force criteria for cohort studies, and AMSTAR for systematic reviews.[10] The guidelines included in the review by the Institute for Quality and Efficiency in Health Care were assessed using the AGREE II instrument.[11]

Participants in the randomized study by Saxena et al. were recruited from the gynecology outpatient department of a tertiary care hospital (period of recruitment and data collection were not reported).[12] Patients were randomized to an intervention or control condition and matched on age.[12]

In addition to the one relevant guideline captured in the systematic review of guidelines,[11] six evidence-based guidelines were included.[13-18] The guidelines led by Brosseau were developed by the Ottawa Panel methodologists and clinical experts in exercise physiology, rheumatology, and physiotherapy.[13] The guidelines led by Bruce were developed by the Infectious Diseases Society of America (IDSA) Standards and Practice Guidelines Committee of clinicians and knowledge users.[14] The guidelines led by Qaseem were developed by the American College of Physicians (ACP) Clinical Practice Guidelines committee of physicians,[16] and the Department of Veterans Affairs and Department of Defense (VA/DoD) guidelines were developed by the Evidence-Based Practice Work Group composed of guideline champions and subject matter experts.[15] Guidelines led by Bussieres were developed by the Canadian Chiropractic Guideline Initiative (CCGI) Guideline Panel, composed of methodologists, clinicians, researchers, and a patient advocate.[17] Lastly, the guideline led by Cote was developed by the Ontario Protocol for Traffic Injury Management (OPTIMa) Collaboration, composed of clinicians, researchers, a patient liaison, consumer representative, retired judge, and automobile insurance industry experts.[18]

All guideline development groups drafted guideline recommendations based on systematic reviews of the evidence.[13-18] Where reported, dates covered by the searches ranged from database inception to November 2016.[13] The quality of the included studies was assessed by guideline development groups using the Physiotherapy Evidence Database (PEDro),[13] the Cochrane Risk of Bias tool for randomized controlled trials,[19] the Cochrane Back Review Group methods,[20] the US Preventive Services Task Force method,[15,20] AMSTAR,[17,20] or the Scottish Intercollegiate Guidelines Network criteria.[18] It was unclear how observational studies identified in the IDSA guideline[14] were critically appraised as the methods handbook provides multiple options for IDSA guideline authors.[19] Strength and quality of the evidence informing each recommendation was graded according to the methods of the Ottawa Methods Group[13] or GRADE[14-17] in five of the guidelines. Recommendations were not graded in the OPTIMa guideline by Cote et al.[18] Characteristics of the included guidelines are presented in Table 4 and details on the ratings of the quality of evidence and strength of recommendations are included in Table 5 (Appendix 2).

### *Country of Origin*

The systematic review by Chou et al.[10] was led by an author in the US, and the review by the Institute for Quality and Efficiency in Health Care[11] was conducted in Germany. The randomized study by Saxena et al. was conducted in India.[12] The Ottawa panel guideline, the OPTIMa guideline, and the CCGI guideline were led by authors in Canada,[13,17,18] and the IDSA, ACP, and VA/DoD guidelines were led by US organizations.[14-16] Only the US VA/DoD guideline was expressly developed for use in a particular country.[15]

### *Patient Population*

Of relevance to the current report, one systematic review examined adults with chronic lower back pain of at least 12 weeks duration[10] while the other examined guidelines for patients with chronic (greater than 12 weeks duration) back pain with no specified cause.[11] Patients in the randomized study were female gynecological patients (aged 18 to 45 years) of a tertiary care hospital being treated for chronic pelvic pain.[12] the periods of recruitment and data collection were not reported.[12]

The guidelines are intended to be used by health care professionals in general,[13,16-18] specialists (i.e., HIV clinicians,[14] or chiropractors[17]), or clinicians affiliated with the US VA or DoD.[15] An intended guideline user was not identified in the systematic review of guidelines.[11]

Target populations for the individual guidelines are patients with knee osteoarthritis,[13] people living with HIV and chronic pain,[14] adults- [15,16] and families of VA or DoD members[15] with lower back pain, adults and older adults with neck pain lasting longer than three months.[17,18] The target population for the systematic review of guidelines is patients with chronic back pain.[11]

### *Interventions and Comparators*

In the systematic review by Chou et al.[10] broad interventions and comparators were eligible for inclusion; of relevance to this report, studies that compared the effectiveness of yoga versus pharmacological therapies were eligible.[10] In the systematic review of evidence-based guidelines by the Institute for Quality and Efficiency in Health Care, recommendations regarding any type of intervention were eligible for inclusion, and of relevance to the current report, recommendations on viniyoga and Iyengar yoga were identified.[11] Patients in the randomized study were randomized to participate in hour-long morning sessions of supervised group-based yoga led by an experienced (five to 10 years) instructor five times a week for eight weeks (intervention) plus conventional therapy with analgesics, or to receive conventional therapy with analgesics alone (comparator) over the same period.[12] All included guidelines contained recommendations on the use of yoga for the treatment of chronic non-malignant pain.[13-18]

### *Outcomes*

A broad array of outcomes related to pain resolution, function, quality of life, and harms were considered In the systematic review by Chou et al.[10] In the randomized study, pain and quality of life were assessed by self-report at baseline and immediately following the 8-week intervention.[12] Outcomes were not explicitly considered in the systematic review of guidelines, but may be inferred from the purpose of the review, which was to examine guidelines for the treatment of chronic low back pain.[11] Regarding the individual guidelines, outcomes considered were related to pain reduction, resolution, and episodes; function; disability; quality of life; optimal health; patient satisfaction; and adverse effects.[13-18]

## Summary of Critical Appraisal

Details regarding the strengths and limitations of included publications are provided in Appendix 3.

### *Systematic Reviews*

Two systematic reviews[10,11] were assessed using AMSTAR 2.[21] Several strengths and few weaknesses were identified.

Both reviews used comprehensive literature search strategies, assessed and considered the quality of included studies[10] and guidelines[11] in the results, and disclosed conflicts of interest among authors where they existed.[10,11] Despite the overall robust methodology followed by Chou et al., rationale for narratively synthesizing study results was not provided and it is uncertain whether this was the appropriate method of synthesis.[10] Regarding the review of guidelines, it was not clear whether the review methods were defined a priori, leaving uncertainty as to whether decisions driven based on the available guidelines.[11]

### *Randomized Controlled Trials*

One randomized study[12] was assessed using the RoB 2.[8] Strengths of the randomized study included use of a computer-generated random allocation sequence and allocation concealment using opaque envelopes until the time participants were informed of their group assignment. Several limitations following baseline assessment led to an increased risk of bias in this study. For instance, there was differential drop-out (22.5% in the pharmacological group versus no loss to follow up in the yoga group). Reasons for drop-out were not reported, and it is possible that the differences may have been due to the absence of participant blinding and the use of a “pharmacological treatment as usual” comparator rather than a sham comparator.[12] Compliance to the yoga intervention was reportedly poor for 25% of participants in the yoga intervention group and this may have been due to acceptability of the intervention or to the outcomes of interest (e.g., pain).[12] A post-hoc decision was made to select 30 participants from each group for inclusion in the final analysis. It is likely researchers had access to unblinded data prior to making this decision. As such, results may have been biased with only the most highly motivated participants being included in the intervention arm. Finally, there was a lack of clarity in the reporting of the results (i.e., whether only simple main effects for the yoga and comparator groups were reported or whether an interaction was also reported). Taken together, these limitations substantially decrease confidence in the results of this study.

### *Guidelines*

Six evidence-based guidelines.[13-18] were assessed using the AGREE II instrument.[9] All guidelines included a clearly outlined scope and purpose and were clearly presented. In general, guidelines were developed with a high degree of methodological rigour.

Stakeholder involvement varied across guidelines depending on the stakeholder. For instance, all guidelines included individuals from relevant professional groups and clearly defined target users. However, only four guidelines considered the views and preferences of the target population[15,17,18,20] and this was done to varying degrees. For example, Qaseem et al. searched for patient perspectives via a literature review, the VA/DoD guideline was shown to a small focus group of patients to gather their views on the completed product,[15] Bussieres et al. included a patient advocate on the guideline panel,[17] and the review by Cote et al. included a literature review on patient preferences and a patient representative on the guideline development panel.[18]

Applicability (i.e., potential barriers and facilitators to implementation, strategies to improve uptake, and resources needed to implement the guideline[9] was not considered as part of

the development process of three of the six included guidelines.[13,14,18] Applicability was purposefully omitted by Cote et al. as it was considered out of scope for the project and there were plans in place by the Government of Ontario to consider applicability and develop tools and resources for application.[18]

## Summary of Findings

A table of the main study findings and authors' conclusions is presented in Appendix 4.

### *Clinical Effectiveness of Yoga*

The systematic review conducted by Chou et al. did not identify any relevant studies comparing yoga with a pharmacological treatment, despite searching for this evidence.[10] Therefore, all clinical effectiveness findings in this report are from the included RCT.[12]

#### Pain

Following an eight-week intervention period, participants randomized to a yoga intervention plus conventional pharmacotherapy had significant improvements from baseline in self-reported pain scores. In contrast, pain scores reported by the conventional pharmacological therapy alone group did not significantly change from baseline to post-treatment.[12] The authors conducted a two-way repeated measures analysis of variance, however they did not report whether the changes in pain scores over time differed significantly between groups.

#### Quality of Life

Participants randomized to a yoga intervention had significant improvements in all domains of quality of life (i.e., physical, psychological, social, and environmental) from baseline to the end of an eight-week intervention.[12] The improvements in self-reported quality of life were significantly greater in the yoga versus pharmacological group for the physical, psychological, and social domains, but were not significantly different between groups for the environmental domain.[12]

### *Cost-Effectiveness*

No relevant evidence regarding the cost-effectiveness of yoga was identified; therefore, no summary can be provided.

### *Guidelines*

#### HIV

For people living with HIV, the IDSA guideline led by Bruce et al., recommends yoga for the treatment of chronic neck and back pain, headache, rheumatoid arthritis, and general musculoskeletal pain (strong recommendation, moderate quality evidence).[14]

#### Knee Osteoarthritis

The Ottawa Panel guideline adopted one recommendation from a previous guideline regarding the use of yoga for knee osteoarthritis.[13] Specifically, an eight-week Hatha Yoga program of 60 minute classes once per week, plus 30 minutes of yoga at home once per week, is recommended for older women with knee osteoarthritis for the management of chronic pain and physical function (positive recommendation for pain relief, clinically important benefit demonstrated; positive recommendation for physical function, clinically

important benefit without statistical significance; neutral recommendation for quality of life, no benefit demonstrated).[13]

**Low Back Pain**

The systematic review conducted by the Institute for Quality and Efficiency in Health Care identified one evidence-based guideline that recommends viniyoga and Iyengar yoga for the treatment of non-specific low back pain (strength of recommendation and quality of evidence not reported in the systematic review of guidelines).[11]

Two guidelines included in this report also recommend yoga for low back pain. The ACP guideline led by Qaseem[16] recommends non-pharmacological treatments such as yoga (strong recommendation; low quality evidence) to be considered as a first-line treatment for patients with low back pain.[16] while the VA/DoD guideline recommends considering inclusion of yoga in an exercise program (weak recommendation; low-to-moderate quality evidence).[15]

**Neck Pain**

The CCGI guideline led by Bussieres,[17] recommends choosing supervised yoga over education and home exercises for short-term improvement in chronic neck pain of grade I or II lasting longer than three months' duration (weak recommendation; low-quality evidence from one study that examined a three month Iyengar yoga intervention).[17] Somewhat in contrast, the OPTIMa guideline led by Cote[18] recommends structured patient education in combination with one of several options, which include yoga and non-steroidal anti-inflammatory drugs based in part on the same Iyengar study that informed the CCGI recommendation (weak recommendation, low quality evidence).

## Limitations

A few key limitations are noteworthy within this report. First, limited evidence from clinical studies was identified. Therefore, conclusions are based on comparative evidence from one randomized controlled trial of limited methodological quality with a vague pharmacological comparator (i.e., pharmacological treatment as usual).[12] While Chou et al. searched for comparative evidence in their systematic review, no studies of relevance to this report were identified.[10] Taken together, this limits the certainty in the comparative effectiveness of yoga relative to pharmacological treatment options.

Second, the only eligible primary study dealt with chronic pelvic pain, which is a very specific type of pain. Therefore, the clinical effectiveness results may not be generalizable to other types of pain such as chronic low back pain or neck pain. Similarly, the only eligible primary study compared yoga in combination with pharmacotherapy to pharmacotherapy alone; no evidence was identified regarding the independent effect of yoga (i.e., in the absence of additional treatment).

Third, guideline recommendations in favour of yoga for the treatment of chronic pain were based on low- to-moderate quality evidence (where reported) and recommendation strength ranged from weak to strong. Despite the evidence quality, guideline panels consistently recommended in favour of yoga and this was based more on factors such as perceived low risk of harms and patient preferences rather than certainty in effectiveness.

Finally, no relevant cost-effectiveness studies were identified. This may be due to the lack of research regarding the comparative clinical effectiveness of yoga versus pharmacological treatments.

## Conclusions and Implications for Decision or Policy Making

Comparative evidence for the clinical effectiveness of yoga versus pharmacological treatments for chronic pain, and guidelines on the use of yoga for chronic pain, was identified for inclusion in this report. No eligible cost-effectiveness studies were identified.

One systematic review of clinical studies did not identify any relevant evidence regarding the comparative clinical effectiveness of yoga versus pharmacological treatments for chronic pain.[10] One randomized study of limited quality showed statistically significant improvements in chronic pelvic pain and three of four dimensions of quality of life with an eight-week intervention of yoga plus usual treatment with analgesics, and no difference between baseline and post-treatment for usual treatment with analgesics alone (specific pharmacological regimen(s) not described). Interactions were not reported. It may be premature to draw conclusions about the comparative effectiveness of yoga versus pharmacological treatments given the paucity of clinical evidence and inherent methodological flaws noted within the included randomized study.

One systematic review of evidence-based guidelines (that included one relevant recommendation)[11] and six individual guidelines[13-18] include recommendations for yoga as a treatment for a chronic pain. The guidelines tended to be vague regarding the recommended duration, frequency, and type of yoga due to the limited evidence to inform these parameters. Additional randomized controlled trials of high methodological quality that clearly report the details of the intervention and comparator protocols may enable updated versions of guidelines to provide increased specificity.

Current evidence for the clinical and cost-effectiveness of yoga versus pharmacological treatments for chronic non-malignant pain is limited. Additional research is needed to inform specific guidance around yoga recommendations (e.g., type, duration, frequency) for adults with chronic non-malignant pain.

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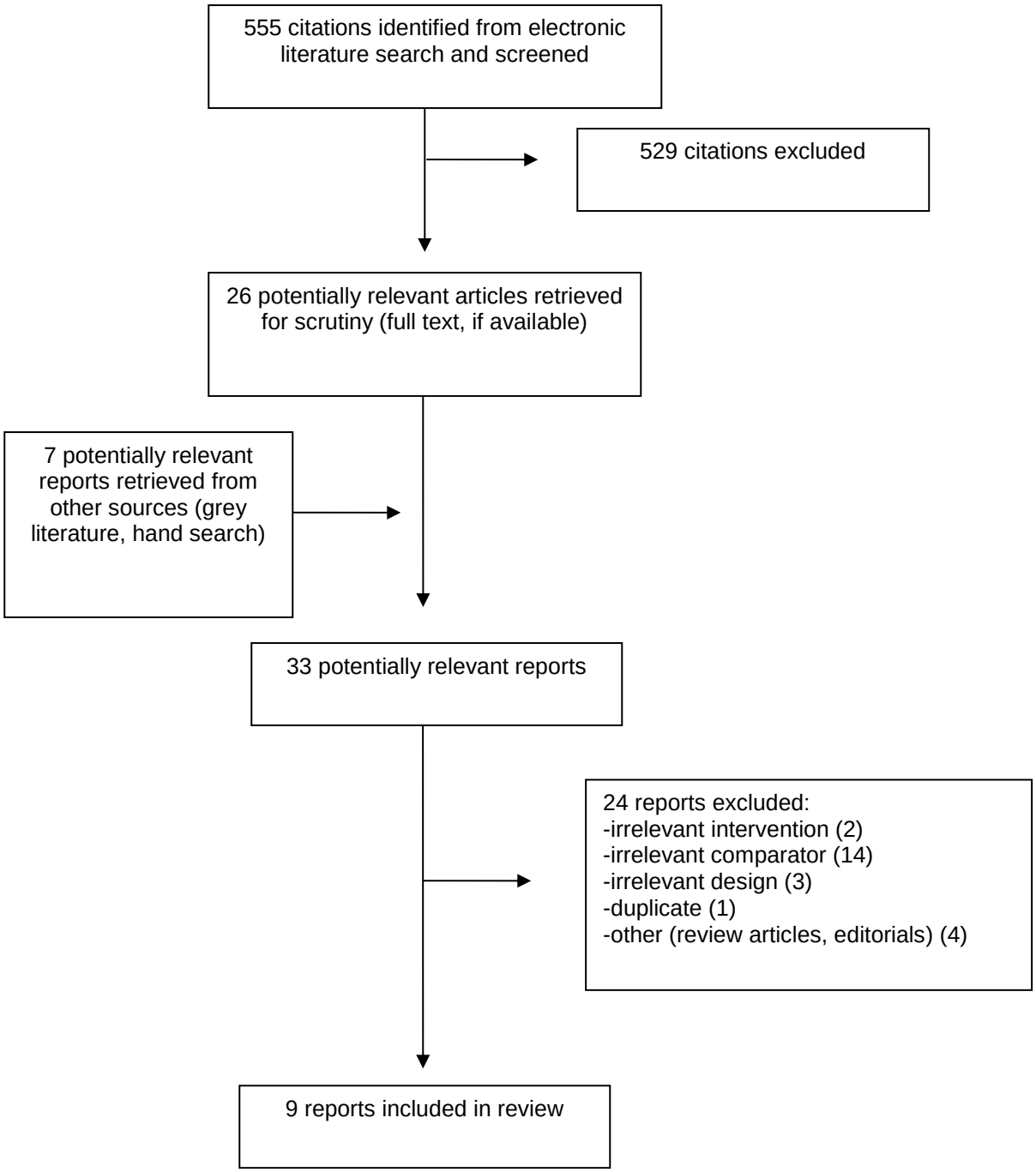
## Appendix 1: Selection of Included Studies



# Appendix 2: Characteristics of Included Publications

## Table 2: Characteristics of Included Systematic Reviews

| First Author, Publication Year, Country | Study Designs and Numbers of Primary Studies Included | Population Characteristics | Intervention and Comparator(s) | Clinical Outcomes, Length of Follow-Up |
|---|---|---|---|---|
| Chou, 2016[10]<br><br>US | Systematic reviews of RCTs; RCTs; cohort studies (harms only)<br><br>Databases searched up to April 2015<br><br>N = 156 studies included;<br>no studies of relevance to this report were identified | Eligible population: Adults with LBP of any duration<br><br>Relevant population: Adults with chronic (≥12 weeks) LBP | Eligible interventions: pharmacological and noninvasive nonpharmacological therapies<br><br>Relevant interventions: yoga<br><br>Eligible comparisons: placebo, sham treatment, no treatment, wait list, usual care, or one included therapy versus another<br><br>Relevant comparisons: pharmacological therapies (no studies identified) | Reduction or elimination of LBP<br><br>Function (specific, overall)<br><br>HRQoL<br><br>Work disability / return to work<br><br>Global improvement<br><br>Number of back pain episodes<br><br>Time between back pain episodes<br><br>AE (serious, less serious)<br><br>Follow-up:<br>Post-test<br>Or dichotomized if possible as: Long term (≥1 year);<br>Short term (up to 6 months) |
| Institute for Quality and Efficiency in Health Care, 2015[11]<br><br>Germany | Evidence-based guidelines<br><br>Databases searched for guidelines published between January 2009 to August 2015<br><br>N = 6 guidelines | Eligible and relevant: Guidelines for patients with chronic back pain defined as pain below the rib cage, above the gluteal folds, with or without radiation to other areas; unspecified cause; chronic or chronically recurring course (>12 weeks); varying intensity of pain<br><br>Included guidelines: pain related to neurological diseases, | Relevant intervention: Viniyoga and Iyengar yoga | Relevant outcome: Chronic non-specific back pain<br><br>Follow-up: Not applicable |

| First Author, Publication Year, Country | Study Designs and Numbers of Primary Studies Included | Population Characteristics | Intervention and Comparator(s) | Clinical Outcomes, Length of Follow-Up |
|---|---|---|---|---|
| | | patients with low back pain of any duration without radiation to legs,<br>chronic back pain, non-specific or specific LBP | | |

AE = adverse event; HRQoL = Health related quality of life; LBP = low back pain; RCT = randomized controlled trial.

## Table 3: Characteristics of Included Primary Clinical Study

| First Author, Publication Year, Country | Study Design | Population Characteristics | Intervention and Comparator(s) | Clinical Outcomes, Length of Follow-Up |
|---|---|---|---|---|
| Saxena, 2017[12]<br><br>India | RCT<br><br>Randomized case-control study, matched on age | N = 60<br><br>Inclusion criteria:<br>Females<br>Chronic pelvic pain<br>Aged 18 to 45 years<br><br>Population characteristics:<br>Mean age:<br>Conventional therapy: 30.9 years (SD = 6.97)<br>Yoga: 32.6 years (SD = 5.59); beginner level yoga experience | Intervention:<br>Regular supervised yoga with trained expert<br>5 times / week x 8 weeks<br>+<br>Conventional therapy (i.e., analgesics - mainly NSAIDS - as required for chronic pelvic pain)<br><br>Comparator:<br>Conventional therapy (i.e., analgesics - mainly NSAIDS - as required for chronic pelvic pain) | Pain (intensity and relief)<br>Assessed with visual analog scale<br>0 to 30 (mild/no pain)<br>31 to 69 (moderate pain)<br>70 to 100 (severe pain)<br>-within patient test-retest reliability<br>-other psychometrics not reported by study authors<br><br>QoL<br>Assessed with the 26-item WHOQOL-BREF<br>5-point scale anchored at the extremes by 1 (very dissatisfied / very poor to 5 (very satisfied / very good)<br>Domains: physical health, psychological, social, environmental; domain scores ranged from 4 to 20<br>Composite scores: Overall QoL, General Health<br>composite scores ranged from 0 to 100 |

| First Author, Publication Year, Country | Study Design | Population Characteristics | Intervention and Comparator(s) | Clinical Outcomes, Length of Follow-Up |
|---|---|---|---|---|
| | | | | Higher scores denote higher QoL<br>Authors reported good psychometric properties<br><br>Follow-up:<br>8 weeks (end of intervention) |

NSAID = nonsteroidal anti-inflammatory drugs; QoL = quality of life; RCT = randomized controlled trial; SD = standard deviation; WHOQOL-BREF = World Health Organization brief quality of life questionnaire.

## Table 4: Characteristics of Included Guidelines

| Intended Users; Target Population | Objective | Guideline Development Group | Recommendations Development and Evaluation Methodology |
|---|---|---|---|
| Brosseau / the Ottawa Panel, 2017;[13] Canada | | | |
| Intended Users:<br>Health care professionals<br><br>Target Population:<br>Patients with knee osteoarthritis | "To identify effective mind-body exercise programs and provide both healthcare professionals and knee osteoarthritis patients with updated, high-quality recommendations supporting non-traditional land-based exercises for knee osteoarthritis." (p. 583) | The Ottawa Panel composed of:<br>• the 18-member Ottawa Methods Group;<br>• the 11-member Expert Panel of health professionals with clinical and methodological expertise in exercise physiology, rheumatology, and physiotherapy | Systematic search for high quality (i.e., PEDro score ≥6) RCTs was conducted; databases searched from inception to May 2013 and updated from June 2013 to May 2016; records were screened in duplicate; meta-analyses were conducted<br><br>Individual study quality assessed using PEDro<br><br>Recommendations were drafted by the Ottawa Methods Group based on the systematic review<br><br>Evidence quality assessment conducted according to Ottawa Methods Group grading system<br><br>CPG reviewed and approved by the Expert Panel through online Delphi questionnaire |
| Bruce / IDSA, 2017;[14] US | | | |
| Intended Users:<br>HIV clinicians<br><br>Target Population<br>People living with HIV and chronic pain | To facilitate clinicians in the treatment of chronic pain in people with HIV | IDSA SPGC composed of:<br>• 10 content experts including clinicians and members of partner organizations | Subgroups conducted systematic review and supplementary literature searches;<br>4 databases searched from 1966 to 2016<br><br>Individual studies were critically appraised using the Cochrane Risk of Bias tool for RCTs or an unspecified tool for observational studies[19]<br><br>Generated evidence profiles and summarized findings and quality of evidence per outcome |

| Intended Users; Target Population | Objective | Guideline Development Group | Recommendations Development and Evaluation Methodology |
|---|---|---|---|
| | | | Generated GRADE evidence to decision framework for development of recommendations<br><br>Full panel developed and graded recommendations during face to face meeting / teleconference<br><br>Draft review by 3 external reviewers;<br>SPGC review and approval;<br>Board of Directors review and final approval. |
| Qaseem / ACP, 2017;[16] US | | | |
| Intended Users: Clinicians<br><br>Target Population: Adults (≥18 years) with acute, subacute, or chronic LBP | "To provide treatment guidance based on the efficacy, comparative effectiveness, and safety of noninvasive pharmacologic and nonpharmacologic treatments for acute (<4 weeks), subacute (4 to 12 weeks), and chronic (>12 weeks) low back pain in primary care." (p. 515) | ACP's CPG Committee<br><br>Composed of:<br>Chair appointed by ACP governing board;<br>11 committee member physicians trained in internal medicine and subspecialties who are ACP members in good standing[20] | Systematic review conducted by AHRQ. Databases searched through November 2016 for studies published in English since 2008. Earlier studies were identified using ACP/APS systematic reviews. Meta-analyses were conducted where applicable.<br><br>RCTs were assessed with the Cochrane Back Review Group methods, cohort studies were assessed with the U.S. Preventive Services Task Force method, and systematic reviews were assessed with the AMSTAR tool.<br><br>Committee commissioned evidence reports and graded the recommendations using a modified version of GRADE<br><br>The AHRQ systematic review was peer reviewed by invited reviewers and posted for public comment<br><br>Final recommendations were approved by committee via voting with a 2/3 quorum requirement and approval by at least 2/3 of those present<br><br>Patient preference considered through a literature search<br><br>Final approval via voting among ACP board or regents and board of governors.<br><br>Accompanying evidence reviews were submitted to peer reviewed journals<br><br>Guideline was peer reviewed through journal submission process and posted online for comments from ACP board and regional governors<br><br>Conflicts of Interest were declared, discussed, and resolved at each meeting or the member was recused where conflicts could not be resolved |

| Intended Users; Target Population | Objective | Guideline Development Group | Recommendations Development and Evaluation Methodology |
|---|---|---|---|
| VA/DoD, 2017;[15] US | | | |
| Intended Users:<br>VA and DoD health care practitioners involved in the care of Service Members, retirees, veterans, or beneficiaries with LBP<br><br>Target Population:<br>VA and DoD Service Members, retirees, veterans, or beneficiaries with LBP | "To provide healthcare providers with a framework by which to evaluate, treat, and manage the individual needs and preferences of patient with LBP." (p. 5)<br><br>"to improve the patient's health and wellbeing by providing evidence-based guidance…" (p. 5) | VA and DoD Evidence-Based Practice Work Group<br><br>Composed of:<br>• Guideline Champions<br>• Diagnosis and Treatment of LBP Work Group composed of subject matter experts within VA/DoD;<br>Supported by:<br>• Office of Quality, Safety and Value, VA;<br>• Office of Evidence Based Practice, US Army Medical Command | Update of 2007 VA/DoD LBP CPG<br><br>Champions were identified and they identified Work Group members<br><br>First planning meeting held by conference call; steps included formulating and prioritizing research questions, conducting a systematic review, face-to-face meeting to discuss evidence; drafting, revising, and submitting CPG to the Work Group<br><br>Evidence review contracted out to The Lewin Team (included ECRI Institute)<br><br>Systematic reviews of clinical and epidemiological evidence reviewed through Oct 21, 2016<br><br>Individual study quality critically appraised using the US Preventive Services Task Force criteria<br><br>Quality of evidence and strength of recommendations assessed by Champions and Work Group using GRADE system<br><br>New and updated recommendations were drafted by the Work Group based on the systematic reviews, or carried forward from the 2007 version without updated evidence<br><br>The CPG was drafted iteratively – draft 1 and 2 were posted online for internal review and comment by the Work Group, feedback considered and revisions made; draft 3 was posted for peer review by VA and DoD health systems employees and external experts from 5 universities before being finalized<br><br>Patient focus group held prior to finalization |
| Bussieres / CCGI, 2016;[17] Canada | | | |
| Intended Users:<br>Chiropractors and primary health care providers who offer conservative care (i.e., "designed to avoid invasive | To update and combine 2 previous guidelines and provide guidance on the management of adults and elderly patients with recent and persistent neck pain to improve clinical decision making and delivery of care | CCGI guideline panel<br><br>Composed of:<br>• 2 appointed chairs (1 was the lead methodologist of the guideline panel)<br>• Project executive committee<br>• Guideline panelists (clinicians, clinical | High-quality systematic reviews<br><br>Updated the search of the peer-reviewed published reports up to December 2015; assessed quality of evidence with AMSTAR<br><br>The GRADE system was used to develop guidelines<br><br>Adapted high quality guidelines<br><br>Patient values and preferences were considered |

| Intended Users; Target Population | Objective | Guideline Development Group | Recommendations Development and Evaluation Methodology |
|---|---|---|---|
| medical therapeutic measures or operative procedures." p. 525) to patients with NADs and WADs grades I to III;<br>Policy makers<br><br>Target Population: Adults and elderly patients with recent onset (0 to 3 months) and persistent (>3 months) neck pain and associated disorders | | researchers, methodologists, professional leader/ decision maker, patient advocate | Guidelines developed during 3 face-to-face meetings<br><br>Consensus via modified Delphi<br><br>Guideline peer reviewed by 10-member external (CCGI member, non-panel member) committee. |
| Cote / OPTIMa, 2016;[18] Canada | | | |
| Intended Users: Clinicians in primary, secondary, and tertiary health care settings.<br><br>Target Population: Adults (≥18 years) with recent-onset (0-3 months) and persistent (4-6 months) NAD grades I-III [not persistent for >6 months] | To: "(1) accelerate recovery; (2) reduce the intensity of symptoms; (3) promote early restoration of function; (4) prevent chronic pain and disability; (5) improve health related quality of life; (6) reduce recurrences; and (7) promote active participation of patients in their care." (p. 2002)<br><br>"To promote uniform high quality care for individuals with NAD." (p. 2002) | OPTIMa Collaboration<br><br>Composed of:<br>• 21-member multidisciplinary Guideline Expert Panel of expert clinicians, academics and scientists, a patient liaison, a consumer representative, a retired judge, automobile insurance industry experts | Updated systematic reviews that informed previous guidelines with 8 reviews on effectiveness, cost-effectiveness, and safety of non-invasive interventions for management of NAD grades I-III<br><br>Included studies critically appraised using SIGN criteria; retained low risk of bias for evidence summary.<br><br>Recommendations developed by authors of each systematic review.<br><br>The overall quality of the evidence and the strength and quality of recommendations was not assessed<br><br>Recommendations sub-committee modified draft recommendations according to OHTAC framework key decision determinants, best evidence from reviews, and patient experiences research; wording of recommendations developed according to the NICE methodology.<br><br>Recommendation sub-committee reviewed and debated draft and modified if warranted based on evidence; recommendations agreed to by consensus. |

| Intended Users; Target Population | Objective | Guideline Development Group | Recommendations Development and Evaluation Methodology |
|---|---|---|---|
| | | | Draft recommendations and supportive evidence presented to Guideline Expert Panel at quarterly meetings. Panel provided feedback and voted by secret ballot to accept, reject, or modify each recommendation. Consensus = acceptance by 75% of Panel.<br><br>Stakeholders were invited to review and comment on the guideline; the provincial government held public consultations on the guideline |

ACP = American College of Physicians; AE = adverse effects; AMSTAR = A MeaSurement Tool to Assess systematic Reviews ; CCGI = the Canadian Chiropractic Guideline Initiative CPG = Clinical Practice Guideline; DoD = Department of Defense; ECRI = Emergency Care Research Institute; HIV = human immunodeficiency virus; IDSA = Infections Disease Society of America; IMMPACT = Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials; IOM = Institute of Medicine; LBP = low back pain; NAD = neck pain and associated disorders; OHTAC = Ontario Health Technology Advisory Committee; OMTIMAa = Ontario Protocol for Traffic Injury Management; NICE = National Institute for Health and Care Excellence; SIGN = Scottish Intercollegiate Guidelines Network; SPGC = Standards and Practice Guidelines Committee; VA = Veterans Affairs; WAD = whiplash-associated disorders.

## Table 5: Ratings for Evidence and Recommendation

| Strength of Recommendation | Quality of Evidence |
|---|---|
| Brosseau, 2017[13] | |
| Ottawa Panel grading system /<br>Cochrane strength of recommendation<br><br>Grade A:<br>• Clinical importance ≥15%; statistical significance *P* < 0.05; RCT - single or meta-analysis<br>• Strongly recommended<br><br>Grade B:<br>• Clinical importance ≥15%; statistical significance *P* < 0.05; CCT – single or meta-analysis<br>• — No applicable Cochrane strength of recommendation<br><br>Grade C+:<br>• Clinical importance ≥15%; not statistically significant; RCT, CCT, or observational study – single or meta-analysis<br>• Use suggested<br><br>Grade C:<br>• Clinical importance <15%; not statistically significant; any design<br>• Neutral<br><br>Grade D:<br>• Clinical importance <15% favours control; not statistically significant; any design<br>• Neutral | Not applicable |

| Strength of Recommendation | Quality of Evidence |
|---|---|
| Grade D+:<br>• Clinical importance <15% favours control; not statistically significant; RCT, CCT, or observational study – single or meta-analysis<br>• Use not suggested<br><br>Grade D-:<br>• Clinical importance ≥15% favours control; *P* < 0.05 favours control; well designed RCT with >100 participants (if <100 participants, becomes grade D)<br>• Strongly not recommended | |
| Bruce / IDSA, 2017[14] | |
| GRADE<br>Strong: "The desirable effects of an intervention clearly outweigh the undesirable effects, or clearly do not."22<br><br>Weak: When the tradeoffs between the desirable and undesirable effects of an intervention are uncertain "because of low quality evidence or because evidence suggests desirable and undesirable effects are closely balanced."22<br><br>(p. 926) | GRADE system:<br><br>High quality: "Further research is very unlikely to change our confidence in the estimate of effect."[22]<br><br>Moderate quality: "Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate."[22]<br><br>Low quality: "Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate."[22]<br><br>Very low quality: "Any estimate of effect is very uncertain."[22]<br><br>(p. 926) |
| Qaseem / ACP, 2017[16] | |
| Adapted from GRADE:<br><br>Strong: the benefits clearly outweigh the risks and burden or the risks and burden clearly outweigh the benefits<br><br>Weak: "When benefits are finely balanced with risks and burden or appreciable uncertainty exists about the magnitude of benefits and risks, a recommendation is classified as weak. Patient preferences may strongly influence the appropriate therapy."[20] (p. 198) | High: Evidence from 1 or more well-designed and well-executed RCTs that yield consistent and directly applicable results. Further research is very unlikely to change committee's confidence in the estimate of effect.[20]<br><br>Moderate: Evidence from RCTs with important limitations or evidence from well-designed NRS, cohort, case–control, or multiple time series with or without intervention. Further research will probably have an important effect on confidence in the estimate of effect and may change the estimate.[20]<br><br>Low: Evidence from observational studies that have not been rated up for large magnitude of effect, dose-response association, or presence of observed effect when all plausible confounders would increase the observed effect. Further research is very likely to have an important effect on confidence in the estimate of effect and will probably change the estimate.[20]<br><br>Insufficient: Evidence that is not available or does not permit a conclusion.[20] |

| Strength of Recommendation | Quality of Evidence |
|---|---|
| VA/DoD, 2017[15] | |
| GRADE System:<br><br>Strong: "the Work Group is highly confident that desirable outcomes outweigh undesirable outcomes" (p. 64)<br><br>Weak: the desirable effects likely outweigh the undesirable effects, but the confidence is somewhat lower<br><br>Recommendation for: "the desirable consequences outweigh the undesirable consequences" (p. 64)<br><br>Recommendation Against: "the undesirable consequences outweigh the desirable consequences" (p. 64)<br><br>No recommendation for or against: Insufficient evidence to make a recommendation | GRADE system:<br><br>High quality: "Further research is very unlikely to change our confidence in the estimate of effect."[22]<br><br>Moderate quality: "Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate."[22]<br><br>Low quality: "Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate."[22]<br><br>Very low quality: "Any estimate of effect is very uncertain."[22]<br><br>(p. 926) |
| Bussieres, 2016[17] | |
| GRADE system:<br><br>Strong: "the desirable consequences clearly outweigh the undesirable consequences." (p. 529)<br><br>Weak: "on the balance of probabilities, the desirable consequences likely outweigh the undesirable consequences." (p. 529) | GRADE system:<br><br>High quality: "Further research is very unlikely to change our confidence in the estimate of effect."[22]<br><br>Moderate quality: "Further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate."[22]<br><br>Low quality: "Further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate."[22]<br><br>Very low quality: "Any estimate of effect is very uncertain."[22]<br><br>(p. 926) |
| Cote, 2016[18] | |
| Strength of recommendations not assessed. | Quality of evidence not assessed. Only studies with low risk of bias were included in the reviews. |

CCT = clinical controlled trial; DoD = Department of Defense; IDSA = Infectious Disease Society of America; RCT = randomized controlled trial; VA = Veterans Affairs.

# Appendix 3: Critical Appraisal of Included Publications

## Table 6: Strengths and Limitations of Systematic Reviews and Meta-Analyses using AMSTAR 2[21]

| Strengths | Limitations |
|---|---|
| Chou, 2016[10] | |
| • The research protocol was published online a priori<br>• A comprehensive literature search was performed<br>• Study selection was conducted in duplicate<br>• Data extraction was completed by one reviewer and checked for accuracy and completeness by a second reviewer<br>• Review authors provided a list of excluded studies and justified the exclusions<br>• Included studies were described in adequate detail<br>• Risk of bias in randomized studies was assessed appropriately using methods developed by the Cochrane Back Review Group for RCTs, cohort studies were assessed using US Preventive Services Task Force criteria, and systematic reviews were assessed using AMSTAR<br>• Review authors reported on the sources of funding for the studies included in the review<br>• Review authors accounted for risk of bias in individual studies when interpreting review findings<br>• Observed statistical heterogeneity was discussed in the results<br>• No authors had conflicts of interest to report | • Results were synthesized narratively (described as qualitatively by study authors) rather than meta-analyzed; it was not clear if this was the appropriate method of synthesis as the rationale was not provided. There was no a priori plan to statistically combine studies if it were possible |
| Institute for Quality and Efficiency in Health Care, 2015[11] | |
| • Study selection and extraction were conducted in duplicate<br>• A comprehensive literature search was performed<br>• Grey literature was eligible for inclusion<br>• Included guideline characteristics were provided<br>• Quality of included guidelines was assessed and considered in formulation of conclusions<br>• Likelihood of publication bias was not assessed, but not considered to be a concern with publication of evidence-based guidelines<br>• Conflict of Interest statement was included | • Unclear if methods were defined a priori<br>• A list of excluded guidelines was not provided |

AMSTAR = A MeaSurement Tool to Assess systematic Reviews; RCT = Randomized Controlled Trial.

## Table 7: Strengths and Limitations of Clinical Studies using the RoB 2[8]

| Strengths | Limitations |
|---|---|
| Saxena, 2017[12] | |
| • Allocation sequence was random and concealed until participants were enrolled and assigned to intervention groups. | • Drop-out rates different substantially between intervention groups (22.5% comparator group vs. none reported in yoga group); it was possible drop-out in the comparator group was due to knowledge of the assigned interventions. |

| Strengths | Limitations |
|---|---|
| • There were no significant differences between groups at baseline.<br>• The numerical result assessed was not likely to have been selected on the basis of results from multiple outcome measurements or analyses of the data. | • Compliance to the yoga intervention was reportedly poor for 25% of participants (compliance was not reported for comparator group).<br>• Data were not analyzed in accordance with a pre-specified plan that was finalized before unblinded outcome data were available for analysis: researchers selected 30 participants from each group (40 were assigned to each group) for analysis.<br>• It was not clear why the quality of life domains were not consolidated for analysis as a composite score.<br>• Blinding did not occur and no placebo or sham comparator was used to limit participants' ability to predict the purpose of the study; it was possible participant responses at outcome assessment could have been influenced by knowledge of the intervention received (e.g., self-reported responses may have been answered more favorably due to knowledge of receiving a promising intervention vs. usual pharmacological treatment). |

## Table 8: Strengths and Limitations of Guidelines using AGREE II[9]

| Item | Guideline | | | | | |
|---|---|---|---|---|---|---|
| | Brosseau, 2017[13] | Bruce / IDSA, 2017[14] | Qaseem / ACP, 2017[16] | VA/DoD, 2017[15] | Bussieres, 2016[17] | Cote, 2016[18] |
| Domain 1: Scope and Purpose | | | | | | |
| 1. The overall objective(s) of the guideline is (are) specifically described. | Yes | Yes | Yes | Yes | Yes | Yes |
| 2. The health question(s) covered by the guideline is (are) specifically described. | Yes | Yes | Yes | Yes | Yes | Yes |
| 3. The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described. | Yes | Yes | Yes | Yes | Yes | Yes |
| Domain 2: Stakeholder Involvement | | | | | | |
| 4. The guideline development group includes individuals from all relevant professional groups. | Yes | Yes | Yes | Yes | Yes | Yes |
| 5. The views and preferences of the target population (patients, public, etc.) have been sought. | No | No | Yes | Yes | Yes | Yes |
| 6. The target users of the guideline are clearly defined. | Yes | Yes | Yes | Yes | Yes | Yes |

| Item | Guideline | | | | | |
|---|---|---|---|---|---|---|
| | Brosseau, 2017[13] | Bruce / IDSA, 2017[14] | Qaseem / ACP, 2017[16] | VA/DoD, 2017[15] | Bussieres, 2016[17] | Cote, 2016[18] |
| Domain 3: Rigour of Development | | | | | | |
| 7. Systematic methods were used to search for evidence. | Yes | Yes | Yes | Yes | Yes | Yes |
| 8. The criteria for selecting the evidence are clearly described. | Yes | No | Yes | Yes | Yes | Yes |
| 9. The strengths and limitations of the body of evidence are clearly described. | Yes | Yes | Yes | Yes | Yes | No |
| 10. The methods for formulating the recommendations are clearly described. | Partial yes (insufficient detail) | Yes | Yes | Yes | Yes | Yes |
| 11. The health benefits, side effects, and risks have been considered in formulating the recommendations. | Yes | Yes | Yes | Yes | Partial yes (evidence on adverse events from treatments was not reviewed) | Yes |
| 12. There is an explicit link between the recommendations and the supporting evidence. | Yes | Yes | Yes | Yes | Yes | Yes |
| 13. The guideline has been externally reviewed by experts prior to its publication. | Yes | Yes | Yes | Yes | Yes | Yes |
| 14. A procedure for updating the guideline is provided. | No | Yes | Yes | Yes | Yes | Yes |
| Domain 4: Clarity of Presentation | | | | | | |
| 15. The recommendations are specific and unambiguous. | Yes | Yes | Yes | Yes | Yes | Yes |
| 16. The different options for management of the condition or health issue are clearly presented. | Yes | Yes | Yes | Yes | Yes | Yes |
| 17. Key recommendations are easily identifiable. | Yes | Yes | Yes | Yes | Yes | Yes |
| Domain 5: Applicability | | | | | | |
| 18. The guideline describes facilitators and barriers to its application. | No | No | Yes | Yes | Yes | No (considered beyond scope) |

| Item | Guideline | | | | | |
|---|---|---|---|---|---|---|
| | Brosseau, 2017[13] | Bruce / IDSA, 2017[14] | Qaseem / ACP, 2017[16] | VA/DoD, 2017[15] | Bussieres, 2016[17] | Cote, 2016[18] |
| 19. The guideline provides advice and/or tools on how the recommendations can be put into practice. | No | No | Yes | Yes | Yes | No (considered beyond scope) |
| 20. The potential resource implications of applying the recommendations have been considered. | No | No | No | Yes | Yes | No (considered beyond scope) |
| 21. The guideline presents monitoring and/or auditing criteria. | No | No | No | No | No | No (considered beyond scope) |
| Domain 6: Editorial Independence | | | | | | |
| 22. The views of the funding body have not influenced the content of the guideline. | Yes | Unclear (funder was identified; no statement to indicate whether the views of the funder influenced the content of the guideline) | Yes | Yes | Yes | Yes |
| 23. Competing interests of guideline development group members have been recorded and addressed. | Yes | Yes | Yes | Yes | Yes | Yes |

# Appendix 4: Main Study Findings and Authors' Conclusions

## Table 9: Summary of Findings Included Systematic Reviews and Meta-Analyses

| Main Study Findings | Authors' Conclusion |
|---|---|
| Chou, 2016[10] | |
| No studies were identified that compared yoga with a pharmacological treatment comparator. | No relevant conclusion reported. |
| Institute for Quality and Efficiency in Health Care, 2015[11] | |
| "One guideline recommends yoga for the treatment of chronic non-specific LBP, but only Viniyoga and Iyengar yoga." (p. 28) | "For non-drug measures, recommendations were identified on massages and manual therapy, exercise and physiotherapy, as well as aqua gymnastics and yoga." (p. 28) |

LBP = low back pain.

## Table 10: Summary of Findings of Included Primary Clinical Study

| Main Study Findings | Authors' Conclusion |
|---|---|
| Saxena, 2017[12] | |
| Yoga (Group II; n = 30) vs. conventional pharmacological therapy (Group I; n = 30)<br><br>Pain (Mean, SD)<br>Yoga<br>Baseline: 66.90, 8.40 to post-test: 34.07, 10.12 ($P < 0.001$)<br>Vs.<br>Conventional pharmacological therapy<br>Baseline: 65.60, 5.89 to post-test: 67.03, 6.557 (NS)<br>Between-group differences at baseline (NS)<br>Between group differences at post-test $P < 0.001$<br><br>QoL – Physical Domain *transformed* (Mean, SD)<br>Yoga<br>Baseline: 41.41, 7.93 to post-test: 69.64, 9.03 ($P < 0.001$)<br>Vs.<br>Conventional pharmacological therapy<br>Baseline: 39.41, 8.36 to post-test: 39.98, 7.22 (NS)<br>Between-group differences at baseline (NS)<br>Between group differences at post-test ($P < 0.001$)<br><br>QoL – Psychological Domain *transformed* (Mean, SD)<br>Yoga<br>Baseline: 47.64, 12.17 to post-test: 71.92, 10.03 ($P < 0.001$)<br>Vs.<br>Conventional pharmacological therapy<br>Baseline: 43.47, 9.0 to post-test: 43.19, 9.25 (NS)<br>Between-group differences at baseline (NS)<br>Between group differences at post-test ($P < 0.001$)<br><br>QoL – Social Domain *transformed* (Mean, SD)<br>Yoga | "From this study, it can be concluded that after 8 weeks of yoga therapy, Group II CPP subjects had lesser intensity of pain as shown by significantly reduced VAS scores and improved QOL with a significant increase in physical, psychological, and social domain scores of WHOQOL-BREF. Hence, yoga regimen used in our study can be a used as add-on treatment for the pain relief and for improving QOL in patients of CPP. Better pain management with yoga can help reduce dependence on NSAIDs and its associated side effects." (p. 6) |

| Main Study Findings | Authors' Conclusion |
|---|---|
| Baseline: 57.77, 16.66 to post-test: 75.00, 10.94 (*P* < 0.001)<br>Vs.<br>Conventional pharmacological therapy<br>Baseline: 46.39, 11.09 to post-test: 48.33, 11.45 (NS)<br>Between-group differences at baseline (NS)<br>Between group differences at post-test (*P* < 0.001)<br><br>QoL – Environmental Domain *transformed* (Mean, SD)<br>Yoga<br>Baseline: 62.60, 8.97 to post-test: 65.00, 7.80 (*P* < 0.001)<br>Vs.<br>Conventional pharmacological therapy<br>Baseline: 64.06, 6.50 to post-test: 65.00, 5.76 (NS)<br>Between-group differences at baseline (NS)<br>Between group differences at post-test (*P* = 0.686) | |

CPP = chronic pelvic pain; NS = not significant; NSAID = nonsteroidal anti-inflammatory drug; QoL = quality of life; SD = standard deviation; VAS = visual analogue scale; WHOQOL-BREF = World Health Organization brief quality of life questionnaire.

## Table 11: Summary of Recommendations in Included Guidelines

| Recommendations | Strength of Evidence and Recommendations |
|---|---|
| Brosseau, 2017[13] | |
| "Recommendations: The eight-week Hatha Yoga program (60 minute classes once per week, plus 30 minute home program four times per week) for older women with knee osteoarthritis for management for pain relief (WOMAC subscale) at the eight weeks end of treatment measure is recommended. Participation in the program is also suggested for improved physical function (WOMAC subscale) at end of treatment of eight weeks. There is a neutral improvement for quality of life (SF-12 subscale) at end of treatment of eight weeks." (p. 588) | Positive recommendation for pain relief – Grade B (clinically important benefit demonstrated)<br><br>Positive recommendation for physical function – Grade C+ (clinically important benefit demonstrated without statistical significance)<br><br>Neutral recommendation for QoL – Grade C (no benefit demonstrated) |
| Bruce, 2017[14] | |
| Recommended non-pharmacological treatments for people with HIV and chronic pain:<br><br>"11. Yoga is recommended for the treatment of chronic neck/back pain, headache, rheumatoid arthritis, and general musculoskeletal pain." (p. 1603) | Strong recommendation<br><br>Moderate quality evidence |
| Qaseem / ACP, 2017[16] | |
| "Recommendation 2: For patients with chronic low back pain, clinicians and patients should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction (moderate-quality evidence), tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation (low-quality evidence)" (p. 523) | Strong recommendation<br><br>Low quality evidence |

| Recommendations | Strength of Evidence and Recommendations |
|---|---|
| VA/DoD, 2017[15] | |
| "Recommendation 16: For patients with chronic low back pain, we suggest offering an exercise program, which may include Pilates, yoga, and tai chi." (p. 6)<br><br>Note:<br>• Chronic pain was defined as > 4 weeks<br>• This recommendation replaced a previous recommendation based on systematic review evidence | Weak recommendation<br><br>The yoga-specific recommendation was based on low-to-moderate quality evidence |
| Bussieres, 2016[17] | |
| Recommendation:<br>"For patients with persistent (>3 months) grades I to II neck pain and disability, we suggest supervised yoga over education and home exercises for short term improvement in neck pain and disability." (p. 546)<br><br>Evidence:<br>"Baseline intensity of pain was more than 40/100 and duration was at least 3 months. Yoga was specific to the Iyengar type, with a maximum of 9 sessions over 9 weeks." (p. 546) | Weak recommendation, low-quality evidence |
| Cote, 2016[18] | |
| "Recommendation 5: For NAD grades I–II >3 months duration, clinicians may consider structured patient education in combination with: range of motion and strengthening exercises, qigong, yoga, multimodal care (exercise with manipulation or mobilization), clinical massage, low-level laser therapy, or non-steroidal anti-inflammatory drugs. In view of evidence of no effectiveness, clinicians should not offer strengthening exercises alone, strain-counterstrain therapy, relaxation massage, relaxation therapy for pain or disability, electrotherapy, shortwave diathermy, clinic-based heat, electroacupuncture, or botulinum toxin injections." (p. 2001)<br><br>This recommendation was based on one RCT with low risk of bias that found Iyengar yoga was more beneficial than education and a home exercise program.<br><br>Further guidance: clinicians may offer a program of Iyengar yoga supervised by a certified Iyengar yoga teacher, limited to a maximum of nine sessions over 9 weeks.<br><br>Note: Grade I-II NAD indicates no signs or symptoms of major structural pathology with no-to-major interference with ADL | Not graded. |

ADL = activities of daily living; HIV = human immunodeficiency virus; NAD = neck pain and associated disorders; RCT = randomized controlled trial; SF-12 = Short Form 12-item general health questionnaire; WAD = whiplash associated disorders; WOMAC = Western Ontario and McMaster Universities Osteoarthritis Index.

# Appendix 5: Additional References of Potential Interest

## Cost-Effectiveness – Other Comparator

California Technology Assessment Forum (CTAF). Cognitive and mind-body therapies for chronic low back and neck pain: effectiveness and value. Boston (MA): Institute for Clinical and Economic Review; 2017: https://icer-review.org/wp-content/uploads/2017/03/CTAF_Chronic_Pain__Evidence_Report_100417.pdf, Accessed 2019 Jul 5.