

Article Title: Rheumatoid Arthritis and Osteoarthritis Clinical Practice Guidelines Provide Few Complementary and Alternative Medicine Therapy Recommendations: A Systematic Review

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Abstract

Sixty percent of patients with arthritis have used complementary and alternative medicine (CAM) therapies at least once. The two most common types of arthritis include rheumatoid arthritis (RA) and osteoarthritis (OA). The quality and quantity of CAM recommendations for RA and OA is currently unknown. The purpose of this research was to identify the quantity and assess the quality of CAM recommendations in clinical practice guidelines (CPGs) for the treatment and/or management of RA and OA. A systematic review was conducted to identify CPGs; MEDLINE, EMBASE and CINAHL were searched from 2008 to 2018. The Guidelines International Network and the National Center for Complementary and Integrative Health websites were also searched. Three independent reviewers evaluated the quality of reporting for each guideline that provided CAM recommendations, and the specific section providing CAM recommendations, using the AGREE II instrument. From 525 unique search results, seven guidelines (3 OA, 4 RA) mentioned CAM and 5 guidelines made CAM recommendations. Scaled domain percentages from highest to lowest were (overall, CAM) as follows: clarity of presentation (92.2% vs. 94.1%), scope and purpose (90.1% vs. 87.4%), rigour of development (72.6% vs. 64.2%), stakeholder involvement (64.8% vs. 49.6%), editorial independence (61.1% vs. 60.6%), and applicability (51.4% vs. 33.3%). None of the 5 guidelines was recommended by both appraisers for either the overall guideline or CAM section. For the overall guideline, appraisers agreed in their overall recommendation for 3 of 5 guidelines, including 3 Yes with modifications; of the remaining 2 guidelines, 1 was rated by the three appraisers as 1 No and 2 Yes with modifications, while 1 guideline was rated at 2 Yes and 1 Yes with modifications. For the CAM section, appraisers agreed in their overall recommendation for all 5 guidelines including 1 No, and 4 Yes with modifications. Roughly half of arthritis CPGs found included in this review provided CAM recommendations. The quality of CAM recommendations are of lower quality than overall

recommendations across the scope and purpose, stakeholder involvement, rigour of development, applicability, and editorial independence domains. Quality varied within and across guidelines.

Introduction

Arthritis is a general term that encompasses a group of over 100 diseases affecting the joints [1]. There are two broad categories of arthritis: degenerative arthritis and inflammatory arthritis [2]. Osteoarthritis (OA), the most prevalent form of arthritis, is a degenerative condition most commonly affecting the joints of the knees, hips, hands and spine [2]. Inflammatory forms of arthritis are different from OA in that the source of joint damage is inflammation as opposed to cartilage degeneration [2]. Most forms of inflammatory arthritis are also autoimmune diseases, including rheumatoid arthritis (RA) [2]. Common symptoms of arthritis include swelling, pain, stiffness and decreased range of motion [3]. These symptoms can range from mild to severe, and severe cases can result in chronic pain, permanent joint damage and consequent detriment to quality of life [3]. Approximately 25% of the United States (USA) adult population suffer from arthritis [4]. This condition is one of the leading causes of disability in the USA and Canada [3]. In the United Kingdom (UK), 60% of arthritis patients have used complementary and alternative medicine (CAM) therapies at least once [5]. CAM therapies refer to health care approaches that are not typically considered part of conventional care or not traditional to Western practice [6]. According to the National Center for Complementary and Integrative Health (NCCIH), the term “complementary” refers to a non-mainstream practice used together with conventional medicine, whereas “alternative” refers to a non-mainstream practice used to replace conventional medicine [6].

Common CAM therapies used for arthritis include: acupuncture; diet and nutritional supplements; herbal medicine; manipulative therapies such as chiropractic, osteopathic and manual therapies; massage therapy; hydrotherapy; balneotherapy; thermal therapy; homoeopathy; and meditative movement therapies [5]. For example, acupuncture purportedly relieves symptoms of pain by diverting pain signals relayed to the brain from damaged tissues, in addition to stimulating endorphins and enkephalins—hormones which also serve to relieve pain [5]. Common dietary and nutritional supplements used for arthritis are glucosamine sulphate and chondroitin, which are claimed to nourish damaged cartilage, as well as fish and plant oils [5]. Popular herbs for arthritis include devil's claw, *Boswellia serrata*, rosehip, and traditional Chinese medicines [5]. Manipulative and manual therapies are primarily used to treat musculoskeletal issues associated with arthritis, and massage therapy is used to reduce anxiety and stress and manage pain through relief of muscle tension and improved circulation [5]. Movement and meditative therapies such as tai chi, qi gong and yoga incorporate breathing exercises and postures intended to reduce stress and build balance, mobility, and muscle strength [5]. In a national survey of American rheumatologists, it was found that there was general acceptance toward some types of CAM, though the percentage of favourable responses ranged significantly between certain CAM modalities [7].

Health care professionals refer to and rely on evidence-based clinical practice guidelines (CPGs) to determine whether the use of a given therapy is recommended for specific clinical situations, and to guide informed and shared decision-making with patients regarding associated benefits and risks [8]. While some CAM modalities appear to be gaining acceptance among rheumatologists, in general, many health care professionals lack the necessary CAM knowledge to help patients in their decision-making, underscoring the need to identify whether CAM recommendations can be found in CPGs for the treatment and/or

management of RA and OA. The purpose of this study is to conduct a systematic review to determine mention and recommendations of CAM for the treatment and/or management of RA and OA in CPGs and assess the quality of CAM recommendations using the AGREE II instrument.

Methods

A systematic review was conducted to identify CPGs for the treatment or management of RA and OA using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria [9, 10]. A protocol was registered with PROSPERO, registration number CRD42019132282. Eligible guidelines were assessed with the widely used and validated Appraisal of Guidelines, Research and Evaluation II (AGREE II) instrument [11]. CPGs with CAM recommendations were re-assessed with AGREE II whereby the assessors applied the 23 items to only the CAM sections of the guideline. We chose to assess guidelines with the AGREE II instrument as opposed to another guideline appraisal instrument, as it is one of the most widely validated guideline assessment instruments as featured on Equator Network (<https://www.equator-network.org/>).

Eligibility criteria

Eligibility criteria for RA and OA guidelines were based on the Population, Intervention, Comparison and Outcomes framework. Eligible populations were adults aged 19 years and older with RA or OA. With respect to interventions, we only included guidelines that included treatment and/or management of RA or OA in order to determine whether any mention or recommendations of CAM therapies were included. There were no comparisons. Outcomes were AGREE II scores which reflect guideline methodological rigour and transparency. Eligible guidelines were published in 2008 or later, in the English language,

and were either publicly available or could be ordered through our library system. Publications in the form of consensus statements, protocols, abstracts, conference proceedings, letters or editorials, based on primary studies that evaluated RA or OA management or treatment, or focused on RA or OA curriculum, education, training, research, professional certification or performance, were not eligible.

Searching and screening

MEDLINE, EMBASE and CINAHL were searched on October 22, 2018, from 2008 to October 19, 2018, inclusive. The search strategy (Supplementary File 1) consisted of a broad search of all arthritis guidelines. We also searched the Guidelines International Network, a repository of guidelines [12] using keyword searches restricted based on the eligibility criteria including “arthritis”. Next, we searched the NCCIH web site which contained a single list of CAM guidelines (<https://nccih.nih.gov/health/providers/clinicalpractice.htm>). AMA and another research assistant each independently screened all titles and abstracts from all sources. Searches results were first de-duplicated electronically on OVID, then double checked manually using a Microsoft Excel spreadsheet; no referencing software was used. AMA and the other research assistant each independently screened all full-text items to confirm eligibility. JYN reviewed the screened titles and abstracts and full-text items to standardize screening, and helped to discuss and resolve selection differences between the two screeners.

Data extraction and analysis

The following data were extracted from each guideline and summarized: date of publication; country of first author; type of organization that published the guideline (academic institutions, government agencies, disease-specific foundations, or professional associations

or societies); and whether any CAMs were mentioned in this guideline. If CAMs were mentioned in a guideline, the types of CAM mentioned, CAM recommendations made, CAM funding sources, and whether any CAM providers were part of the guideline panel were also extracted. Most data were available in the guideline; to assess applicability, the web site of each developer was browsed and searched for any associated knowledge-based resources in support of implementation. AMA and the other research assistant completed the data extraction and analysis, then met with JYN to resolve any discrepancies, which were resolved by consensus.

Guideline quality assessment

The extraction and analysis of data from eligible guidelines followed standardized methods for applying the AGREE II instrument [11]. First, a pilot test of the AGREE II instrument was conducted with three separate guidelines during which all three evaluators independently assessed these three guidelines with the AGREE II instrument. Discrepancies were discussed and resolved. All three evaluators then independently assessed all eligible guidelines containing CAM therapy recommendations twice (i.e. once for the overall guideline, and once for only the CAM sections of the guideline) for 23 items across 6 domains using a seven-point Likert scale from strongly disagree (1) to strongly agree (7) that the item was met. Following this, the overall quality of each guideline was rated (1 to 7), and that information was used to recommend for or against use of each guideline. The modified AGREE II questions used to guide the scoring of the CAM sections of each guideline are found in Supplementary File 2. All three assessors met to resolve differences. Average appraisal scores were calculated by taking the average rating for all 23 items of a single appraiser of a single guideline, followed by taking the average of this value for both appraisers. Average overall assessments were calculated as the average of both appraisers'

“overall guideline assessment” scores for each guideline. Scaled domain percentages were generated for inter-domain comparison, and were calculated by adding both appraisers’ ratings of items within each domain, and scaling by maximum and minimum possible domain scores, before converting this into a percentage. Average appraisal scores, average overall assessments and scaled domain percentages for each guideline were tabulated for comparison.

It should be noted that only eligible guidelines that contained CAM therapy recommendations were assessed using the AGREE II tool, in order to determine the difference in AGREE II scores between the overall guideline and specific CAM sections; only demographic information is reported for eligible guidelines that did not contain CAM therapy recommendations.

Results

Search results (Fig. 1)

Searches retrieved 637 items, 580 were unique, and 543 titles and abstracts were eliminated, leaving 37 full-text guidelines that were considered. Of those, 22 were not eligible, primarily because they could not be retrieved (15), had newer guidelines available (6) or did not meet other eligibility criteria (1), leaving 15 guidelines eligible for review. Of these guidelines 7 made mention of CAM therapies and 5 made CAM therapy recommendations. A list of excluded articles by citation is provided in Supplementary File 3.

Guideline characteristics (Table 1)

Eligible guidelines were published from 2008 to 2018 in the UK (n=6), the USA (n=3), the Netherlands (n=1), Scotland (n=1), Portugal (n=1), Hong Kong (n=1), Canada (n=1) and

Japan (n=1) [13,14,15,16,17,18,19,20,21,22,23,24,25,26,27]. The guidelines were funded and/or developed by professional associations or societies (n=12) and government agencies (n=3). CAMs mentioned across the 7 CPGs included electrotherapy (e.g. ultrasound, transcutaneous electrical nerve stimulation, interferential therapy, laser therapy) (n=6), manual therapy (e.g. manipulation, massage therapy) (n=4), dietary supplements and nutraceuticals (e.g. glucosamine and chondroitin) (n=4), hydrotherapy (n=3), thermotherapy (n=3), acupuncture (n=2), yoga (n=2), tai chi (n=1), magnet therapy (n=1) and CAM in general (n=4). Recommendations relating to CAM were made in 5 guidelines, and related to manual therapy (n=4), electrotherapy (n=4), acupuncture (n=2), thermotherapy (n=2), dietary supplements and nutraceuticals (n=2) and hydrotherapy (n=1); only these guidelines were assessed using the AGREE II tool. No CAM funding sources existed across any guidelines, and 4 guidelines included CAM providers as part of the guideline panel. We provide a summary of CAM recommendations made across RA and OA CPGs for the benefit of clinicians and researchers in Fig. 2.

Guidelines mentioning CAM without recommendations

Two eligible guidelines made mention of CAM but did not make any CAM recommendations; these were not assessed using the AGREE II tool. One of these guidelines presented vague mention of CAM, acknowledging the lack of reporting within the guideline itself on CAM therapies such as transcutaneous electrical nerve stimulation [18]. The second guideline described CAM modalities in some detail, including treatments such as tai chi, hydrotherapy, thermotherapy, laser therapy, ultrasound and dietary supplements. While providing information on the background and evidence base of these modalities, this guideline concluded that there was insufficient evidence for the effectiveness of CAM and did not make specific recommendations [19].

Average appraisal scores, average overall assessments and recommendations regarding use of guidelines: overall guideline

Table 2 shows appraisal scores, average overall assessments and recommendation regarding use for each guideline. For each of the 5 guidelines, the average appraisal scores ranged from 3.7 to 6.2 on the seven-point Likert scale (7 representing that the appraiser strongly agrees that the item is met); the average appraisal scores of 4 guidelines were equal to or greater 5.0, and 1 guideline was equal to or greater than 6.0. Average overall assessments for the 5 guidelines ranged from 3.7 (lowest) to 6.7 (highest), including 4 guidelines equal to or greater than a score of 5.0 and 2 guidelines equal to or greater than 6.0.

Average appraisal scores, average overall assessments and recommendations regarding use of guidelines: CAM sections

Table 2 shows average appraisal scores, average overall assessments and recommendation regarding use for each guideline. For each of the 5 guidelines, the average appraisal scores ranged from 3.2 to 5.8 on the seven-point Likert scale; the average appraisal scores of 4 guidelines were equal to or greater than 4.0, and 3 guidelines were equal to or greater than 5.0. Average overall assessments for the 5 guidelines ranged from 2.7 (lowest) and 5.7 (highest), including 4 guidelines equal to or greater than a score of 5.0.

Overall recommendations: overall guideline (Table 3)

None of the 5 guidelines was recommended by both appraisers. Appraisers agreed in their overall recommendation for 3 of 5 guidelines, including 3 Yes with modifications [13, 15, 17]. Of the remaining 2 guidelines, 1 was rated by the three appraisers as 1 No and 2 Yes with modifications [16], while 1 guideline was rated at 2 Yes and 1 Yes with modifications [14].

Overall recommendations: CAM sections (Table 3)

None of the 5 guidelines was recommended by both appraisers. Appraisers agreed in their overall recommendation for all 5 guidelines including 1 No [16], and 4 Yes with modifications [13,14,15, 17].

Scaled domain percentage quality assessment (Table 4)

With regard to scaled domain percentages of the overall guideline, scope and purpose scores were 87.0–98.1%, stakeholder involvement scores were 57.4–81.5%, rigour-of-development scores were 24.3–92.4%, clarity-of-presentation scores ranged from 83.3 to 98.1%, applicability scores were 30.6–65.3%, and editorial independence scores ranged from 0.0 to 86.1%. With regard to scaled domain percentages of the CAM guideline sections, scope and purpose scores were 75.9–98.1%, stakeholder involvement scores were 27.8–63.0%, rigour-of-development scores were 19.4–85.4%, clarity-of-presentation scores ranged from 90.7 to 96.3%, applicability scores were 12.5–59.7%, and editorial independence scores ranged from 0.0–86.1%.

Scope and purpose

The overall objectives and health questions were generally well-defined in all guidelines. Authors provided the goal of the guideline, the type of treatment or management strategies they sought to assess, the target disease or condition (i.e. RA or OA), and the population to whom the guideline was meant to apply. Two guidelines broadly defined the target population as adults with a diagnosis of either RA or OA [13, 14]. Three guidelines defined a more specific target population, such as patients with OA of the knee or OA of the hip [15,16,17]. The scaled domain percentage for scope and purpose items in CAM sections

approximated that of the overall guidelines as the overall objectives, health questions, target disease, and target populations described were applicable to both to CAM therapies and non-CAM therapies that were discussed.

Stakeholder involvement

In terms of the overall guideline, all guidelines provided thorough and detailed characteristics of the guideline development group members, typically including degrees held by, and institutional affiliation of each member, in addition to some of the following: subject discipline, geographical location, and description of member's role in the group. Two guidelines detailed the views and preferences of the target population [13, 14]; however, 3 did not [15,16,17]. Target users of the guideline were typically explicitly defined. Three guidelines offered clear descriptions, for example, type of practitioner or specialty [15,16,17], while 2 guidelines offered less specific details about target users [13, 14]. The scaled domain percentage for stakeholder involvement specific to CAM was notably lower than the score for overall guidelines. Three guidelines identified CAM experts in the guideline development group [14,15,16], while 2 did not [13, 17]. Views and preferences of CAM-related therapies in the target population were only mentioned in a single guideline [14]. CAM patients were clearly defined in all guidelines.

Rigour of development

Systematic methods were nearly always employed to search for evidence with the criteria for evidence selecting often being clearly described [13,14,15, 17], with the exception of one guideline [16]. The strengths and weaknesses of the evidence were clearly described in all guidelines but one [16]. The methods for recommendations formulation differed; while the majority of guidelines provided sufficient detail on how consensus was reached [13,14,15,

17], a single guideline provided minimal information [16]. Each guideline considered some health benefits, side effects and/or risks associated with the formulation of their recommendations. The majority of guidelines provided an explicit link between their recommendations and the supporting evidence, with the exception of one guideline in which this was inconsistent [16]. While most guidelines clearly stated that they were reviewed externally prior to publication [13,14,15, 17], one did not [16]. Some guidelines did not mention the purpose and intent for, or the methods used to conduct the external review [13, 16]. Most guidelines included a procedure for updating the guideline except one [16], however, among those that did, none provided a detailed methodology. The scaled domain percentage for rigour of development specific to CAM recommendations was notably lower than that of overall guideline recommendations. Systematic methods were almost always used to search for CAM evidence, and the criteria for selecting the evidence were almost always clearly described [13,14,15, 17], with the exception of one guideline [16]. The strengths and weaknesses of the evidence pertaining to CAM were clearly described in all guidelines except for one [16]. The methods for CAM recommendation formulation were generally well-described in all but one guideline [16]. While each guideline considered some health benefits, side effects, and/or risks associated with the formulation of their CAM recommendations, these considerations were not as apparent in some guidelines compared with those of non-CAM treatments [13, 15, 17]. The link between CAM recommendations and supporting evidence was explicit in all guidelines except one [16]. No guideline included CAM experts in an external review prior to publication. Any specified procedures for updating a guideline were assumed to extend to the CAM sections of the guideline.

Clarity of presentation

Each guideline offered specific, clear recommendations, however, a couple lacked one or more details as follows: identification of the intent or purpose, relevant population or caveats [15, 16]. All 5 guidelines scored well in regard to providing a wide-range of options for the treatment and/or management of the condition [13,14,15,16,17]. Key recommendations were also largely easy to identify. The scaled domain percentage of clarity of presentation pertaining to CAM recommendations was similar to that of the overall guidelines, as CAM recommendations were also specific, clear and easy to identify, and the CAM options were clearly presented in all guidelines [13,14,15,16,17].

Applicability

Facilitators and barriers to implementation of the recommendations were discussed in most guidelines, albeit generally not in great detail [13,14,15,16]. All guidelines provided advice and/or tools supporting the implementation of their respective recommendations. Four guidelines addressed the resource implications of implementing the recommendations [13,14,15, 17]. The guidelines provided general monitoring and auditing criteria, but tended to lack sufficient detail on criteria such as quality indicators and other stipulations of this applicability item. The scaled domain percentage for applicability pertaining to CAM sections was significantly lower than that of the overall guidelines. Three guidelines discussed facilitators and barriers to implementation of the CAM recommendations [13,14,15]. Two guidelines included advice and/or tools to support implementation of the CAM recommendations [14, 15]. Four guidelines addressed the resource implications of implementing the CAM recommendations [13,14,15, 17]. The guidelines did not tend to present specific monitoring and auditing criteria for CAM in particular.

Editorial independence

Guidelines varied in their quality of reporting their funding source or competing interests of guideline development panel members. Several guidelines that declared a funding source did not state whether their funding source influenced the content of the guideline [13, 14, 17], while one guideline provided no funding information [14], and one identified both criteria [15]. No guidelines had CAM funding sources.

No guidelines explicitly stated that no funding supported their development. One guideline did not address competing interests [16]. One guideline did not specify how potential competing interests were identified or considered [15], while two others did not describe how they may have influenced the guideline development process or issuing of recommendations [15, 17].

Discussion

The purpose of this research was to identify whether any high-quality resources which patients and health care professionals could base discussions and decisions about use of CAM therapies for RA and OA exist, by assessing the quantity and quality of CAM recommendations in CPGs for the treatment and/or management of RA and OA. This study identified 15 guidelines published between 2008 and 2018 that were relevant to the treatment and/or management of RA or OA, 7 guidelines that made mention of CAM, and 5 guidelines that made CAM recommendations. Quality as assessed by the 23-item AGREE II instrument varied widely across guidelines overall and by domain. In assessing the overall guideline, 4 guidelines scored 5.0 or higher in both average appraisal score and average overall assessment [13,14,15, 17], and 1 guideline scored 4.0 or lower in both of these metrics [16]. In assessing the CAM section of each guideline, 4 guidelines scored 4.0 or higher in both

average appraisal score and average overall assessment [13,14,15, 17], and 1 guideline scored 3.0 or lower in both of these metrics [16] (1 = strongly disagree; 7 = strongly agree that criteria are met).

To our knowledge, no previous studies have identified the quantity and assessed the quality of CAM recommendations in RA and OA guidelines. Thus, this is the first study to assess the credibility and nature of CAM therapy recommendations in RA and OA guidelines. Previous studies have assessed the quality of arthritis guidelines [28,29,30,31,32,33,34,35,36,37,38,39,40]. Of these, six pertain to RA guidelines [28, 30, 32, 34, 36, 37, 39], four to OA guidelines [29, 31, 38, 40], one to juvenile idiopathic arthritis [33], and one to psoriatic arthritis [35]. In addition, some of the aforementioned studies have also considered the mention of CAM and CAM recommendations for arthritis [31,32,33, 37,38,39,40], though only three studies considered some CAM interventions [37,38,39]. Some of these studies found the guidelines to primarily be of low quality or varying in quality, and that treatment recommendations were inconsistent across guidelines [28,29,30]. Studies that found most guidelines to be of high quality tended to review a small number of guidelines [32, 33]. One study found recommendations made across guidelines to be consistent despite varying guideline quality [31]. Given that rheumatologists' attitudes to CAM are variable, and tend to depend on their familiarity with and evidence-base regarding the CAM therapy [41], this study adds to the medical literature by providing an overview of CAM therapy recommendations for RA and OA, given that increased research can better delineate the CAM risk/benefit profile [42].

In the present study, the scaled domain percentages for the overall guidelines from highest to lowest were as follows: clarity of presentation (94.2%), scope and purpose (90.4%), rigour of

development (72.6%), stakeholder involvement (64.8%), editorial independence (61.1%) and applicability (51.4%). The scaled domain percentages for the CAM section of the guidelines from highest to lowest were as follows: clarity of presentation (94.1%), scope and purpose (87.4%), rigour of development (64.2%), editorial independence (60.6%), stakeholder involvement (49.6%) and applicability (33.3%). Previous studies that evaluated arthritis CPGs have reported similar findings, with the scope and purpose criteria being generally well-addressed [31, 32, 37], and stakeholder involvement, editorial independence and applicability domain criteria inadequately addressed or absent from guidelines [29,30,31,32,33, 35,36,37,38,39]. Therefore, the variable quality of reporting in arthritis guidelines is not unique to this study.

Strengths of this study included a comprehensive, systematic review methodology that identified eligible RA and OA treatment and/or management guidelines, as well as the utilization the AGREE II instrument, which has been validated and serves as a widely accepted instrument for the assessment of guideline quality [11]. One limitation includes the fact that we placed a restriction on only assessing English-language guidelines. Additionally, all sourced guidelines were independently assessed by three appraisers as opposed to four as recommended by the AGREE II instrument to optimize reliability. To improve consistency across assessors, JYN, AMA, and an additional research assistant conducted an initial pilot-test during which they independently appraised three independent guidelines, then discussed discrepancies and achieved consensus in how to apply the AGREE II instrument. Following the appraisal of all eligible guidelines, JYN met with AMA and the additional research assistant to resolve any discrepancies without unduly modifying legitimate discrepancies.

By describing the quantity and quality of RA and OA guidelines that included CAM recommendations, this study revealed that few CAM recommendations are available to support informed and shared decision-making among patients and health care professionals regarding CAM. This may be reflective of the inconsistency in literature surrounding the efficacy of CAM in RA, OA and other rheumatologic conditions [40]. Despite this, the prevalence of CAM use is particularly high among rheumatism and arthritis patients globally [43, 44]. In contrast, the number of patients reporting CAM use to their rheumatologists is relatively low, for reasons including fear of a negative response from clinicians or having already used CAM before seeing their clinician [45]. In a study of arthritis patients, 92% having used CAM, and 54% of which disclosed CAM use, it was determined that patients were more likely to disclose CAM use if their rheumatologists included them in decision-making processes [46]. To this end, improved reporting of CAM recommendations within RA and OA guidelines could better inform clinicians of the benefits and harms of CAM therapies which could be discussed with patients, encourage CAM use disclosure, and improve quality of care, as currently most rheumatologists do not inquire about CAM despite high rates of use [45, 47].

Guidelines with higher overall domain scores tended to also have higher scored CAM sections relative to those of other guidelines, but the CAM scaled domain percentages were often lower than percentages for the overall guideline. This indicates a discrepancy in the quality of reporting of CAM recommendations even among higher quality guidelines [13, 14]. With previous studies also demonstrating the lack of consistency in recommendations across arthritis CPGs [29, 30, 33], and in the reporting of non-pharmacological treatments compared with general clinical management [37], the findings of this study highlight the added need for improved reporting of CAM recommendations in this subset of guidelines.

The AGREE II instrument and other guideline development tools can be used to improve overall quality and address the lower quality seen in domains that are generally less well-reported in CAM sections of RA and OA guidelines [48,49,50].

Conclusions

This study identified 15 CPGs published since 2008 on the treatment and/or management of RA or OA, 5 of which included CAM therapy recommendations. Appraisal of these 5 guidelines with the AGREE II instrument revealed variable guideline quality. Guidelines that achieved higher AGREE II scores compared with other guidelines in terms of both the overall guideline and CAM sections could be used as the basis for discussion about the use of CAM therapies for which recommendations were made. The relatively lower quality of reporting for the CAM sections in comparison to other treatments within these guidelines should be amended in future updates. Updates to guidelines that achieved variable or lower scaled domain percentages overall and with regard to CAM sections could be improved in accordance with the AGREE II instrument, and with the aid of a variety of tools for guideline development. This finding also suggests a need for further research on evidence-based CAM therapies for RA and OA that could allow for improved reporting of CAM recommendations. Such improvements would better equip health care professionals to better inform patients inclined to use CAM regarding possible benefits and risks, and encourage RA and OA patients to be more involved in shared-decision making processes regarding their care.

Data availability

All relevant data are included in this manuscript.

Abbreviations

AGREE II: Appraisal of Guidelines for Research & Evaluation II

CAM: Complementary and alternative medicine

CPG: Clinical practice guideline

NCCIH: National Center for Complementary and Integrative Health

OA: Osteoarthritis

PICO: Population, Intervention, Comparison and Outcome

PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses

RA: Rheumatoid arthritis

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Contributions

JYN: conceptualized and designed the study, collected and analysed data, drafted the manuscript, and gave final approval of the version to be published.

AMA: assisted with the collection and analysis of data, revised the manuscript critically, and gave final approval of the version to be published.

Ethics declarations

Disclosures

None.

Consent for publication

All authors consent to this manuscript's publication.

Supplementary Files

Supplementary File 1: MEDLINE Search Strategy for Rheumatoid and Osteoarthritis

Guidelines Executed October 22, 2018

Supplementary File 2: Modified AGREE II Questions Used to Guide Scoring of CAM

Sections of Each Guideline

Supplementary File 3: List of Excluded Articles

Figures

Figure 1: PRISMA Diagram

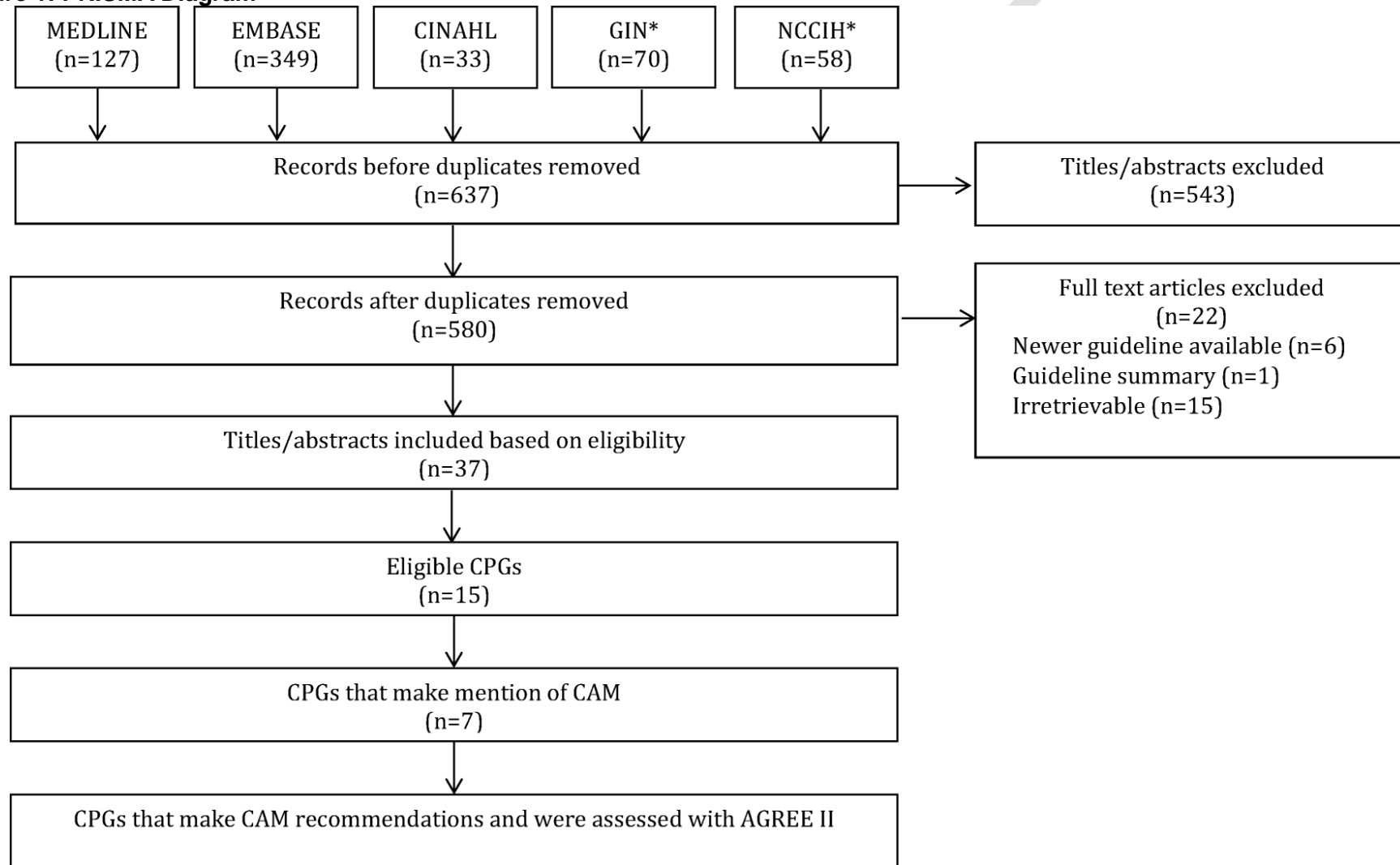


Figure 2: Summary of CAM Recommendations in Clinical Practice Guidelines

Guideline	CAM Therapy					
	Manual Therapy	Electrotherapy	Acupuncture	Thermotherapy	Dietary Supplements and Nutraceuticals	Hydrotherapy
NICE 2018 (RA) [13]	N/A	N/A	N/A	N/A	0	N/A
NICE 2014 (OA) [14]	+	+	-	+	-	N/A
APTA 2017 (OA) [15]	+	+	N/A	N/A	N/A	N/A
RDSPT 2008 (RA) [16]	-	-	N/A	-	N/A	-
AAOS 2013 (OA) [17]	0	0	-	N/A	-	N/A

Legend:
 +/green = recommendation for the therapy's use
 -/red = recommendation against the therapy's use
 0/yellow = recommendation unclear/uncertain/conflicting
 N/A/grey = no recommendation provided

Tables

Table 1 Characteristics of Eligible Guidelines

Guideline	Country (first author)	Developer	CAM category mentioned	Guideline topic
NICE 2018 [13]	UK	National Institute for Health and Care Excellence	General CAM, diet and complementary therapies	Management of rheumatoid arthritis in adults
NICE 2014 [14]	UK	National Institute for Health and Care Excellence	Dietary supplements and nutraceuticals, acupuncture, yoga, thermotherapy, magnet therapy, manual therapy, hydrotherapy, electrotherapy	Management of osteoarthritis in adults
APTA 2017 [15]	USA	American Physical Therapy Association, Journal of Orthopaedic & Sports Physical Therapy	Manual therapy, electrotherapy (ultrasound)	Hip pain and mobility deficits in hip osteoarthritis
RDSPT 2008 [16]	Netherlands	Royal Dutch Society for Physical Therapy	Hydrotherapy, electrotherapy, manual therapy (massage, chiropractic), thermotherapy	Physical therapy in patients with rheumatoid arthritis
AAOS 2013 [17]	USA	The American Academy of Orthopaedic Surgeons	Acupuncture, electrotherapy, manual therapy, nutraceuticals, yoga	Treatment of osteoarthritis of the knee
Lau 2015 [18]	Hong Kong	Asia Pacific League of Associations for Rheumatology	General CAM, electrotherapy (transcutaneous electrical nerve stimulation)	Treatment recommendations for rheumatoid arthritis

Guideline	Country (first author)	Developer	CAM category mentioned	Guideline topic
SIGN 2011 [19]	Scotland	Scottish Intercollegiate Guidelines Network	Tai Chi, hydrotherapy, thermotherapy, electrotherapy (laser therapy, ultrasound), dietary supplements, general CAM	Management of early rheumatoid arthritis
Luqmani 2009 [20]	UK	British Society for Rheumatology, British Health Professionals in Rheumatology	N/A	Management of rheumatoid arthritis (after first 2 years)
Fonseca 2011 [21]	Portugal	Portuguese Society of Rheumatology	N/A	Use of biological agents in rheumatoid arthritis
Singh 2012 [22]	USA	American College of Rheumatology	N/A	Use of disease-modifying antirheumatic drugs and biologic agents in treatment of rheumatoid arthritis
Bornstein 2014 [23]	Canada	Canadian Rheumatology Association	N/A	Pharmacological management of rheumatoid arthritis
Koike 2009 [24]	Japan	Japan College of Rheumatology	N/A	Use of tocilizumab in rheumatoid arthritis
Deighton 2010 [25]	UK	British Society for Rheumatology, British	N/A	Rheumatoid arthritis guidelines on eligibility for biological

Guideline	Country (first author)	Developer	CAM category mentioned	Guideline topic
		Health Professionals in Rheumatology		therapy
Ding 2010 [26]	UK	British Society for Rheumatology, British Health Professionals in Rheumatology	N/A	Rheumatoid arthritis guidelines on safety of anti-TNF therapies
Chakravarty 2008 [27]	UK	British Society for Rheumatology, British Health Professionals in Rheumatology	N/A	Disease-modifying anti-rheumatic drug therapy for rheumatoid arthritis

Table 2 Average Appraisal Scores and Average Overall Assessments of Each Guideline

Guideline	Metric	Appraiser 1	Appraiser 2	Appraiser 3	Average	Standard deviation
NICE 2018 [13] (Overall)	Appraisal score	5.9	5.2	6.0	5.7	0.4
	Overall assessment	7.0	5.0	6.0	6.0	1.0
NICE 2018 [13] (CAM Section)	Appraisal score	5.1	4.7	5.3	5.0	0.3
	Overall assessment	5.0	5.0	5.0	5.0	0.0
NICE 2014 [14] (Overall)	Appraisal score	6.4	5.8	6.5	6.2	0.4
	Overall assessment	7.0	6.0	7.0	6.7	0.6
NICE 2014 [14] (CAM Section)	Appraisal score	6.0	5.5	6.0	5.8	0.3
	Overall assessment	6.0	5.0	6.0	5.7	0.6
APTA 2017 [15] (Overall)	Appraisal score	5.6	5.3	5.7	5.5	0.2
	Overall assessment	5.0	5.0	6.0	5.3	0.6
APTA 2017 [15] (CAM Section)	Appraisal score	5.4	5.2	5.6	5.4	0.2
	Overall assessment	4.0	5.0	6.0	5.0	1.0
RDSPT 2008 [16] (Overall)	Appraisal score	3.7	3.8	3.9	3.8	0.1
	Overall assessment	3.0	4.0	4.0	3.7	0.6
RDSPT 2008 [16] (CAM Section)	Appraisal score	3.0	3.3	3.3	3.2	0.2
	Overall assessment	2.0	3.0	3.0	2.7	0.6

Guideline	Metric	Appraiser 1	Appraiser 2	Appraiser 3	Average	Standard deviation
AAOS 2013 [17] (Overall)	Appraisal score	5.4	5.1	5.3	5.3	0.2
	Overall assessment	6.0	5.0	5.0	5.3	0.6
AAOS 2013 [17] (CAM Section)	Appraisal score	4.7	4.3	4.9	4.6	0.3
	Overall assessment	5.0	5.0	5.0	5.0	0.0

Table 3 Overall Recommendations for Use of Appraised Guidelines

Guideline	Overall guideline			CAM section		
	Appraiser 1	Appraiser 2	Appraiser 3	Appraiser 1	Appraiser 2	Appraiser 3
NICE 2018 [13]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
NICE 2014 [14]	Yes with modifications	Yes	Yes	Yes with modifications	Yes with modifications	Yes with modifications
APTA 2017 [15]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
RDSPT 2008 [16]	No	Yes with modifications	Yes with modifications	No	No	No
AAOS 2013 [17]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications

Table 4 Scaled Domain Percentages for Appraisers of Each Guideline

Guideline		Domain score (%)					
		Scope and purpose	Stakeholder involvement	Rigour of development	Clarity of presentation	Applicability	Editorial independence
NICE 2018 [13]	Overall guideline	90.7	66.7	81.9	98.1	58.3	75.0
	CAM section	92.6	51.9	68.1	96.3	30.6	75.0
NICE 2014 [14]	Overall guideline	98.1	81.5	92.4	96.3	65.3	86.1
	CAM section	98.1	63.0	85.4	92.6	59.7	86.1
APTA 2017 [15]	Overall guideline	88.9	59.3	82.6	83.3	59.7	72.2
	CAM section	81.5	63.0	78.5	96.3	50.0	69.4
RDSPT 2008 [16]	Overall guideline	87.0	57.4	24.3	88.9	43.1	0.0
	CAM section	75.9	42.6	19.4	90.7	12.5	0.0
AAOS	Overall	87.0	59.3	81.9	94.4	30.6	72.2

Guideline		Domain score (%)					
		Scope and purpose	Stakeholder involvement	Rigour of development	Clarity of presentation	Applicability	Editorial independence
2013 [17]	guideline						
	CAM section	88.9	27.8	69.4	94.4	13.9	72.2