



# Quality of complementary and alternative medicine recommendations in low back pain guidelines: a systematic review

Jeremy Y. Ng<sup>1</sup> · Uzair Mohiuddin<sup>1</sup>

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## Abstract

**Background** Individuals with low back pain (LBP) often turn to complementary and alternative medicine (CAM) to seek relief. The purpose of this study was to determine mention of CAM in LBP clinical practice guidelines and assess the quality of CAM recommendations using the Appraisal of Guidelines, Research and Evaluation II (AGREE II) instrument.

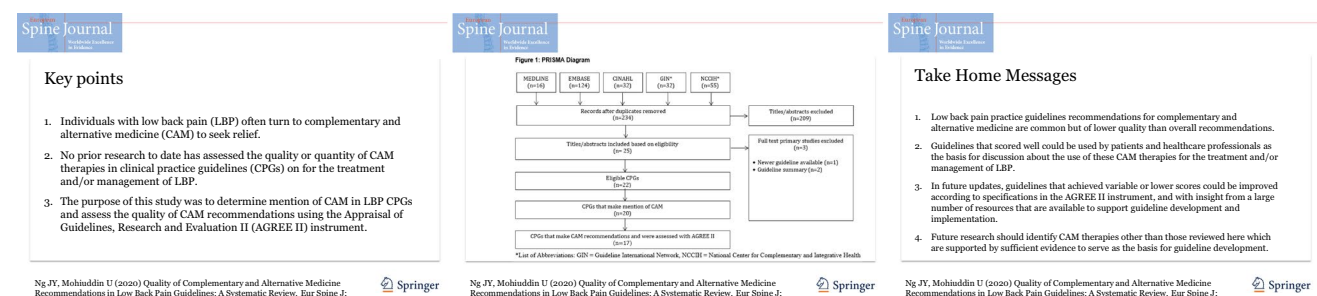
**Methods** A systematic review was conducted to identify LBP guidelines. MEDLINE, EMBASE and CINAHL were searched from 2008 to 2018. The Guidelines International Network and the National Center for Complementary and Integrative Health websites were also searched. Eligible guidelines providing CAM recommendations were assessed with the AGREE II instrument.

**Results** From 181 unique search results, 22 guidelines on the treatment and/or management of LBP were found, and 17 made recommendations on CAM therapy. With regard to scaled domain percentages, this overall guideline scored higher than the CAM section for 4 of 6 domains (overall, CAM): (1) scope and purpose (88.6%, 87.1%), (2) clarity of presentation (83.0%, 73.2%), (3) stakeholder involvement (57.0%, 41.7%), (4) rigor of development (47.2%, 44.7%), (5) editorial independence (34.8%, 34.8%) and (6) applicability (31.8%, 21.8%).

**Conclusions** The majority of LBP guidelines made CAM recommendations. The quality of CAM recommendations is significantly lower than overall recommendations across all domains with the exception of scope and purpose and editorial independence. This difference highlights the need for CAM recommendation quality improvement. Future research should identify CAM therapies which are supported by sufficient evidence to serve as the basis for guideline development.

## Graphic abstract

These slides can be retrieved under Electronic Supplementary Material.



**Keywords** Low back pain · Complementary and alternative medicine · Systematic review · AGREE II · Clinical practice guideline

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Extended author information available on the last page of the article

## Abbreviations

AGREE II Appraisal of Guidelines, Research and Evaluation II  
CAM Complementary and alternative medicine  
CPG Clinical practice guideline

LBP	Low back pain
NCCIH	National Center for Complementary and Integrative Health
PICO	Patients, Intervention, Comparison and Outcomes
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-analyses

## Background

Low back pain (LBP) is a disorder of the lumbosacral spine that can give root to considerable disability in individuals [1] and results in increased healthcare costs and missed work [2]. LBP is predominantly classified into three categories: acute, subacute and chronic LBP. Acute LBP lasts less than 6 weeks, subacute LBP spans from 6 to 12 weeks, and chronic LBP persists for greater than 12 weeks [3–6]. LBP can additionally be categorized as nonspecific and specific LBP. Nonspecific LBP refers to stiffness, soreness and pain of the lumbosacral region that lacks a distinct, attributable cause. In contrast, specific LBP can be traced to a specific pathology or condition. For instance, specific LBP can be a consequence of major trauma, infections, bone conditions and inflammatory conditions [1, 3, 7]. The point prevalence of LBP has been estimated to be 28.4% in Canada and 13.1% in the USA [8, 9].

Patients suffering from LBP often consider complementary and alternative medicine (CAM) to seek relief. The National Center for Complementary and Integrative Health (NCCIH) has defined “complementary therapy” as atypical medical practices used in conjunction with standard conventional medicine while “alternative therapy” is classified as atypical medical practices used in replacement of conventional medicine [10]. The use of CAM therapy in the management of LBP is not uncommon. A national German study found that 54% of patients burdened with neck and back pain utilized complementary therapy to treat the condition. The survey found that the majority of patients used either heat or massage therapy, spinal manipulation, acupuncture or transcutaneous electrical nerve stimulation [11]. A Canadian survey revealed that 39.1% of patients with chronic back pain used CAM therapies. This study found the use of chiropractic manipulation to be the highest (74.4%), followed by massage therapy (55.5%) and acupuncture (20.6%) [12]. Most often, conventional healthcare practitioners such as doctors and nurses are inadequately trained to make recommendations regarding CAM therapies and may consider referring a patient to a CAM practitioner to administer the intervention [13]. Thus, it would be helpful for healthcare practitioners to have an awareness of effective CAM interventions to provide an evidence-informed referral to the relevant CAM specialist.

Clinical practice guidelines (CPGs) have become an integral component of evidence-based medicine in directing healthcare professionals toward decision-making in regard to given interventions and therapies. CPG developers evaluate evidence to recommend interventions with the highest degree of evidence-based support [14]. Only one prior study has evaluated the methodological quality of LBP clinical guidelines. Using the Appraisal of Guidelines, Research and Evaluation II (AGREE II) instrument, the authors concluded that the majority of clinical guidelines evaluated lacked adequate standards of quality for use [15]. It is pertinent that evidence-informed guidance of high methodological quality on CAM use is available to clinicians without adequate knowledge about CAM therapies within CPGs. 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 LBP in CPGs and assess the quality of CAM recommendations using the AGREE II instrument.

## Methods

### Approach

A systematic review was conducted to identify LBP guidelines using standard methods [16] and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria [17]. A protocol was registered with PROSPERO; the registration number is CRD42019132300. Eligible guidelines containing CAM recommendations were assessed with the widely used and validated AGREE II instrument [18]. Articles were then reassessed with AGREE II whereby the assessors applied the 23 items to only the sections containing CAM recommendations in these guidelines. AGREE II consists of 23 items grouped in six domains: scope and purpose, stakeholder involvement, rigor of development, clarity and presentation, applicability and editorial independence.

### Eligibility criteria

Eligibility criteria for LBP guidelines were based on the Population, Intervention, Comparison and Outcomes (PICO) framework. Eligible *populations* were adults aged 19 years and older with any type of LBP. With respect to *interventions*, we only included CPGs that included recommendations for the treatment and/or management of LBP in order to determine whether any mention or recommendations of CAM therapies were included. *Comparisons* pertained to the assessed overall quality of LBP guidelines and the CAM recommendation subsections using the AGREE II instrument. *Outcomes* were AGREE II scores which reflect guideline content and format. The following conditions were also

applied to define eligible guidelines: published in 2008 or later, which provides a decade-long window into treatment/management guidelines for LBP providing at least 5 years since the publication of AGREE II which provides developers with criteria for developing high-quality guidelines; published in the English language; and either publicly available or could be ordered through our library system. 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 specifically the CAM sections; only demographic information is reported for eligible guidelines that did not contain CAM therapy recommendations.

## Searching and screening

MEDLINE, EMBASE and CINAHL were searched on October 09, 2018, from 2008 to October 11, 2018, inclusive. The search strategy (Supplementary File 1) included Medical Subject Headings and keywords that reflect terms commonly used in the literature to refer to CAM [19]. We also searched the Guidelines International Network, a repository of guidelines [<https://www.g-i-n.net/>] using keyword searches restricted based on the eligibility criteria including “low back pain.” Next, we searched the NCCIH website which contained a single list of CAM guidelines [<https://nccih.nih.gov/health/providers/clinicalpractice.htm>]. UM and another research assistant screened titles and abstracts from all other sources. UM and another research assistant screened full-text items to confirm eligibility. JYN reviewed the screened titles/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 (i.e., academic institutions, government agencies, disease-specific foundations, or professional associations or societies); and whether any CAM therapies were mentioned in this guideline. If CAM therapies 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 data extracted. Most data were available in the guideline; to assess applicability, the website of each developer was browsed and searched for any associated knowledge-based resources in support of implementation.

## Guideline quality assessment

The extraction and analysis of data from eligible guidelines followed standardized methods for applying the AGREE II instrument [18]. First a pilot test of the AGREE II instrument was conducted with three separate guidelines during which all three evaluators (UM, JYN and the other research assistant) independently assessed these three guidelines with the AGREE II instrument. Discrepancies were discussed and resolved. UM and the other research assistant 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 is met; rated the overall quality of each guideline (1–7); and used that information to recommend for or against the 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. JYN resolved 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.

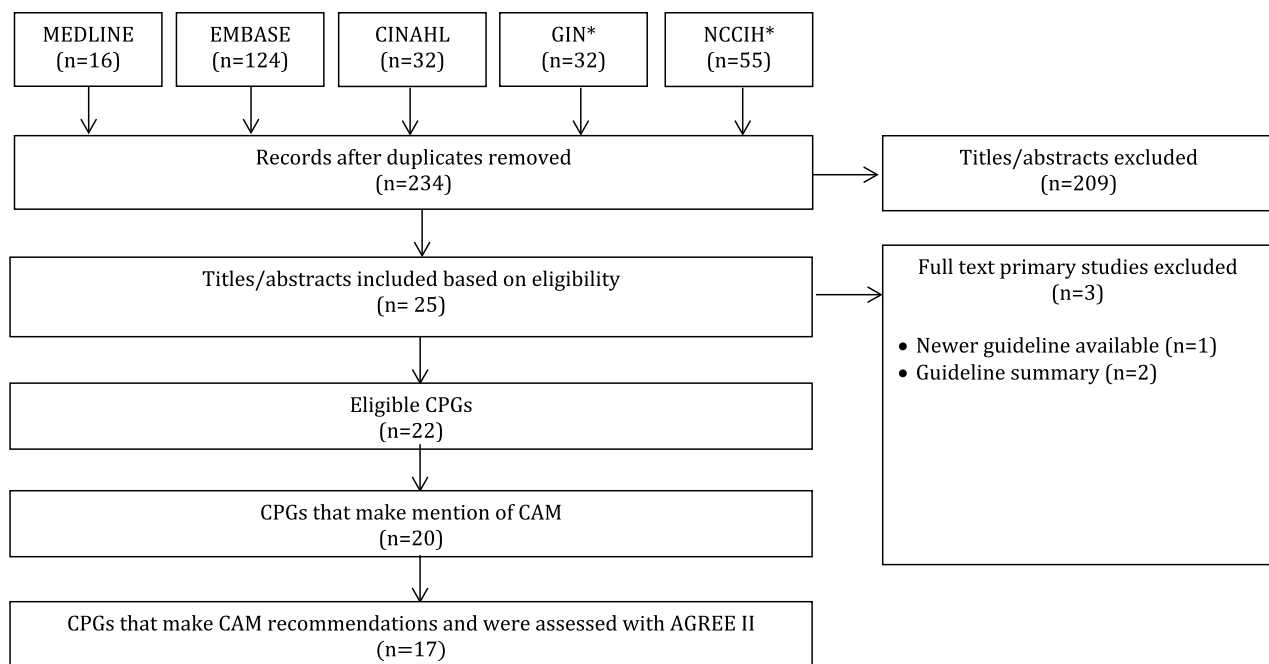
## Results

### Search results (Fig. 1)

Searches retrieved 259 items, 234 were unique, and 209 titles and abstracts were eliminated, leaving 25 full-text articles that were considered. Of those, 3 were not eligible, as a newer guideline was available (1) or they were guideline summaries (2), leaving 22 guidelines eligible for review. Of these guidelines, 20 out of the 22 made mention of CAM therapies and 17 made CAM therapy recommendations.

### Guideline characteristics (Table 1)

Eligible guidelines were published from 2008 to 2018 in the USA, Canada, Netherlands, UK, Hong Kong, South Africa, Germany, China, Saudi Arabia, Belgium and Australia [1–7, 20–34]. The guidelines were funded and/or developed by



\*List of Abbreviations: GIN = Guidelines International Network, NCCIH = National Center for Complementary and Integrative Health

**Fig. 1** PRISMA diagram

professional associations or societies ( $n = 10$ ), academic institutions ( $n = 7$ ), disease-specific foundations ( $n = 3$ ), a government agency ( $n = 1$ ) and an international agency ( $n = 1$ ). Twenty guidelines made mention of CAMs [1, 2, 4–7, 21–34]. The NCCIH has classified CAM therapies into three types: (1) natural products (herbs, vitamins, minerals, probiotics), (2) mind and body practices (yoga, chiropractic and osteopathic manipulation, meditation, acupuncture, relaxation techniques, Tai Chi, Qi Gong, hypnotherapy) and (3) other complementary health approaches (ayurvedic medicine, traditional Chinese medicine, homeopathy, naturopathy, functional medicine) [10]. Using this classification, guidelines that made mention of CAM were identified. These CAMs included spinal manipulation (18), acupuncture (11), massage therapy (8), manual therapy (7), yoga (4), tai chi (4), herbal therapy (1), homeopathic therapy (1) and osteopathic manipulative treatment (1). Recommendations relating to CAM were made in 17 guidelines and included spinal manipulation ( $n = 13$ ), acupuncture ( $n = 10$ ), massage therapy ( $n = 7$ ), manual therapy ( $n = 6$ ), yoga ( $n = 2$ ), tai chi ( $n = 2$ ), osteopathic manipulative treatment ( $n = 1$ ), herbal therapy ( $n = 1$ ) and homeopathic therapy ( $n = 1$ ); only these guidelines were assessed using the AGREE II tool. CAM funding sources were used in 3 of the guidelines [5, 22, 28], and 10 guidelines included CAM providers as part of the guideline panel [5–7, 22, 24, 28, 30–32, 34]. We provide a summary of CAM recommendations made across LBP CPGs for the benefit of clinicians and researchers in Fig. 2.

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

Average appraisal scores, average overall assessments and recommendation regarding use for each guideline are shown in Supplementary File 3. The average appraisal scores for each of the 17 guidelines ranged from 2.5 to 5.3 on the seven-point Likert scale (where 7 equals strongly agree that the item is met, and 1 equals strongly disagree that the item is met); of which 5 guidelines scored below 4.0, 12 guidelines achieved or exceeded an average appraisal score of 4.0, and 3 guidelines achieved or exceeded an average appraisal score of 5.0. Average overall assessments for the 17 guidelines ranged between 2.5 (lowest) and 6.0 (highest), including 3 guidelines scoring below 4.0, 14 guidelines equaling or exceeding a score of 4.0 and 8 guidelines equaling or exceeding a score of 5.0.

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

Average appraisal scores, average overall assessments and recommendation regarding use for each guideline are shown in Supplementary File 3. The average appraisal scores for each of the 17 guidelines ranged from 2.4 to 5.0 on the seven-point Likert scale (where 7 equals strongly

**Table 1** Characteristics of eligible guidelines

Guideline	Country (first author)	Developer	CAM category	Guideline topic
Cheng 2012 [3]	Hong Kong	Guideline Development Working Group	None	Prevention and management of low back pain in working population in primary care
Groff 2014 [20]	USA	Congress of Neurological Surgeons and the Joint Section on Disorders of the Spine and Peripheral Nerves of the American Association of Neurological Surgeons and Congress of Neurological Surgeons	None	Fusion procedures for degenerative disease of the lumbar spine
Brighton 2012 [4]	South Africa	Department of Rheumatology, Steve Biko Academic Hospital, University of Pretoria	Spinal manipulation	Management of acute low back pain in adults
Kreiner 2016 [21]	USA	North American Spine Society	Spinal manipulation	Diagnosis and treatment of adult isthmic spondylolisthesis
Brosseau 2012 [5]	Canada	Ottawa Methods Group	Massage therapy Acupuncture	Therapeutic massage for low back pain
Goertz 2012 [6]	USA	Institute for Clinical Systems Improvement	Spinal manipulation Acupuncture	Adult acute and subacute low back pain
Snow 2016 [22]	USA	American Osteopathic Association	Osteopathic manipulative treatment	Osteopathic manipulative treatment (OMT) for low back pain
Chenot 2017 [23]	Germany	National Care Guideline Development Group for Non-Specific Back Pain	Spinal manipulation Massage therapy Acupuncture	Non-specific low back pain
Zhao 2016 [24]	China	National Technical Committee on Acupuncture and Moxibustion of the Standardization Administration of China and the China Association of Acupuncture Moxibustion	Acupuncture	Use of acupuncture for low back pain
Itz 2016 [25]	Netherlands	World Institute of Pain	Spinal cord stimulation	Invasive treatment of pain syndromes of the lumbosacral spine
Chou 2009 [7]	USA	American Pain Society	Spinal cord stimulation	Interventional therapies, surgery and interdisciplinary rehabilitation for low back pain
Staal 2014 [26]	Netherlands	Royal Dutch Society for Physical Therapy	Joint manipulation (manual therapy) Massage therapy	Physical therapy in patients with low back pain
Jassir 2013 [27]	Saudi Arabia	Clinical Practice Guidelines Subcommittee, Orthopedic Surgery Department, King Khalid University Hospital, King Saud University	Manual therapy Acupuncture Spinal manipulation	Management of persistent non-specific low back pain

**Table 1** (continued)

Guideline	Country (first author)	Developer	CAM category	Guideline topic
Hegmann 2016 [28]	USA	American College of Occupational and Environmental Medicine	Massage therapy Yoga Tai Chi Herbal therapy Homeopathic therapy Aromatherapy Manipulation Manual therapy Acupuncture	Examination, medical history evaluation, patient examination and treatment and/or management options for and relating to low back disorders
Wambeke 2017 [29]	Belgium	Belgian Health Care Knowledge Centre	Spinal manipulation Manual therapy Acupuncture Yoga Tai Chi	Assessment and management of low back pain and radicular pain
Arvin 2016 [1]	UK	National Institute for Health and Care Excellence	Spinal manipulation Manual therapy Massage therapy Acupuncture Yoga Tai Chi	Low back pain and sciatica in over 16 s: assessment and management
Savigny 2009 [30]	UK	National Institute for Health and Care Excellence	Spinal manipulation Acupuncture Manual therapy Massage therapy Acupuncture	Assessment and management of low back pain and sciatica in over 16 years old
Ju 2009 [31]	Australia	University of Adelaide	Acupuncture Spinal manipulation Massage therapy Chiropractic care	Management of acute/subacute soft tissue injuring to the low back
Globe 2016 [32]	USA	Council on Chiropractic Guidelines and Practice Parameters	Chiropractic care	Chiropractic care for low back pain
Towards Optimized Practice Alberta 2011 [33]	Canada	Toward Optimized Practice (TOP) Alberta	Spinal manipulation Massage therapy Acupuncture	Evidence-informed primary care management of low back pain
Delitto 2012 [34]	USA	American Physical Therapy Association	Spinal manipulation Manual therapy	Low back pain relating to orthopaedic care
Qaseem 2017 [2]	USA	American College of Physicians	Spinal manipulation Acupuncture Massage therapy Tai Chi Yoga	Noninvasive treatment for acute, subacute and chronic low back pain

Guideline	CAM Therapy								
	Spinal Manipulation	Acupuncture	Massage Therapy	Manual Therapy (Chiropractic)	Yoga	Tai Chi	Osteopathic Manipulation	Herbal Therapy	Homeopathic Therapy
Hegmann et al. 2016 [28]	+	0	+	0	0	0		0	0
Qaseem et al. 2017 [2]	+	+	+		+	+			
Arvin 2016 [1]	+	-	+	+					
Towards Optimized Practice Alberta 2011 [33]	0	0	0	0					
Chenot 2017 [23]	+	0	0						
Jassir et al. 2013 [23]	+	+		+					
Delitto 2012 [34]	+			+					
Goertz 2012 [6]	+	0							
Savigny 2009 [30]	+	+							
Staal 2014 [26]	+		+						
Wambeke 2017 [29]	+	0							
Brighton, 2012 [4]	0								
Brosseau 2012 [5]			+						
Globe 2016 [26]				+					
Ju 2009 [31]	0								
Snow 2016 [22]							+		
Hong 2016 [24]		+							

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

**Fig. 2** Summary of CAM recommendations in clinical practice guidelines

agree that the item is met, and 1 equals strongly disagree that the item is met); fifteen guidelines achieved or exceeded an average appraisal score of 3.0, 8 guidelines achieved or exceeded an average appraisal score of 4.0, and 1 guideline achieved a score of 5.0. Average overall assessments for the 17 guidelines ranged between 2.5 (lowest) and 5.5 (highest), including 5 guidelines scoring below 4.0, 12 guidelines equaled or exceeded a score of 4.0 and 4 guidelines equaled or exceeded a score of 5.0.

### Overall recommendations: overall guideline (Table 2)

None of the 17 guidelines were recommended by both appraisers. Appraisers agreed in their overall recommendation for 16 of 17 guidelines including 3 No [4, 26, 33] and 13 Yes with modifications [2, 5, 6, 22–24, 27–32, 34]. The remaining 1 guideline was rated by the two appraisers as Yes with modifications and Yes, respectively [1].

**Table 2** Overall recommendations for use of appraised guidelines

Guideline	Overall guideline		CAM section	
	Appraiser 1	Appraiser 2	Appraiser 1	Appraiser 2
Brighton 2012 [4]	No	No	No	No
Brosseau 2012 [5]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Goertz 2012 [6]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Snow 2016 [22]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Chenot 2017 [23]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Zhao 2016 [24]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Staal 2014 [26]	No	No	No	No
Jassir 2013 [27]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Hegmann 2016 [28]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Wambeke 2017 [29]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Arvin 2016 [1]	Yes with modifications	Yes	Yes with modifications	Yes with modifications
Savigny 2009 [30]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Ju 2009 [31]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Globe 2016 [32]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Toward Optimized Practice Alberta 2011 [33]	No	No	No	No
Delitto 2012 [34]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications
Qaseem 2017 [2]	Yes with modifications	Yes with modifications	Yes with modifications	Yes with modifications

### Overall recommendations: CAM sections (Table 2)

None of the 17 guidelines were recommended by both appraisers. Appraisers agreed in their overall recommendation for all 17 guidelines including 3 No [4, 26, 33] and 14 Yes with modifications [1, 2, 5, 6, 22–24, 27–32, 34].

### Scaled domain percentage quality assessment (Table 3)

Scaled domain percentages scores of the guidelines were as follows (overall, CAM sections): scope and purpose (55.6–100%, 50.0–100.0%), stakeholder involvement (30.6–83.3%, 2.8–77.8%), rigor of development (10.4–82.3%, 7.3–80.2%), clarity of presentation (50.0–100.0%, 50.0–100.0%), applicability (2.1–54.2%, 2.1–43.8%) and editorial independence (0.0–70.8%, 0.0–70.8%).

### Scope and purpose

The overall objectives were well defined and specified in all but one guideline [4]. The health questions being covered by each guideline were specifically described in all but two guidelines [4, 33]. In CAM subsections of the guidelines, the overall objectives and health questions encompassed the scope of the CAM recommendations in all but two guidelines [4, 33]. The population to whom the guideline is meant to apply to was detailed clearly in all eligible guidelines.

### Stakeholder involvement

Most guidelines provided a detailed description of the members of the guideline development group [1, 2, 5, 6, 22–24, 26–28, 30, 32, 34]. For guidelines making CAM recommendations, most guidelines included CAM experts involved in guideline development [1, 5, 6, 22, 24, 26, 28, 30–32, 34], while some did not [2, 4, 23, 27, 29, 33]. Some guidelines detailed the views and preferences of the target population [6, 32] while most did not [1, 2, 4, 5, 22–24, 26–31, 33, 34]. In regard to the CAM subsections of the 17 guidelines, only one guideline sought the views and preferences of the patients using CAM therapy [32]. Target users of most guidelines were clearly defined and described how the guideline may be used by the target audience [1, 2, 4–6, 22–24, 26–34]. Authors typically identified CAM experts for whom the guideline would be relevant, with the exception of three guidelines [23, 27, 34].

### Rigor of development

Systematic methods were used to search for evidence in most guidelines [1, 2, 5, 6, 22–24, 28–34]. Guidelines varied in their descriptions of the criteria for selecting evidence; some clearly described selection criteria [1, 2, 5, 22, 30–32] while others did not [4, 6, 23, 24, 26–29, 33, 34]. Regarding CAM subsections of guidelines, most guidelines used systematic methods to search for CAM evidence [1, 2, 5, 6, 22–24, 28–32, 34]; however, many did not describe the criteria for

**Table 3** Scaled domain percentages for appraisers of each guideline

Guideline		Domain score (%)					
		Scope and purpose	Stakeholder involvement	Rigor of development	Clarity of presentation	Applicability	Editorial independence
Brighton 2012 [4]	Overall guideline	55.6	36.1	10.4	50.0	14.6	0.0
	CAM section	50.0	30.6	11.5	52.8	10.4	0.0
Brosseau 2012 [5]	Overall guideline	91.7	61.1	56.3	52.8	2.1	33.3
	CAM section	91.7	61.1	54.2	52.8	2.1	33.3
Goertz 2012 [6]	Overall guideline	100.0	83.3	47.9	88.9	54.2	50.0
	CAM section	94.4	55.6	36.5	83.3	16.7	50.0
Snow 2016 [22]	Overall Guideline	97.2	58.3	55.2	75.0	35.4	54.2
	CAM section	97.2	58.3	55.2	75.0	29.2	54.2
Chenot 2017 [23]	Overall guideline	83.3	47.2	33.3	80.6	22.9	33.3
	CAM section	77.8	11.1	25.0	52.8	2.1	33.3
Zhao 2016 [24]	Overall guideline	69.4	52.8	32.3	100.0	6.3	29.2
	CAM section	69.4	52.8	32.3	100.0	6.3	29.2
Staal 2014 [26]	Overall guideline	86.1	63.9	12.5	86.1	35.4	0.0
	CAM section	86.1	63.9	7.3	69.4	31.3	0.0
Jassir 2013 [27]	Overall guideline	100.0	61.1	28.1	88.9	54.2	29.2
	CAM section	100.0	2.8	27.1	69.4	10.4	29.2
Hegmann 2016 [28]	Overall guideline	100.0	55.6	61.5	83.3	22.9	50.0
	CAM section	100.0	52.8	61.5	55.6	16.7	50.0
Wambeke 2017 [29]	Overall guideline	88.9	44.4	62.5	91.7	35.4	62.5
	CAM section	88.9	19.4	57.3	88.9	31.3	62.5
Arvin 2016 [1]	Overall guideline	100.0	50.0	82.3	94.4	45.8	54.2
	CAM section	100.0	33.3	80.2	80.6	37.5	54.2
Savigny 2009 [30]	Overall guideline	91.7	55.6	50.0	94.4	41.7	29.2
	CAM section	91.7	50.0	47.9	86.1	35.4	29.2
Ju 2009 [31]	Overall guideline	100.0	52.8	61.5	88.9	50.0	8.3
	CAM section	100.0	52.8	59.4	80.6	43.8	8.3
Globe 2016 [32]	Overall guideline	77.8	77.8	57.3	52.8	29.2	45.8
	CAM section	77.8	77.8	57.3	50.0	29.2	45.8
Toward Optimized Practice Alberta 2011 [33]	Overall guideline	80.6	30.6	21.9	94.4	27.1	41.7
	CAM section	80.6	30.6	21.9	72.2	20.8	41.7
Delitto 2012 [34]	Overall guideline	83.3	63.9	52.1	97.2	29.2	0.0
	CAM section	75.0	25.0	51.0	88.9	27.1	0.0
Qaseem 2017 [2]	Overall guideline	100.0	75.0	77.1	91.7	20.8	70.8
	CAM section	100.0	30.6	75.0	86.1	20.8	70.8

selecting CAM-related evidence [4, 6, 23, 24, 26–29, 33, 34]. The strengths and limitations of the body of evidence were clearly described in all guidelines apart from a few [4, 23, 24, 26, 27, 33]. With respect to the CAM subsections of guidelines, guidelines that clearly described the strength and limitations of evidence of full guidelines also did so for CAM sections [1, 2, 5, 6, 22, 28–32, 34].

While some guidelines provided a sufficient amount of detail on how recommendation consensus was reached [1, 2, 5, 23, 28–32], others did not [4, 6, 22, 24, 26, 27, 33, 34]. Guidelines that clearly described how recommendations

were formulated also did this for subsections that made CAM recommendations [1, 2, 5, 23, 28–32]. All authors considered some health benefits, side effects and/or risks in formulating recommendations for the full guideline and CAM sections [1, 2, 4–6, 22–24, 26–34]. Nearly all authors provided an explicit link between recommendations, including CAM recommendations, and the supporting evidence with the exception of three guidelines in which this was inconsistent [26, 27, 33]. While most guidelines explicitly stated they were externally reviewed by experts prior to publication [1, 2, 5, 6, 22, 24, 26–29, 34], a few did not [4, 23,

30–33]. Although most guidelines were externally reviewed by CAM experts prior to publication, three guidelines lacked external revision by CAM experts [5, 6, 27]. Most guidelines did not provide a procedure for updating the guideline despite mentioning plans for updating [21, 25, 26, 28, 31–34]. Only three guidelines mentioned the guideline will be updated and provided a procedure for doing so [6, 22, 29].

### Clarity of presentation

Recommendations in all guidelines, including CAM recommendations, were specific and unambiguous except for one guideline [4]. Authors presented the different options for management of LBP in all guidelines, but a couple did not mention the clinical situation in which the recommendation would be appropriate [4, 22]. In regard to the CAM subsections of the guidelines, many authors did not describe the clinical scenarios in which CAM therapies would be relevant [4, 5, 22, 23, 27, 28, 31]. Key recommendations were generally easily identifiable in all guidelines.

### Applicability

Four guidelines described facilitators and barriers to the application of recommendations, including CAM recommendations [6, 22, 29, 31]. Authors generally provided advice and/or tools on how recommendations could be put into practice with the exception of 5 guidelines [4, 5, 24, 25, 29]. Seven guidelines considered potential resource implications of applying the overall recommendations and CAM recommendations [1, 22, 27–31]. Most guidelines did not present monitoring and/or auditing criteria, with the exception of a few guidelines [4, 6, 26, 27, 32, 34]. In regard to the CAM subsections of guidelines, most guidelines provided little or no auditing and/or monitoring criteria to measure the implementation of CAM recommendations with the exception of 4 guidelines [4, 26, 32, 34].

### Editorial independence

Of the 17 guidelines, two reported that the views of the funding body did not influence the contents of the guideline [5, 33]. Of the remaining guidelines, 11 declared a funding source but not whether the funding source influenced the contents of the guideline [1, 2, 6, 22–24, 27–30, 32] and the remaining guidelines did not declare a funding source [4, 26, 31, 34]. No guidelines explicitly stated that no funding supported their development.

Several guidelines did not report competing interests [4, 5, 24, 26, 27, 31, 33, 34]. Of the remaining guidelines that did detail the competing interests, 10 did not specify how potential competing interests were identified or considered, or how they may have influenced the guideline development

process or issuing of recommendations [1, 6, 22, 23, 28–30, 32].

## Discussion

Due to the high prevalence of CAM therapy use associated with LBP, the purpose of this study was to assess the quantity and quality of CAM recommendations in LBP treatment and/or management guidelines. To our knowledge, no previous studies have assessed the quantity and quality of CAM therapy recommendations in LBP guidelines. Thus, this is the first study to have assessed the credibility and nature of CAM therapy recommendations in LBP guidelines. This study identified 22 guidelines published between 2008 and 2018 that were relevant to the treatment and/or management of LBP; twenty made mention of CAM, of which 17 guidelines made CAM therapy recommendations. Quality as assessed by the 23-item AGREE II instrument varied widely across guidelines overall and by domain. In assessing the overall guideline, 2 guidelines scored 5.0 or higher in both average appraisal score and average overall assessment [1, 2], and 5 guidelines scored 4.0 or lower in both of these metrics [4, 23, 24, 26, 33]. In assessing the CAM section of each guideline, 9 guidelines scored 4.0 or higher in both average appraisal score and average overall assessment [1, 2, 6, 22, 28–32], with only 1 guideline with a score of 5.0 or higher [1], and 4 guidelines scored below 4.0 in both of these metrics [4, 23, 27, 33] (1 = strongly disagree; 7 = strongly agree that criteria are met).

Notable strengths of this study included the use of a comprehensive systematic review to identify eligible LBP treatment and/or management guidelines and the use of the validated AGREE II instrument by which to assess their quality, which is an internationally accepted gold standard for appraising guidelines [18]. The interpretation of these findings may be limited by the fact that guidelines were independently assessed by two appraisers instead of four as recommended by the AGREE II instrument to optimize reliability. To mitigate this and standardize scoring, JYN, UM and an additional research assistant conducted an initial pilot test during which they independently each appraised three independent guidelines, then discussed the results and achieved consensus on how to apply the AGREE II instrument. Following appraisal of the 22 guidelines, JYN met with UM and the additional research assistant to discuss and resolve any uncertainties without unduly modifying legitimate discrepancies.

By describing the quantity and quality of CAM guidelines for the treatment and/or management of LBP, this study revealed that several CAM guidelines are available to support informed and shared decision-making among patients and healthcare professionals. LBP is the most common cause

of limitation of activity for individuals aged 45 years or less in the USA [8]. Of the most frequented modes of care for back pain, chiropractors and massage therapists are commonly consulted [8, 35–39]. This likely reflects the necessity for the presence and usage of LBP guidelines that make recommendations on CAM therapies. Furthermore, the presence of increased research has allowed for the development of guidelines that incorporate CAM therapies in relation to LBP.

## Conclusions

This study identified 22 guidelines published since 2008 on the treatment and/or management of LBP, of which 17 guidelines made CAM therapy recommendations. Appraisal of these guidelines with the AGREE II instrument revealed that quality varied within and across guidelines. Some of these guidelines that achieved higher AGREE II scores and favorable overall recommendations could be used by patients and healthcare professionals as the basis for discussion about the use of these CAM therapies to treat and/or manage LBP. In future updates, guidelines that achieved variable or lower scaled domain percentage and overall recommendations could be improved according to specifications in the AGREE II instrument. Most guidelines included in this study provided recommendations for a specific subset of CAM therapies, including spinal manipulation, acupuncture and massage therapy, which represents a limited scope of CAM therapies that may be useful for the treatment and/or management of LBP. Future research should identify CAM therapies other than those reviewed here which are supported by enough evidence to serve as the basis for guideline development.

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**Authors' contribution** JYN made substantial contributions to the design of the study, collected and analyzed data, drafted the manuscript and gave final approval of the version to be published. UM assisted with the collection and analysis of data, revised the manuscript critically and gave final approval of the version to be published.

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**Availability of data and materials** All relevant data are included in this manuscript.

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflicts of interest.

**Ethics approval and consent to participate** This study involved a systematic review of peer-reviewed literature only; it did not require ethics approval or consent to participate.

**Consent for publication** All authors consent to this manuscript's publication.

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## Affiliations

Jeremy Y. Ng<sup>1</sup>  · Uzair Mohiuddin<sup>1</sup>

✉ Jeremy Y. Ng  
ngjy2@mcmaster.ca

<sup>1</sup> Department of Health Research Methods, Evidence, and Impact, Faculty of Health Sciences, McMaster University, Hamilton, ON, Canada