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HIGHLIGHTS

- Agreement was found for 65% of LBP treatment recommendations in guidelines
- Recommendations with agreement largely supported non-invasive treatments
- Over one-third of recommendations disagreed, mostly for pharmacological treatments
- More research is needed to understand varying levels of agreement across guidelines

Agreement between high-quality clinical practice guidelines in their treatment recommendations for low back pain: A systematic review

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ABSTRACT

Background Context: International and national clinical practice guidelines for low back pain often differ in their treatment recommendations. Previous studies have outlined disagreement between recommendations when comparing guidelines of varying quality, challenging the value of producing them. There is a need to quantify agreement between high-quality low back pain guidelines for monitoring recommendation changes over time and guiding future research for treatments with disagreement.

Purpose: The aim of this review was to assess agreement between high-quality clinical practice guidelines in their treatment recommendations for low back pain published 1 January 2016 to 14 March 2024.

Study design: Systematic review

Outcome Measures: Strength and direction of guideline recommendations were pooled for each low back treatment and the level of agreement or disagreement was reported as a percentage. The number of recommendations for individual treatments was also reported.

Methods: We searched six databases to identify high-quality clinical practice guidelines

defined as those that scored ≥70% in 3 out of 6 AGREE II domains, including 'Rigour of Development'. Two authors independently screened titles and abstracts, then full texts to determine eligibility. Recommendations were stratified by low back pain chronicity and direction and strength of recommendation.

Results: Of 4,920 publications screened, 22 high-quality clinical practice guidelines were included. Overall, there were 588 recommendations for 181 treatments (range 1 to 125 recommendations per CPG). In 154 instances clinical practice guidelines made no recommendation about a treatment although in 97 (63%) a recommendation was made by at least one other clinical practice guideline. Agreement could be assessed for 433 recommendations for 122 low back pain treatments. There was complete or partial agreement for almost two-thirds of recommendations; complete agreement (i.e., both direction and strength agreed) for 26%, and partial agreement (i.e., same direction but different strength) for 39% across guidelines. Recommendations generally supported use of patient education, provision of a self-management plan and fear avoidance and physical therapy and did not support use of invasive treatments, electrotherapy or assistive devices. There was disagreement (i.e., direction of a recommendation differed) for 35% of recommendations, mostly pharmacological interventions.

Conclusion: More research is needed to understand reasons for these disagreements as well as the variation across clinical practice guidelines in electing to make a recommendation.

KEYWORDS: low back pain; clinical practice guidelines; agreement; recommendations; treatment; AGREE II.

BACKGROUND

Numerous international, national and local clinical practice guidelines (CPGs) for the diagnosis and management of low back pain exist.[1] These provide recommendations to guide clinical practice based upon the best available evidence about benefits and harms, combined with other relevant factors such as patient values and preferences, feasibility, equity, resources required, and acceptability to community and patients.[2]

Several studies have reported disagreement between low back pain CPG recommendations published at a similar time, challenging the value of producing them.[1, 3, 4] Given the evidence base informing guidelines is likely to be similar, treatment recommendations between low back pain guidelines should generally agree, although there may be variations due to differing interpretations of the evidence and its certainty, the makeup of the guideline panel making judgments, differences in the development process, as well as differing local contexts.[5, 6]

One reason for disagreement between low back pain CPG recommendations could be that comparisons are being made between CPGs of varying quality. Previous quality appraisals of low back pain CPGs using the Appraisal of Guidelines for Research and Evaluation II (AGREE II) instrument have reported large variations in the quality of low back pain CPGs, with many guidelines rated low and average quality due to poor methodological rigour when formulating guidelines, unsatisfactory involvement of community and patients during CPG development, and poor auditing or monitoring strategies to assess the implementation and adherence of CPG recommendations in practice CPGs.[3, 7-12]

Previous reviews have compared the consistency of low back pain treatment recommendations across CPGs of varying quality.[3, 4, 9, 12] A recent review that included four high-quality low back pain CPGs published from 2013 to 2017 only provided a narrative summary of their recommendations.[11] Formally quantifying agreement between high-quality CPGs could provide a useful metric for monitoring recommendation changes over time, as well as guiding future research for treatments with disagreement due to insufficient evidence. As a quantitative analysis of the agreement between high-quality international CPGs for low back pain has not been conducted, the aim of this systematic review was to assess the agreement between current high-quality CPGs in their treatment recommendations for low back pain.

METHODS

We reported this systematic review in accordance with the recommendations of the Preferred Reporting Items for Systematic reviews and Meta-Analyses 2020 checklist.[13] The protocol was published in the Open Science Framework [details blinded for peer review].[14]

Eligibility criteria

We included high-quality CPGs that provided treatment recommendations for adults with low back pain of any duration, with or without radicular pain, published in the period 1 January 2016 to 14 March 2024. While guidelines for lumbar disc herniation were eligible for inclusion, we did not include recommendations specifically relating to nerve root compression, lumbar radicular pain or post-operative pain from CPGs that met our inclusion criteria. We excluded CPGs developed without a systematic approach to evidence synthesis or based on consensus without evidence-based methods.

We defined 'high quality' according to the AGREE II instrument.[15] The AGREE II instrument is a validated guideline appraisal tool commonly used to evaluate the methodological quality, including potential biases, of CPGs. It consists of 23 items across six domains (Scope and Purpose, Stakeholder Involvement, Rigour of Development, Clarity of Presentation, Applicability, and Editorial Independence) that are rated on a 7-point scale ('strongly disagree' to 'strongly agree') and two overall assessment items.[15] The developers of the AGREE II instrument have reported several approaches for interpreting domain scores and establishing thresholds for low-, moderate- and high-quality guidelines, but have not reported minimum domain scores for defining CPG quality.[15, 16] We defined high-quality guidelines as those with a score of ≥70% in three out of six AGREE II domains, including 'Rigour of Development' which exceeded cut-off scores previously used to define high-quality guidelines for other health conditions by at least 10%.[17-20] We did this to purposefully select the most robust international low back pain guidelines available.

Where available, we used published AGREE II scores to determine the quality of a CPG. If more than one set of published scores were available, we included the set with the highest 'Rigour of Development' AGREE II score. If no published AGREE II scores for a CPG were available, four review authors [blinded for peer review] independently appraised potentially eligible full-text CPGs using the AGREE II appraisal tool and domain scores were calculated in accordance with the AGREE II Consortium.[16] Each reviewer was provided with basic preparation and training using the AGREE II user's manual and online resources.[16] We resolved discrepancies (defined as a difference of three or more item points) between any two raters at a consensus meeting.

Search strategy

To identify low back pain CPGs, we searched the electronic databases MEDLINE and Embase via Ovid, the Guidelines International Network (GIN), Epistemonikos, and websites of the National Institute for Health and Clinical Excellence (NICE) and Scottish Intercollegiate Guidelines Network (SIGN) from 1 January 2016 until 31 December 2021 using search terms for 'low back pain' AND 'clinical practice guidelines'. The search was later updated to 14 March 2024 (see Appendix A).

We also hand searched the reference lists of full text CPGs that we assessed for eligibility and systematic reviews of low back pain treatment guidelines to identify any additional eligible CPGs. Low back pain CPG publications written in a language other than English were translated using Google Translate.

Selection process

Records from MEDLINE, Embase and Epistemonikos were exported to Covidence for duplicate removal and screening.[21] Records from GIN, NICE and SIGN were manually entered into a spreadsheet for screening. Two review authors [blinded for peer review] independently screened the records to identify potentially eligible CPGs. Full-text publications of potentially eligible CPGs were then independently reviewed by two authors [blinded for peer review]. In cases of disagreements, a third review author [blinded for peer review] adjudicated.

Multiple reports of the same CPG were collated so that each guideline was the unit of

interest for this review. If multiple iterations or updates of the same guideline were published and eligible within the 8-year period, we used the most recent guideline provided it met the criteria for being of high quality.

Data extraction and management

We extracted the characteristics of each included CPG, including guideline development organisation or authors, country, year, scope, target users, guideline writers and the number of recommendations made for low back pain treatments. We extracted individual low back pain treatment recommendations and the strength of each recommendation if reported.

One review author [blinded for peer review] grouped treatment recommendations according to whether the recommendation was for acute (<12 weeks) or chronic (12 weeks or longer) symptom duration or the duration was not specified. Where available, we extracted the direction and strength of each specific recommendation based on the Grading of Recommendations Assessment, Development, and Evaluation (GRADE) approach of classifying recommendations in CPGs ('strong' for or against, 'conditional' (or 'weak') for or against).[5, 22] Extracted recommendations were coded by one review author [blinded for peer review] and verified by a second review author [blinded for peer review]. Any discrepancies were resolved by an independent third author [blinded for peer review] to reach consensus. If a guideline presented evidence or discussed a treatment but did not provide a recommendation (e.g., for reasons such as insufficient evidence), we classified these judgments as 'no recommendation'.

According to GRADE, strong recommendations (for or against a test or treatment) should only be made when there is high certainty evidence, otherwise recommendations should be conditional. GRADE also recommends that a recommendation should be made in almost all circumstances unless a recommendation is too speculative or when the trade-offs of the treatment are closely balanced and the panel has difficulty in deciding on the direction of a recommendation.[22]

If a CPG used different nomenclature to classify the strength of recommendations or if the strength of the recommendation was not provided, we made a judgement about its direction and strength based upon our interpretation of the language used by the CPG authors (see Appendix B). This process was performed in duplicate by two independent review authors who discussed discrepancies with a third review author to reach consensus. We grouped recommendations that referred to more than one treatment (e.g., "percutaneous therapies should not be used…") or for medications in the same class (e.g., non-steroidal anti-inflammatory drugs (NSAIDs), muscle relaxants, opioids).

Assessment of agreement of treatment recommendations

We determined there was (i) complete agreement between CPGs when a recommendation was in the same direction (for or against) and was of the same strength (i.e., all strong or conditional for or against); (ii) partial agreement when the direction of a recommendation was the same but the strength of evidence differed (i.e., strong or conditional); and (iii) disagreement when the direction of a recommendation differed (i.e., for versus against) irrespective of the strength of recommendation giving risk to conflicting recommendations across CPGs. Judgments of 'no recommendation' for or against a particular treatment were

excluded from our assessment of agreement as they were not considered a formal recommendation as per GRADE methodology.[22]

Differences between protocol and review

As reported in our protocol, we planned to perform kappa analyses to assess the agreement across CPGs for individual treatment recommendations.[14] However, these analyses were not feasible as all CPGs did not provide recommendations for all treatments. We also updated the search of high-quality CPGs to March 2024 which means we have included CPGs published in the last eight rather than six years.

RESULTS

Figure 1 outlines the search results and eligibility assessment. 4,920 records from electronic databases and other sources were screened by title and abstract. One hundred and twenty-four full text reports were assessed for eligibility. The published AGREE II scores we used to determine eligibility of 46 CPGs and the AGREE II scores of the 19 CPGs that we appraised,[23-41] are reported in Appendix C.

Overall, we excluded 90 full text reports. The most common reason for exclusion other than duplicate records (n=24) was low AGREE II scores (n=26 from published scores, n=13 from our appraisal), followed by wrong population (n=7) and CPGs not being systematically developed (n=5) (Appendix D). Finally, 22 high-quality CPGs (in 34 records, 16 with published AGREE II scores and 6 from our assessment), were included.[23, 27, 29, 31, 33, 42-58]

Overview of included clinical practice guidelines

The characteristics of the included high-quality CPGs are reported in Table 1. Eight were formulated in the United States,[23, 42-48] two each in Canada,[49, 50] Germany,[27, 51] The Netherlands[52, 53] and international working groups,[29, 54] and one each in Belgium,[55] Denmark,[56] France,[31] Japan,[33] South Korea[57] and the United Kingdom.[58] Twenty (91%) of the included guidelines were published in English[23, 29, 31, 33, 43-50, 54, 55, 57-59] or had a secondary publication in English.[53, 60, 61] Two CPGs were translated to English from German[51] and Dutch.[52]

Nine (41%) CPGs had a narrow scope and provided recommendations specific to biologic therapy,[44] physical therapy,[35, 48] chiropractic,[49] lumbar disc herniation,[33] Korean medicine for lumbar disc herniation,[57] invasive facet joint treatments,[43] radiofrequency denervation,[27] or rehabilitation before and after lumbar spine surgery.[31] Four CPGs provided treatment recommendations for low back pain without specification of symptom duration[44, 55, 57, 58]; two provided recommendations for treating acute and subacute low back pain only,[47, 56] two provided recommendations for only treating chronic low back pain[29] or chronic lumbar facet joint pain,[43] respectively; and one provided recommendations for low back pain of any chronicity by assigning patients to profiles based upon the risk of persisting symptoms.[35]

Agreement between guidelines in their treatment recommendations

There were 588 treatment recommendations across all high-quality CPGs for 181 unique treatments (range 1 to 125 per CPG). Three hundred and forty (58%) were strong recommendations (137 for, 203 against use) and 248 (42%) were conditional (199 for, 49 against use). Half of the included guidelines included at least one treatment for which they made no recommendation.[23, 29, 33, 46, 50, 52, 54, 55, 58, 59, 62] No treatment recommendation was

made in 154 instances. For 97 (63%) of these no recommendation judgements made for 70 treatments, a strong or conditional recommendation for or against use of the treatment was made in at least one other CPG.

Agreement could be assessed for 433 recommendations about 122 treatments. There were 94 recommendations for 23 treatments for acute pain, 163 recommendations for 45 treatments for chronic pain and 176 recommendations for 54 treatments where chronicity was not specified. Agreement for the other 207 treatments could not be assessed as only one CPG had considered the treatment and made a recommendation (n=130), no CPG had made a recommendation despite it being considered (n=47), or only one CPG had made a recommendation despite it being considered by more than one CPG (n=30). Appendix E shows the strength and direction of all recommendations that were made, or treatment discussed, by at least two CPGs, and Appendix F shows the recommendations or treatments discussed by only single CPGs.

Complete agreement of treatment recommendations across guidelines

Treatment recommendations that were in complete agreement are shown in Figure 2. For eight treatments there was complete agreement strongly in favour of use. These included patient education (4 CPGs, chronicity not specified; 2 CPGs), providing a self-management plan (3 CPGs, chronicity not specified), fear avoidance therapy with or without physical therapy (2 CPGs, acute; 2 CPGs, chronic), aerobic exercise, (2 CPGs, chronic), tai chi (2 CPGs, chronic), return to work (2 CPGs, chronicity not specified) and proton pump inhibitors as a concomitant therapy to NSAIDs for people with increased risk of gastrointestinal complications (2 CPGs, chronicity not specified).

There were seven treatments with complete agreement conditionally recommending use including use of spinal manipulative therapy (SMT) or mobilisation as part of a multimodal approach (3 CPGs, acute; 5 CPGs, chronicity not specified), cognitive behavioural therapy (CBT) (2 CPGs, chronicity not specified), topical cayenne pepper (2 CPGs, chronic), dry needling (2 CPGs, chronic), McKenzie method (2 CPGs, chronicity not specified), and radiofrequency denervation (2 CPGs, chronicity not specified; 1 CPG).

There were 17 treatments where there was complete agreement strongly recommending against use including against use of traction (2 CPGs, acute; 5 CPGs, no chronicity specified) and benzodiazepines (2 CPGs, acute; 5 CPGs, chronicity not specified). Four CPGs made strong recommendations against use of foot orthotics or insoles, interferential current, lumbar supports and percutaneous electrical nerve stimulation (PENS) (all chronicity not specified). Three CPGs made strong recommendations against use of disc replacement, laser, spinal fusion, transcutaneous electrical nerve stimulation (TENS) and therapeutic ultrasound (all chronicity not specified). Two CPGs made strong recommendations against the use of antibiotics, extraforaminal glucocorticoid injection or prolotherapy, kinesiotaping and short-wave diathermy (all chronicity not specified).

Partial agreement of treatment recommendations across guidelines

There were 30 treatment recommendations that were in partial agreement (i.e., direction of a recommendation was the same but the strength of evidence differed e.g., strong or conditional) for use (range 2 to 8 CPGs) (Figs. 3a to 3c). Most of these were for non-pharmacological or non-invasive interventions including providing advice to stay active,

exercise therapy, patient education and heat therapy. There were 18 treatments with partial agreement recommending against use including systemic (oral, IV or IM) and facet joint glucocorticoids, anticonvulsants and tricyclic antidepressants (TCAs), TENS (for acute pain) and therapeutic ultrasound (for chronic pain).

Disagreement between treatment recommendations across guidelines

There were 42 treatments with conflicting recommendations (i.e., direction of recommendations differed (for versus against) irrespective of the strength of recommendation) across CPGs (Fig. 4). Most of the disagreements involved pharmacologic treatments for acute and chronic low back pain including opioids, tricyclic antidepressants and non-benzodiazepine muscle relaxants, but there was also disagreement involving acupuncture, glucocorticoid injections, and surgery. Disagreements also varied depending upon chronicity of the low back pain.

No treatment recommendations across guidelines

There were five treatments that were each discussed by two CPGs, but no recommendations were made. These treatments included laser therapy and yoga for acute pain, cannabis and inferential current therapy for chronic pain, and vitamin D supplements for low back pain of unspecified chronicity. The reasons given by guideline developers for not providing a recommendation for these treatments were due to inconclusive or conflicting evidence, or low confidence in the available evidence for or against a treatment.[23, 29, 50, 54, 58, 59]

DISCUSSION

We found complete or partial agreement for almost two thirds (65%) of recommendations across two or more high-quality CPGs. There was strong or conditional agreement in favour of patient education and advice to stay active, exercise and movement-based therapies, as well as use of SMT or mobilisation as part of a multimodal approach to patient care, and strong or conditional agreement against use of invasive procedures, electrotherapy modalities, many pharmacological interventions, and assistive devices such as lumbar supports. However, over a third of treatment recommendations were conflicting, largely for pharmacologic treatments, and recommendations also varied depending upon pain chronicity. We were unable to formally assess agreement for an additional 207 treatment recommendations as a recommendation was only made by a single CPG.

There are several possible reasons why low back pain guidelines have conflicting treatment recommendations including time gaps between evidence being published and synthesised by expert panels into CPG recommendations, differing interpretations of the available evidence and its certainty, the composition of the guideline panel responsible for making recommendations, and contextual differences within local settings such as cost-effectiveness considerations for government-funded healthcare and concerns over inequities within populations.[5, 6, 63-65]

Conflicting guideline recommendations can create uncertainty for clinicians and patients and may lead to the delivery of care that is unnecessary or of low value.[66] For example, the inconsistent recommendations between CPGs for the use of non-benzodiazepine muscle relaxants to treat acute low back pain included a strong recommendation for use if pharmacological treatment is desired by clinicians or patients,[46] conditional

recommendations for their use in the short-term,[47, 54] strong recommendations against being used,[51, 59] as well as no recommendation being made due to insufficient evidence for or against their use.[23] This may contribute to wide practice variation within and across settings despite evidence indicating that non-benzodiazepine muscle relaxants are unlikely to produce a clinically meaningful reduction in acute low back pain intensity and may increase the risk of non-serious adverse events such as drowsiness and stomach irritation.[67, 68]

This review adds to the body of work that has assessed the consistency of treatment recommendations across low back pain CPGs.[1, 3, 4, 9] While our review findings are largely aligned with these studies, our review was the only study to quantify the level of agreement exclusively across high-quality CPGs irrespective of country, language, chronicity of back pain, treatment type, healthcare discipline, or the number of CPGs from each country. Half of the included guidelines made no recommendation for at least one treatment they considered but in 63% of cases a recommendation was made by at least one other CPG. We were unable to discern any consistent reason for why a CPG did not make a recommendation for a given treatment and if this was consistent with GRADE methodology which recommends that a recommendation should be made in almost all circumstances unless a recommendation is too speculative or when trade-offs of the treatment are closely balanced and the panel has difficulty in deciding on the direction of a recommendation.[22]

Comparisons of earlier reviews with our findings suggest greater agreement between high-quality CPGs compared to CPGs of varying quality; highlighting a benefit in producing high quality CPGs. Using published data from a review of low- and high-quality low back pain

CPGs,[9] we calculated that only 47% of recommendations were in agreement on whether to use specific treatments. More recently, a review by Zhou and colleagues summarised low back pain treatment recommendations across medium- and high-quality CPGs, including nine (41%) CPGs that did not meet our AGREE II eligibility requirements for being high-quality.[69] Based on published supplementary data from the review we determined that 57% of treatment recommendations were in agreement.

Implications for practice and research

The large number of treatments for which there were either conflicting recommendations, partial agreement and no recommendations across guidelines may contribute to low value care for low back pain.[70] Our review may be useful to direct where further primary studies are needed. For example, no and conditional recommendations may indicate a need for further empiric evidence about the benefits and harms of treatments (e.g., Pilates and tricyclic antidepressants), while strong treatment recommendations for or against a treatment indicate where further trials are unlikely to be needed (e.g., disc replacements and traction). Recommendations generally supported use of patient education, provision of a self-management plan and fear avoidance and physical therapy and did not support use of invasive treatments, electrotherapy or assistive devices.

Findings of this review suggest that agreement between CPG treatment recommendations for low back pain is higher when limiting comparison to high-quality guidelines. While there may be time, methodologic and contextual factors that contribute to the variation in CPG recommendations, the underlying evidence and its synthesis should be a constant. To support development of high-quality guidelines, efforts to facilitate standardised CPG

development based on the latest guidance needs further exploration. This includes the use of rigorous systematic reviews, the GRADE approach to assess the certainty of available evidence, ensuring guidelines panels represent all relevant and diverse parties including clinicians, researchers, policymakers, and people with lived experience of low back pain to align recommendations with the values and preferences of the communities that guidelines are designed to support (e.g., equity, acceptability and the implications of recommendations on available resources).[71]

Establishing a living registry of all back pain trials and living systematic reviews of the available evidence, that are both updated in real time as new trials and evidence accumulate, would likely reduce the large current duplication of effort. While it may not overcome methodologic differences in how the guidance is formulated, it would increase the trustworthiness of the underlying evidence syntheses and encourage guidelines to remain up to date.[72, 73] The concept of a living registry of evidence for low back pain has been proposed previously[7] and there are now examples of living guidelines in development within other disciplines. For example, the Australian and Canadian living guidelines for adults with inflammatory arthritis have been informed by a synthesis of the underlying evidence, with the syntheses published as living Cochrane systematic reviews.[74]

Although it is beyond the scope of this review, we noted considerable variation in AGREE II domain scores for 'interested and relevant parties' involvement' (the term 'stakeholder involvement' has been replaced in this review due to the historical links with colonialists using a stake to claim Indigenous lands[75]) and 'applicability' of included high-quality CPGs which is consistent with studies from other health fields.[76, 77] Differences in the constitution

of guideline panels may contribute to variation in the recommendations that are produced. Involving all relevant participants in the guideline development process, including consideration of patient values and preferences, is likely to optimise the relevance, useability and implementation of CPGs in practice.[78, 79]

Strengths and limitations

Our review was performed according to a published protocol.[14] We used a comprehensive search strategy to find all CPGs for low back pain published over the past eight in all languages across six databases. Where available we used existing AGREE II scores to determine eligibility. This approach is supported by Gianola and colleagues who outlined unnecessary duplication in low back pain guideline appraisal. While we acknowledge the challenges inherent in identifying all relevant CPGs including electronic database indexing issues, publication bias and the low precision of CPG filters, we believe this was limited by combining search results from four large guideline repositories (GIN, Epistemonikos, NICE and SIGN) with search strategies we developed for MEDLINE and Embase databases. We also hand searched the reference lists of all systematic reviews and CPGs that we assessed for eligibility.

This review has several limitations. Interpreting the strength of recommendations from the written language used by guideline working groups was confusing or unclear in some cases. We mitigated this limitation by adopting a rigorous process of verifying the coded strength of CPG recommendations using independent reviewers who discussed discrepancies with a third reviewer to reach consensus. The AGREE II cut-off scores we used for defining 'high-quality' low back pain CPGs were based on cut-off scores of between 50% and 70% reported

for other disciplines[20] as there was no clear guidance by the AGREE II Consortium regarding domain cut-off scores for defining 'high-quality' CPGs.[16] Several publications have similarly defined guidelines as 'high-quality' based on cut-off scores from three of the six AGREE II domains, including Rigour of Development [80, 81] However, changing the cut-off scores we used to determine CPG eligibility would be unlikely to change our overall findings.

Two of the included CPGs were translated with Google Translate from German[51] and Dutch[52] which may have affected the strength of the recommendation (i.e. 'strong' or 'conditional') due to occasional errors in machine translation, but not the direction of the recommendation (i.e. 'for' or 'against').[82] Recent studies exploring machine translation of academic literature to English suggest that translated text using Google Translate has a moderate level of comprehension and usability despite errors with capitalisation, punctuation and fragmented sentences [83-85]

We included high-quality CPGs published over a greater than eight-year period. Therefore, some of the variation in recommendations could be due to the evidence base that was considered at the time that the recommendations were made. While we appraised the quality of the CPG development process, we did not assess the quality and risk of bias of the evidence syntheses upon which the CPGs were based. However, in view of the large variation in both the strength and direction of the CPG recommendations that we observed, as well as the large number of instances where no recommendation was made, it is likely that this also varied across CPGs.

CONCLUSION

Our review of 22 high-quality CPGs for low back pain identified varying levels of agreement for specific treatment recommendations for people with low back pain. Overall, there was complete or partial agreement for 65% of treatment recommendations with disagreement in over a third of treatment recommendations. As well, CPGs made no recommendation about a treatment in over 150 cases even though in almost two-thirds recommendations were made by at least one other CPG. These discrepancies may be explained by methodologic and contextual factors as well as the timing and quality of the underlying evidence syntheses. More research is required to better understand and address these issues.

DISCLOSURES

Conflicts of interest

The authors have declared that no conflicts of interest exist.

[Blinded for peer review] were members of the guideline development group for [undisclosed CPG, blinded for peer review] but were not involved in the AGREE II appraisal process for the guideline.

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FIGURE LEGENDS

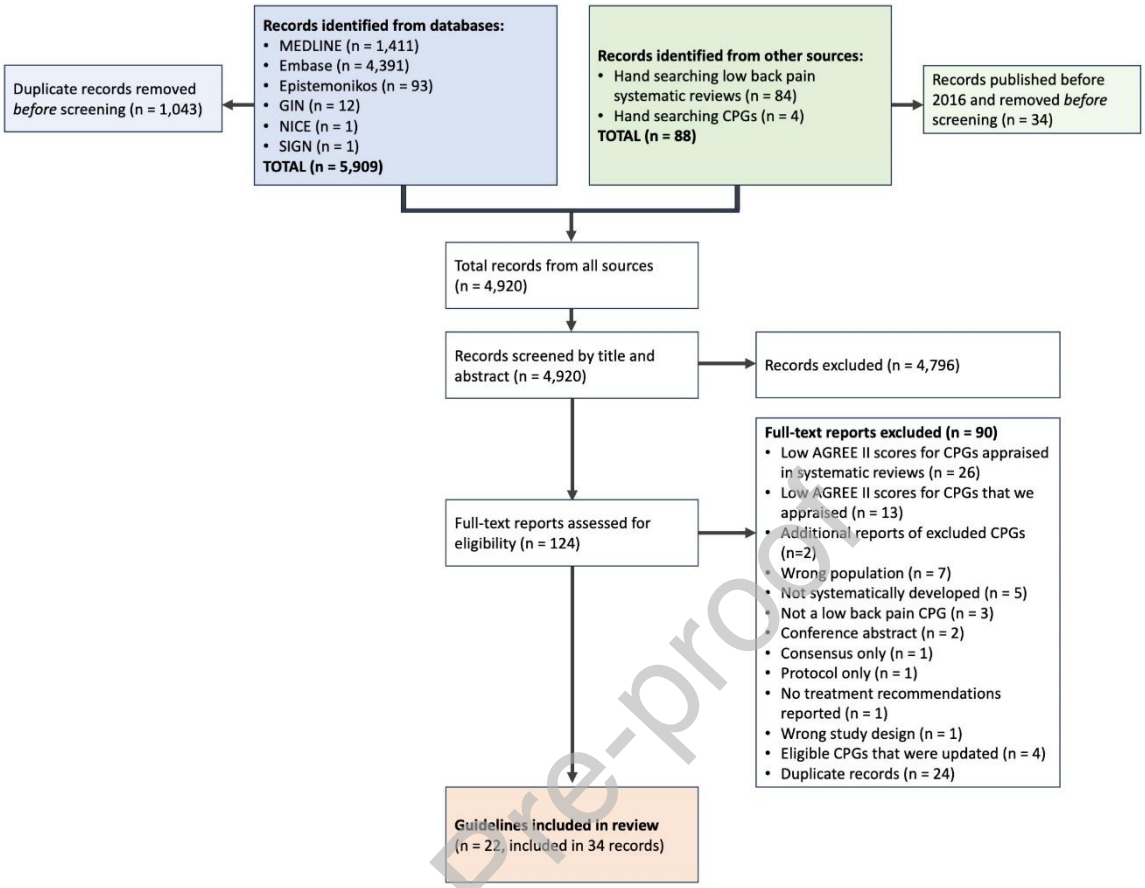

Figure 1: Flow chart of guideline selection.

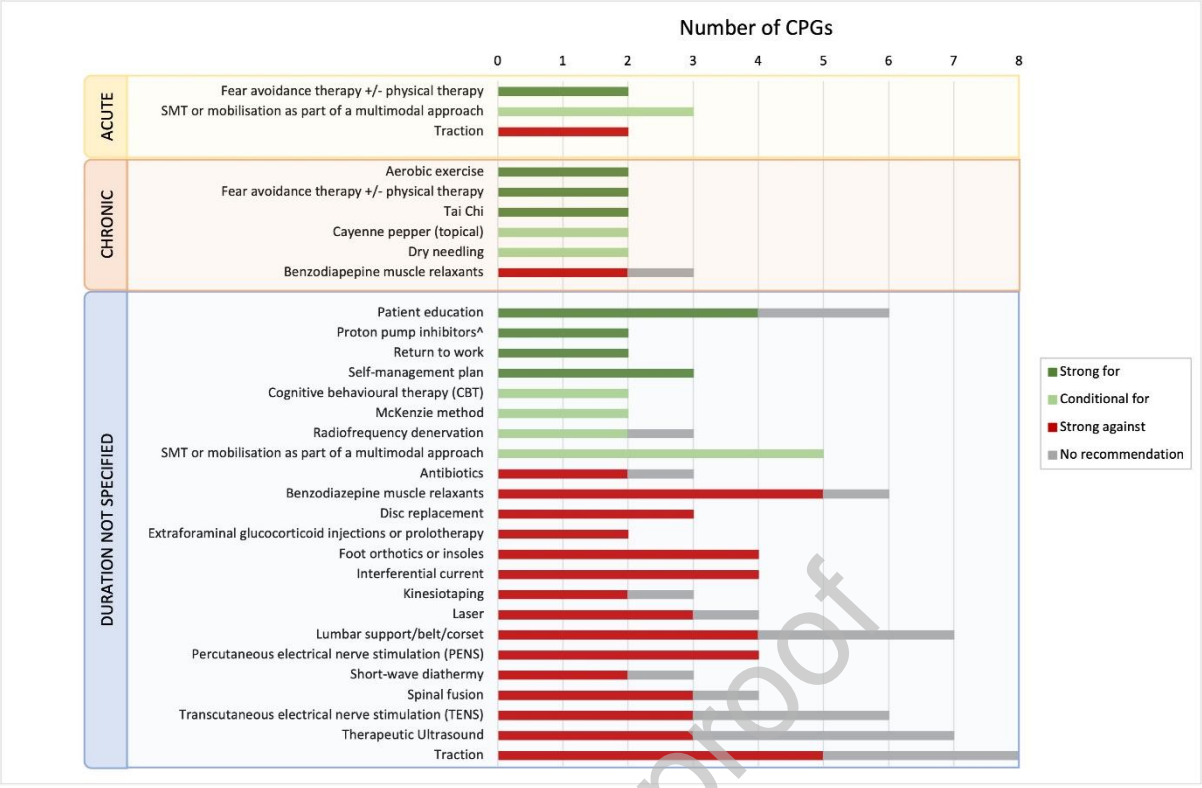

Figure 2: Treatment recommendations with complete agreement across high-quality CPGs, stratified by pain chronicity (acute <12 weeks; chronic ≥12 weeks; duration not specified).

Footnotes: ^ Proton pump inhibitors as a concomitant therapy to NSAIDs for people with increased risk of gastrointestinal complications. SMT = spinal manipulative therapy.

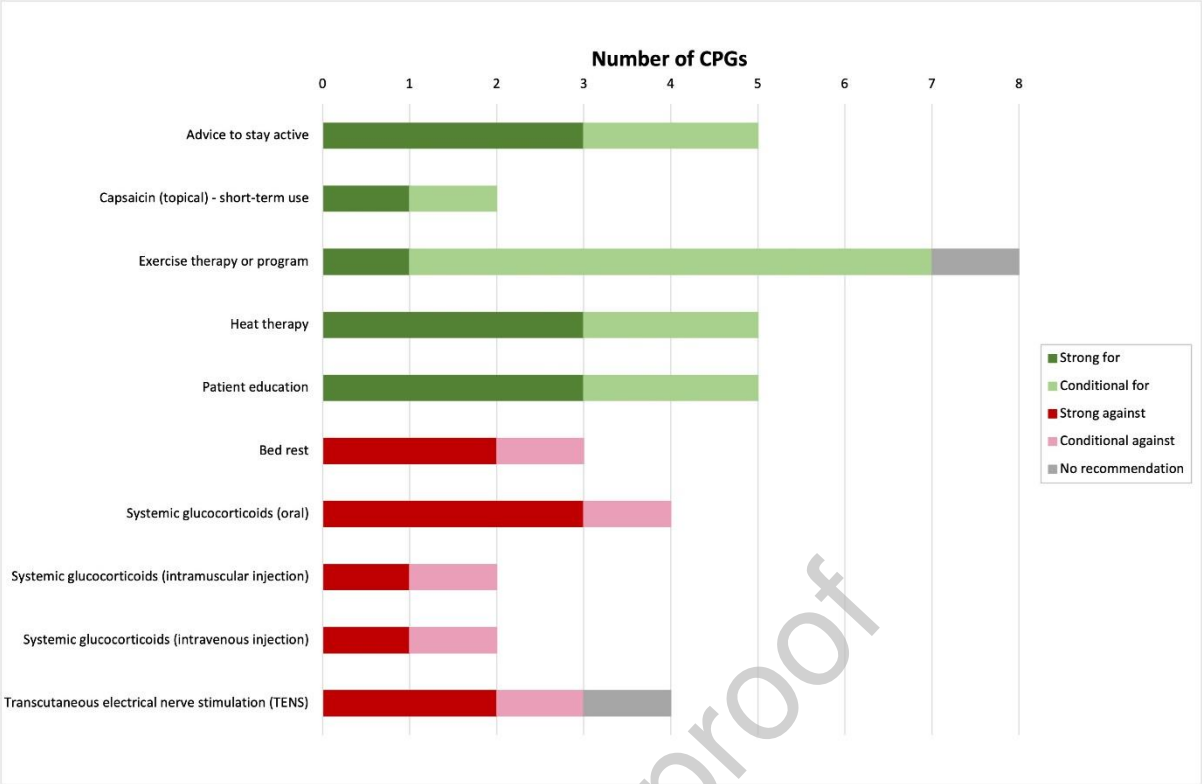

Figure 3a: Acute (<12 weeks) low back pain treatment recommendations from high-quality CPGs with partial agreement for or against being used.

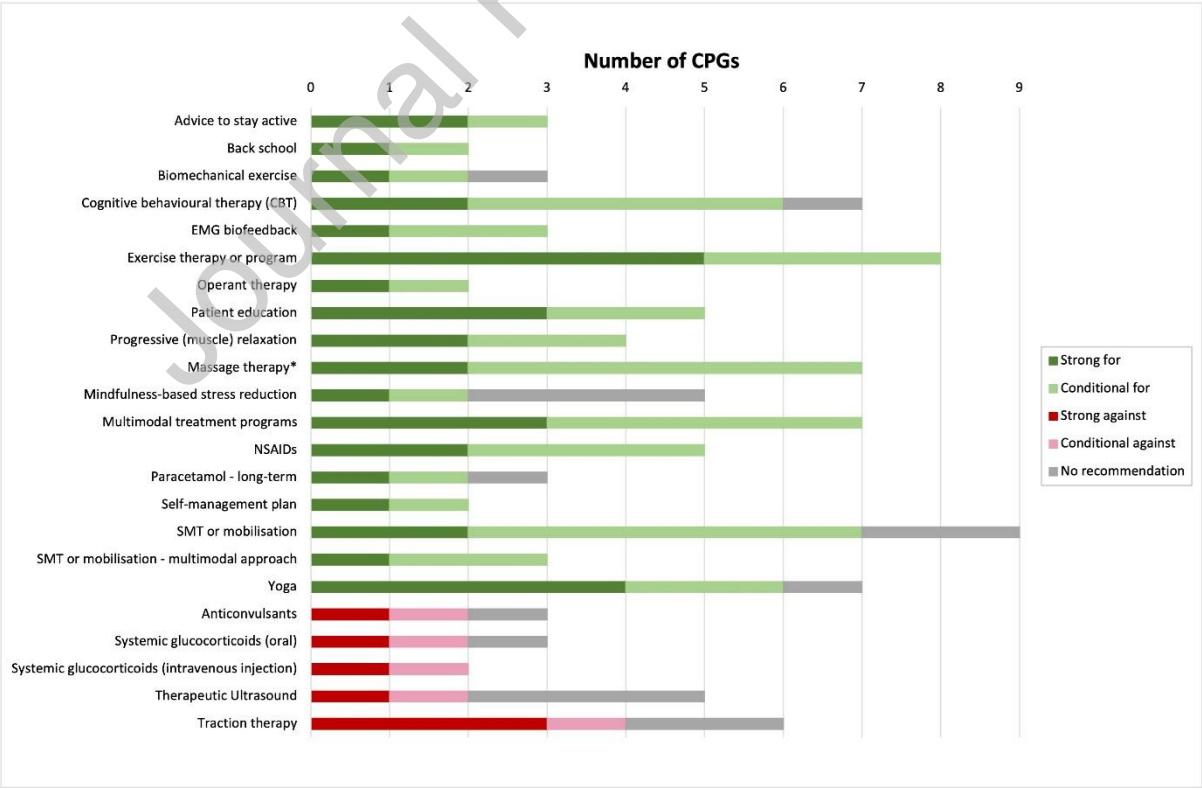

Figure 3b: Chronic (≥12 weeks) low back pain treatment recommendations from high-quality CPGs with partial agreement for or against being used.

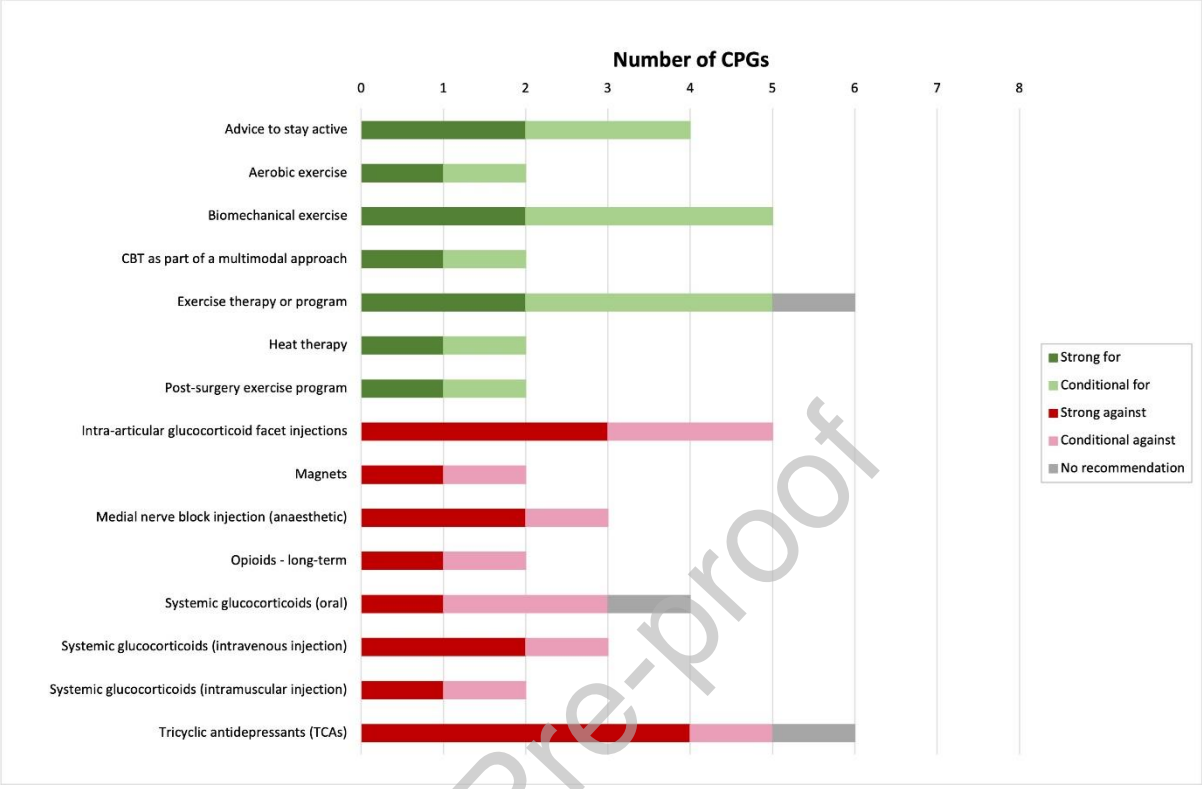

Figure 3c: Duration not specified low back pain treatment recommendations from high-quality CPGs with partial agreement for or against being used. **Footnotes:** *Includes n=4 recommendations for massage to be used as an adjunct with other treatments. [48, 50, 51, 59] EMG = electromyography, NSAIDs = non-steroidal anti-inflammatory drugs.

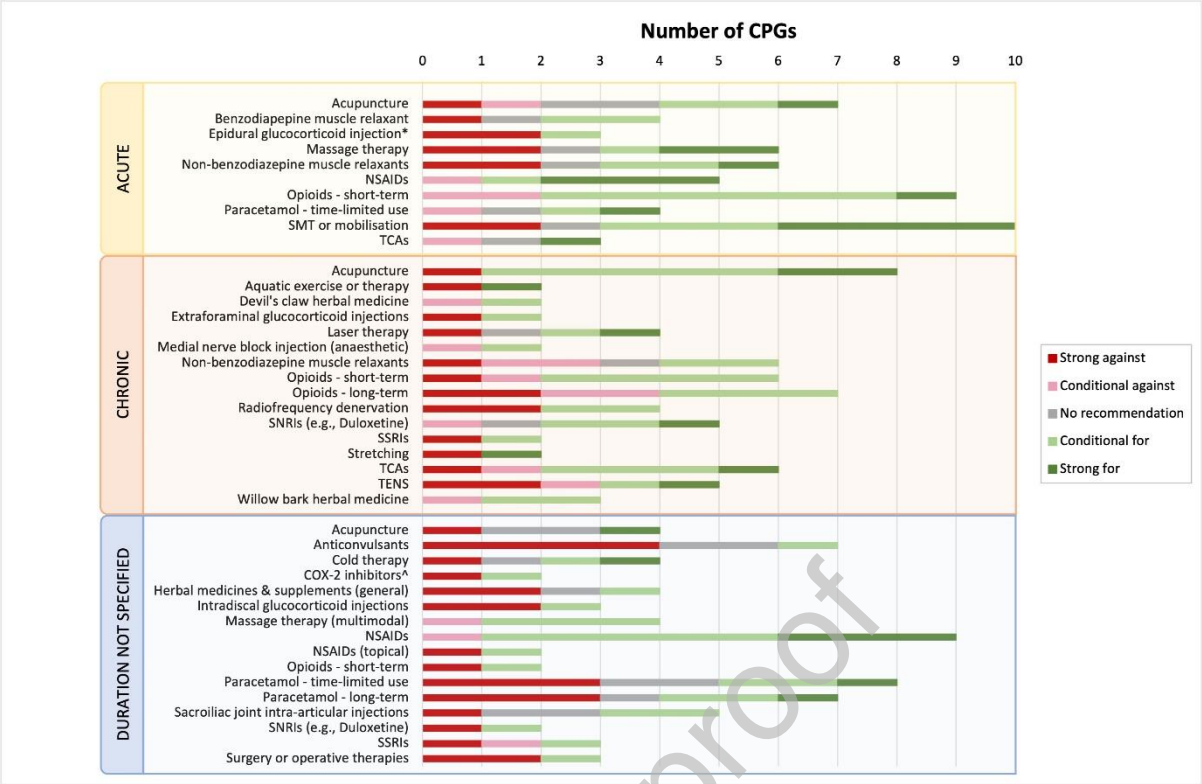

Figure 4: Conflicting CPG recommendations, stratified by pain chronicity (acute <12 weeks; chronic ≥12 weeks; duration not specified). **Footnotes:** *Epidural glucocorticoid injection for short-term effect ^COX-2 inhibitors when classic NSAIDs are contraindicated. NSAIDs = non-steroidal anti-inflammatory drugs, SMT = spinal manipulative therapy, SSRIs = selective serotonin reuptake inhibitors, SNRIs = serotonin-norepinephrine reuptake inhibitors, TCAs = tricyclic antidepressants, TENS = transcutaneous electrical nerve stimulation.

Table 1. Characteristics of included high-quality clinical practice guidelines

Guideline organisation or authors	Country	Year	Scope	Target users	Guideline writers	Number of treatment recommendations and additional records related to CPG
American College of Occupational and Environmenta	USA	2020[59] and 2021[86]	Diagnosis and treatment (non-invasive/inva	Clinicians	Multidisciplinary panel (n=15). Professions not reported.	125 **Additional records of CPG:** 4 [42, 86-88]

l Medicine (ACOEM) [59]			sive) of low back disorders			
American College of Physicians (ACP) [46]	USA	2017	Non-invasive treatments for low back pain	Clinicians	Medical doctors (n=16), lawyer (n=1), consumer/health consultant (n=1).	41 **Additional records of CPG:** 1 [89]
American Society of Interventional Pain Physicians (ASIPP) – biologics [44]	USA	2019	Regenerative medicine techniques for the management of low back pain	Clinicians and researchers	Clinicians with an interest and expertise in regenerative injection therapies. Assumed to be the CPG authors (n=30).	4 **Additional records of CPG:** none
American Society of Interventional Pain Physicians (ASIPP) – facet joint [43]	USA	2020	Invasive facet joint interventions for the management of chronic spinal pain (including lumbar spine)	Not reported. Assumed to be clinicians performing facet joint treatments for chronic spinal pain.	Clinicians with interest and expertise in managing spinal pain and interventional techniques from various medical fields.	2 **Additional records of CPG:** none
Canadian Chiropractic Guideline Initiative (CCGI) [49]	Canada	2018	Management of acute and chronic low back pain with or without back related leg pain in adults using spinal manipulative therapy with and without commonly used	Manual therapy and primary health care clinicians, specialists, and policymakers.	Chiropractors (n=2), clinician researchers (n=6), methodologists (n=3), decision maker (n=1) and patient advocate (n=1).[a]	5 **Additional records of CPG:** none

			conservative treatments.			
Danish Health Authority (DHA) [56]	Denmark	2016	Non-surgical interventions for recent onset (<12 weeks) non-specific low back pain	Clinicians, injured workers, workplace-based employees, workers' compensation insurers, and occupational health and safety professionals	DHA project group (chairman, project manager, lead reviewer, search specialist, methodologist) and a multidisciplinary working group (n=10) invited from professional organisations and scientific societies.	9[b] **Additional records of CPG:** 2 [61, 90]
Department of Veterans Affairs and Department of Defense (VA/DoD) [23]	USA	2022	Diagnosis and treatment of adult patients with LBP, with or without neurological symptoms	Primary care providers and community-based clinicians involved in the care of VA and DoD service members and retirees (and their beneficiaries), and veterans with LBP.	DVA/DoD representatives with expertise in; acupuncture and Chinese medicine (n=1), chiropractic care (n=2), clinical psychology (n=2), neuroradiology (n=1), neurology (n=1), nursing (n=1),	56 **Additional records of CPG:** 2 [91, 92]

					orthopaedic spine surgery (n=2), pain management (n=4), pharmacy (n=2), physical medicine and rehabilitation (n=2), physical therapy (n=2), primary care (n=2), and sports medicine (n=1). Also representatives of VA Office of Quality and Patient Safety (n=3), Defense Health Agency (n=3), 'The Lewin Group' (n=6), ECRI (n=7), Sigma Health Consulting (n=2), Anjali Jain Consulting (n=1), and Duty First Consulting (n=5).	
Dutch College of General Practitioners (NHG) [52]	Netherlands	2017	Diagnosis and management of non-specific low back pain	General practitioners	Acting physician (n=1), general practitioners (n=5), epidemiologists (n=3) and physiotherapist (n=1). The	27 **Additional records of CPG:** 1 [93]

					working group were supported with assistance from NHG staff.	
French Lumbar Surgery Rehabilitation Guideline (Dupeyron et al.) [31]	France	2021	Surgery for non-specific disco-vertebral pathology	Physiotherapists, rheumatologists, neurosurgeons, spine surgeons, physical medicine and rehabilitation physicians, general practitioners, and occupational therapists.	Guideline steering committee consisted of physical medicine and rehabilitation experts (n=9) representing academic, private and public practice.	24 **Additional records of CPG:** none
German National Care Guideline (BÄK/KBV/AWMF), Germany National Association of Statutory Health Insurance Physicians (KBV), Scientific Medical Societies Working Group (AWMF) [51]	Germany	2017	Diagnosis, treatment and rehabilitation of non-specific low back pain	Clinicians, patients with low back pain, the public and interested and relevant parties.	Expert representatives from Scientific Medical Societies Working Group (AWMF), Drugs Commission of the German Medical Association (AkdÄ), German Spine Society (DWG), German Society for Occupational Medicine and Environmental Medicine	66 **Additional records of CPG:** 3 [94-96]

					(DGAUM), German Society for Psychology (DGPs), German Society for Psychological Pain Therapy and Research (DGPSF), Society for Phytotherapy (GPT) and the Federal Association of Independent Physiotherapists (IFK).	
German Spine Society (DWG) [27]	Germany	2023	Management of adult patients with chronic back pain who are suspected of having a specific cause in the spinal facet or sacroiliac joints	Orthopaedic surgeons, neurosurgeons, anaesthesiologists, pain therapists, professional societies for pain, orthopaedics, neurosurgery and anaesthesiology, and patients.	Orthopaedic and trauma surgeons (n=5), neurosurgeons (n=5), an anaesthesiologist (n=1), and a patient representative (n=1).	1 **Additional records of CPG:** 1 [60]
Global Spine Care Initiative (GSCI) [54]	International	2018	Management of non-specific low back and neck pain in low- and middle-income countries, with a focus on non-invasive pharmacological and non-pharmacolog	Clinicians	Medical doctors (n=2), chiropractors (n=3), epidemiologists (n=2), physical therapist (n=1), psychologist (n=1). Note: all authors have	63 **Additional records of CPG:** none

			ical treatments		expertise in epidemiology and public health	
Health Care Knowledge Centre (KCE) [55]	Belgium	2017	Diagnosis and management of low back pain and radicular pain in adults, using pharmaceutical, non-invasive and invasive interventions.	Clinicians involved in the care of adults with low back pain and radicular pain, patients with low back pain and radicular pain, hospital managers and policy makers.	Physiotherapist and chiropractor (n=1), pain therapist (n=1), neurosurgeons (n=4), physiotherapists (n=5), general practitioners (n=3), anaesthesiologist-algologists (n=4), physical medicine & rehabilitation specialists (n=5), orthopaedic surgeons (n=5), occupational medicine physician (n=1) and psychologists (n=2).	36 **Additional records of CPG:** 5 [97-101]
Institute for Clinical Systems Improvement (ICSI) [47]	USA	2018	Treatment of adults with acute or subacute (<12 weeks) low back pain or radiculopathy	All health care professionals and experts	Medical doctors (n=3), osteopathic doctors (n=2), physical therapists (n=3), chiropractor (n=1), health services employee	11 **Additional records of CPG:** none

					(n=1), clinical systems facilitator (n=1) and project manager (n=1).	
Japanese Orthopaedic Association (JOA) [33]	Japan	2022	Epidemiology, pathology, diagnosis, treatment and prognosis of people with symptomatic lumbar disc herniation	Orthopaedic surgeons, clinicians in other fields, and patients	Guidelines committee members (n=15) were selected from various regions of Japan, including representatives of the Japanese Orthopaedic Association, the International Medical Information Centre, and Nankodo Co., Ltd.	16 **Additional records of CPG:** none
Korea Institute of Oriental Medicine (KIOM) [57]	South Korea	2017	Adults aged 18 to 65 years who were diagnosed with back pain via MRI and CT imaging without radicular pain	Korean medicine practitioners	Professional group (n=9), working group (n=8), and review committee group (n=8).	6 **Additional records of CPG:** none
National Institute for Health and Care Excellence (NICE) [58]	UK	2020	Assessment and management of low back pain and sciatica in people aged 16 and over (Includes physical, psychologica	Clinicians and patients	Neurosurgeon (n=1), Musculoskeletal physician / general practitioner (n=1), nurse (n=1), psychologist (n=1),	37 **Additional records of CPG:** 2 [102, 103]

			l, pharmacological, and surgical treatments)		patient representative (n=3), epidemiologist (n=1), orthopaedic surgeon (n=1), general practitioner (n=1), nurse specialist (n=1), researcher (n=1), rheumatologist (n=1), pain medicine consultants (n=2)	
North American Spine Society (NASS) [45]	USA	2020	Diagnosis and treatment of non-specific low back pain in adults	Clinicians	Multidisciplinary working group	46 **Additional records of CPG:** 3 [62, 104, 105]
Orthopaedic Physical Therapy of the American Physical Therapy Association (APTA) [48]	USA	2021	Interventions to assist with low back pain management, delivered by physical therapists or in settings that include physical therapy providers	Physical therapists, internationally	Committee members were selected for their expertise in LBP. Guideline authors were physical therapists (n=7), a chiropractor (n=1) and a librarian (n=1).	33 **Additional records of CPG:** 1 [106]
Toward Optimized Practice (TOP) [50]	Canada	2017	Prevention, assessment and treatment strategies for non-	Primary health care clinicians and adults with non-specific low back pain	Multidisciplinary team of clinicians and researchers in Alberta, Canada	79 **Additional records of CPG:** none

			specific low back pain	in Alberta, Canada.		
Royal Dutch Society for Physical Therapy (KNGF) and the Association of Cesar and Mensendieck Exercise Therapists [35]	Netherlands	2021	Diagnosis and treatment of people with an initial or relapse episode of low back pain and lumbosacral radicular syndrome	Physical therapists and exercise therapists who treat people with low back pain. Also relevant to healthcare providers who are involved in advising and treating people with low back pain, (e.g. GPs, psychologists, orthopaedic surgeons etc.)	Guideline panel consisted of physiotherapists (n=8), a patient representative (n=1), a general practitioner (n=1), an anaesthetist (n=1), a work-related movement specialist (n=1), and an exercise physiologist (n=1).	15 **Additional records of CPG:** 1 [53]
World Health Organization (WHO) [29]	International	2023	Non-surgical treatment interventions for chronic primary low back pain in adults, including older people, that can be delivered in primary and community care settings	Health care workers for all disciplines working in the primary and community care settings (e.g., medical doctors, nurses, allied health practitioners, public health employees etc.)	25 multidisciplinary clinical experts and experts in the fields of gender, healthy equity and human rights, guideline methods, epidemiology, ageing, traditional, complementary and integrative (TCI) medicine, and a person with chronic LBP.	40 **Additional records of CPG:** 8 [107-114]

Footnotes:

a: Twelve of the 13 guideline working group members were chiropractors (reported 'Doctor of Chiropractic' qualifications).

b: Recommendations for treating lumbar radiculopathy published by Stochkendahl *et al.*[61] were not relevant to this review.