RAPID REVIEW REPORT: DIAGNOSIS, INVESTIGATION AND MANAGEMENT OF LOW BACK PAIN

Prepared for the Australian Commission on Safety and Quality in Health Care

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KPH
knowledge into practice

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Abbreviations in this report

Abbreviation	Definition	Abbreviation	Definition
ACOEM	American College of Occupational and Environmental Medicine	NICE	National Institute for Health and Care Excellence (UK)
ACP	American College of Physicians	NPS	National Prescribing Service
ACSQHC	Australian Commission on Safety and Quality in Health Care	NRS	Numeric rating scale
CALD	Culturally and linguistically diverse	NSAIDs	Non-steroidal anti-inflammatory drugs
CARPA	Central Australian Rural Practitioners Association	ODI	Oswestry Disability Index
CBT	Cognitive behavioural therapy	OECD	Organisation for Economic Cooperation and Development
CI	Confidence intervals	OMPSQ	Örebro Musculoskeletal Pain Screening Questionnaire
CPR	Clinical prediction rules	PENS	Percutaneous electrical nerve stimulation
CT	Computed tomography	PG	Pregabalin
DHHS	Department of Health and Human Services (Victoria)	PT	Physical therapy/physiotherapy
ED	Emergency department	RCT	Randomised controlled trial
GB	Gabapentin	RF	Radiofrequency
GP	General practitioner	RMDQ	Roland-Morris Disability Questionnaire
HRQoL	Health-related quality of life	SBST	STarT Back tool
HSU	Health services utilisation	SIGN	Scottish Intercollegiate Guidelines Network
LBP	Low back pain	SMP	Self-management programs
MBR	Multidisciplinary biopsychosocial rehabilitation	SMT	Spinal manipulative therapy
MBS	Medicare benefits schedule	SNRI	Serotonin-norepinephrine reuptake inhibitors
MCE	Motor control exercise	SSRIs	Selective serotonin reuptake inhibitors
MET	Muscle energy technique	TDR	Total disc replacement
MRI	Magnetic resonance imaging	TENS	Transcutaneous electrical nerve stimulation
NHMRC	National Health and Medical Research Council (Australia)	VA/DoD	(US) Veterans' Affairs/Department of Defense
NHS	National Health Service (UK)	VAS	Visual analog scale

Executive summary

This structured evidence summary and literature review was conducted on behalf of the Australian Commission on Safety and Quality in Health Care in order to better understand the current clinical environment for diagnosis, investigation and management of low back pain (LBP) to support the development of a clinical care standard and to identify issues or gaps that may be addressed through input from clinical experts.

The review summarised the current evidence from systematic searches of guidelines and systematic reviews, and an environmental scan of indicators for monitoring and audit. We summarised evidence from 13 reviews of guidelines, 10 recent high quality guidelines, 60 systematic reviews of diagnostic or management interventions, and several documents available in the grey literature reporting on current local and international models of care, initiatives, and quality indicators.

Evidence is available from recent guidelines and systematic reviews which can be used as an evidence base for the lower back pain clinical care standard, as summarised in the following tables.

Diagnosis

Recommendation	Guidelines	Systematic reviews
History taking and physical examination to identify patients with specific disease/alternative diagnosis	Consensus (Expert opinion)	Lacking in evidence
Assessment of red/yellow flags	Consensus (Expert opinion)	Absence of evidence for their accuracy for identifying underlying malignancy.
Use of risk stratification tool(s): STarT Back/Örebro	Consensus (Low-quality evidence)	Perform poorly at assigning higher risk scores to individuals who develop chronic pain than to those who do not, but are better at predicting poor disability outcomes and prolonged absenteeism
Against the use of routine imaging	Consensus (Low-quality evidence)	Imaging associated with higher medical costs, increased healthcare utilization and more absence from work

Management: non-invasive, non-pharmacological

Recommendation	Guidelines	Systematic reviews
Avoiding bed rest	Consensus (high-quality evidence)	No recent review identified.
Using patient education (advice to maintain normal activities, reassurance, self-management)	Consensus (Moderate-quality evidence)	Moderate-quality evidence for a moderate effect of self-management interventions on pain intensity, and small-moderate effect on disability.
Using exercise therapy	Consensus (Moderate-quality evidence)	Moderate-quality evidence for small-moderate effects on pain and function associated with exercise. Pilates most effective treatment for pain, stabilisation/motor control and resistance training most effective treatments for physical function and resistance, and aerobic exercise training most effective treatment for mental health.
Using orthotics (foot orthotics, braces, unstable shoes)	Consensus *against* (Moderate-quality evidence)	Low-quality evidence: small studies and mixed results, some positive effects associated with lumbar support and custom foot orthotics.
Using manual therapies (spinal manipulation, massage)	Consensus *as adjunct therapy* (High-quality evidence)	Low-quality evidence: small studies at high risk of bias, with mixed results and only isolated small positive effects.
Using acupuncture	No consensus	Moderate-quality evidence for short-term improvements in pain, less evidence for improvements in function
Using electrotherapies (Transcutaneous electrical nerve stimulation (TENS), Percutaneous electrical nerve stimulation (PENS), interferential therapy, ultrasound, laser therapy)	No consensus: TENS, laser therapy Consensus *against*: PENS (Moderate-quality evidence), Interferential therapy (High-quality evidence), Ultrasound (Low-quality evidence)	Low-quality evidence: no difference in pain relief or functional disability associated with TENS. No high-quality evidence for therapeutic ultrasound. Moderate-quality evidence for short-term pain relief with low level laser therapy.
Using psychological therapy	Consensus *as adjunct therapy* (Moderate-quality evidence)	Low-quality evidence for small reductions in pain associated with psychological therapy added to physical therapy/exercise.
Using multidisciplinary rehabilitation	Consensus (Moderate-quality evidence)	Moderate-quality evidence for moderate (short-term) improvements in pain and small improvements in functional disability.
Promoting (early) return to work	Consensus (High-quality evidence)	No recent review identified.

Management: non-invasive, pharmacological

Recommendation	Guidelines	Systematic reviews
NSAIDs	Consensus (Moderate-quality evidence)	Moderate/high-quality evidence for small short-term reductions in pain and disability.
Paracetamol	No consensus	High-quality evidence for no difference in pain or disability, quality of life, function, global impression of recovery, or sleep quality.
Opioids	No consensus	Low-quality evidence for clinically relevant pain relief and reduction of disability.
Antidepressants	No consensus	Moderate-quality evidence for small improvements in pain and function associated with duloxetine, but also moderate-quality evidence for no effect of tricyclic antidepressants or SSRIs.
Muscle relaxants	Consensus (Moderate-quality evidence)	High-quality evidence that muscle relaxants provide short-term clinically significant pain relief for acute LBP

Management: invasive

Recommendation	Guidelines	Systematic reviews
Spinal injections (facet joint injections of anaesthetic or steroid, medial branch blocks of local anaesthetic, intradiscal therapy using steroids or NSAIDs, prolotherapy, and trigger point injections of local anaesthetics and a steroid, or botulinum toxin)	Consensus *against* (Moderate-quality evidence)	Limited evidence that facet joint injections not effective for presumed facet joint pain.
Radiofrequency denervation (for chronic LBP)	No consensus	Low-quality evidence that radiofrequency neurotomy associated with greater improvement in disability, pain, and quality of life among patients with chronic lumbar/ sacroiliac joint pain
Epidural steroid injections (for subacute LBP)	No consensus	Probably slightly more effective than placebo in the short term at reducing leg pain and disability in patients with lumbosacral radicular pain, although treatment effects small and potentially not clinically important. Limited evidence suggesting that epidural corticosteroid injections are not effective for spinal stenosis or nonradicular back pain.
Surgery	Consensus *against* (Expert opinion)	Low-quality evidence that surgical management for sciatica associated with better outcomes in the short term for disc herniation, and for spondylolisthesis and spinal stenosis at short and long term.
Spinal decompression	Consensus (Low-quality evidence)	No recent review comparing with usual care or other management options identified.
Spinal fusion	Consensus *against* (Low-quality evidence)	Low-quality evidence that lumbar fusion is not superior to intensive, structured exercise and CBT program at reducing pain or disability.
Disc replacement	Consensus *against* (Low-quality evidence)	Insufficient evidence for effectiveness.

Evidence from the Australian Atlases of Healthcare variation indicate that there is a large variation in health care delivery for lower back pain in Australia, as indicated by the number of MBS-funded services for CT imaging of the lumbar spine and the number of hospitalisations for lumbar spine decompressions and for lumbar spine fusions.

Contrary to more recent guidelines and the systematic review evidence, paracetamol continues to be recommended as first line therapy for low back pain in several jurisdictions, and the use of NSAIDs in the first instance is not always recommended.

A number of audits, indicators and data collection mechanisms have been developed or are in use, including patient reported measures, to support the measurement of care improvement for lower back pain in Australia and internationally. These include monitoring indicators from recent high-quality guidelines, a rigorously developed core outcome set for research and clinical practice published in the peer-reviewed literature, indicators from international (UK, Canada) quality standards, and indicators for low back pain care and pain from Australian initiatives.

1 Background

On behalf of the Australian Commission on Safety and Quality in Health Care, we have produced this structured evidence summary and literature review to better understand the current clinical environment for diagnosis, investigation and management of low back pain (LBP) to support the development of a clinical care standard and to identify issues or gaps that may be addressed through input from clinical experts.

The 2015 Australian Atlas of Healthcare Variation found marked geographical variation in MBS-funded computed tomography (CT) scans of the lumbar spine around Australia, suggesting overuse of this investigation. The number of MBS-funded services for CT imaging of the lumbar spine was 11.8 times higher in the area with the highest rate compared to the area with the lowest rate. The Second Australian Atlas of Healthcare Variation (2017) found substantial variation in rates of lumbar spinal fusion and spinal decompression. The rate of lumbar spinal fusion surgery in Australia has been increasing, with most of the increase occurring in the private sector.

The rapid literature review addressed the following research questions:

1. What relevant evidence from guidelines or systematic reviews is available which can be used as an evidence base for the lower back pain clinical care standard?
2. What do current guidelines recommend regarding the diagnosis, investigation and management of lower back pain (including radiological imaging and spinal surgery) and what is the evidence level for these?
3. What evidence is available to indicate that health care delivery for lower back pain in Australia is not in line with best available evidence?
4. What contributes to these variations in health care delivery for lower back pain? These may include factors related to service models, patient preferences or clinical knowledge or skills.
5. What programs or interventions have been used to improve health care delivery and outcomes for lower back pain and what were their outcomes?
6. What audits, indicators and data collection mechanisms have been developed or are in use, including patient reported measures, to support the measurement of care improvement for lower back pain? [In Australia and internationally]

2 Review methods

2.1 Guidelines

(Research questions 1, 2, 6)
Three reviews of guidelines for LBP were published in 2016-18,[2-4] summarising a total of 15 Australian and international guidelines released between 2011 and 2017. These included four high-quality guidelines identified by the Commission in the brief for this review:

- United Kingdom[5]: National Institute for Health and Care Excellence (2016) *Low back pain and sciatica in over 16s: assessment and management (NICE guideline NG59)*. Available from: http://www.nice.org.uk/guidance/ng59.
- USA[6]: Qaseem A, Wilt TJ, McLean RM, Forciea MA (2017) Clinical guidelines committee of the American College of Physicians. *Noninvasive treatments for acute, subacute, and chronic low back pain: a clinical practice guideline from the American College of Physicians.* Ann Intern Med 166(7):514–530
- Denmark[7]: Stochkendahl MJ, Kjaer P, Hartvigsen J et al (2017) *National clinical guidelines for non-surgical treatment of patients with recent onset low back pain or lumbar radiculopathy.* Eur Spine J 27(1):60–75
- Belgium[8]: Van Wambeke P, Desomer A, Ailliet L et al (2017) *Low back pain and radicular pain: assessment and management.* Good Clinical Practice (GCP) Brussels: Belgian Health Care Knowledge Centre (KCE).

We initially checked for updates of the 15 included guidelines. We then repeated the search conducted for the most recent and comprehensive review of guidelines (Oliveira 2018) for the period since the search underpinning that review was conducted: 2018-current. The databases and search terms used were:

- MEDLINE via OVID (key words: low back pain AND clinical guidelines),
- PEDro (key words: low back pain AND practice guidelines),
- National Guideline Clearinghouse (www.guideline.gov; key word: low back pain),
- National Institute for Health and Clinical Excellence (NICE) (www.nice.org.uk; key word: low back pain).

Reviews of guidelines identified in the search of the peer-reviewed literature (see methods below) were screened for additional guidelines published within the target period of 2015-current.

AGREE II quality appraisals for all potentially relevant guidelines (published 2015-current) were extracted from reviews of guidelines.[9-12] To include all guidelines of reasonable quality, we selected all those with an overall assessment of 60% or higher.

Data extraction

From the identified guidelines, we extracted relevant recommendations and level of evidence (including GRADE where available) into evidence tables (see Appendix C). We also extracted any evidence regarding current clinical practice, and indicators currently used to support the measurement of care improvement for lower back pain. Where recommendations/indicators were specific to particular populations, this was noted.

Quality appraisal

The quality of recommendations in identified guidelines was appraised by one reviewer using AGREE-REX (see Appendix A). These ratings are included in the data extraction tables in Appendix C. In the body of the report we include AGREE II quality appraisals from reviews of guidelines, as these were each conducted by between two and twelve reviewers, and as such was expected to be more robust.

2.2 Grey literature

(Research questions 3, 4, 5, 6)

We searched websites of Commonwealth, State and Territory health departments for relevant policies, reports and papers and extract any information relating to:

- Variation in health care delivery and outcomes for lower back pain in Australia. This might include health care delivery outcomes for lower back pain including patient experience, clinical outcomes, and use of health care resources [e.g. length of stay, cost, health service utilisation]
- Contributors to variations in care, including service models, patient preferences or clinical knowledge or skills.
- Descriptions or evaluations of programs or interventions used to improve health care delivery and outcomes for lower back pain.
- Audits, indicators and data collection mechanisms to support the measurement of care improvement for lower back pain.

We also searched the websites of the Australian Commission on Safety and Quality in Healthcare, Australian Institute for Health and Welfare, National Health and Medical Research Council, Australian Council on Healthcare Standards, NPS MedicineWise, the Royal Australian College of General Practitioners, Royal Australasian College of Surgeons, the Medical Services Advisory Committee, the NSW Agency for Clinical Innovation, the University of Wollongong Electronic Persistent Pain Outcomes Collaboration, the PRECISION Pain Registry, OECD Health Care Quality Indicators, the US Agency for Healthcare Research and Quality, Canadian Institute for Health Information, NICE, NHS, Public Health Scotland, and the Health Quality and Safety Commission New Zealand. These websites were chosen in consultation with the review team and with Commission representatives; while the list is not exhaustive, it includes major national and international government and non-government sources and was expected to provide a reasonable overview of the available evidence.

2.3 Systematic reviews and meta-analyses

(Research questions 1, 5, 6)
We searched relevant peer-reviewed databases (Medline, Embase, Cinahl, Cochrane) for systematic reviews and meta-analyses published in English in the past 5 years (2015-current). We searched for systematic reviews relating to the diagnosis, investigation and management of LBP, specifically for reviews of evaluations of programs or interventions that aim to improve health care delivery and outcomes for LBP. We also identified any systematic reviews of audits, indicators and data collection mechanisms for LBP care.

Reviews of guidelines identified through the search process were noted as per section 2.1 above.

The following search terms were used to identify relevant systematic reviews/meta-analyses (specific to Medline via Ovid, terms for each database were tailored to the requirements of each database):

MEDLINE via Ovid

#1	exp Back Pain/ OR "back pain".tw.
#2[1]	meta-analysis.pt. or meta-analysis/ or systematic review/ or meta-analysis as topic/ or "meta analysis (topic)"/ or "systematic review (topic)"/ or exp technology assessment, biomedical/ or ((systematic* adj3 (review* or overview*)) or (methodologic* adj3 (review* or overview*))).ti,ab,kf,kw. or ((quantitative adj3 (review* or overview* or synthes*)) or (research adj3 (integrati* or overview*))).ti,ab,kf,kw. or ((integrative adj3 (review* or overview*)) or (collaborative adj3 (review* or overview*)) or (pool* adj3 analy*)).ti,ab,kf,kw. or (data synthes* or data extraction* or data abstraction*).ti,ab,kf,kw. or (handsearch* or hand search*).ti,ab,kf,kw. or (mantel haenszel or peto or der simonian or dersimonian or fixed effect* or latin square*).ti,ab,kf,kw. or (met analy* or metanaly* or technology assessment* or HTA or HTAs or technology overview* or technology appraisal*).ti,ab,kf,kw. or (meta regression* or metaregression*).ti,ab,kf,kw. or (meta-analy* or metaanaly* or systematic review* or biomedical technology assessment* or bio-medical technology assessment*).mp,hw. or (medline or cochrane or pubmed or medlars or embase or cinahl).ti,ab,hw. or (cochrane or (health adj2 technology assessment) or evidence report).jw. or (meta-analysis or systematic review).mp. or (comparative adj3 (efficacy or effectiveness)).ti,ab,kf,kw. or (outcomes research or relative effectiveness).ti,ab,kf,kw. or ((indirect or indirect treatment or mixed-treatment) adj comparison*).ti,ab,kf,kw.
#3	#1 AND #2
#4	#3 NOT (Comment OR Congress OR Editorial OR Letter OR News).pt.
#5	limit #4 to yr="2015 -Current"

Eligibility criteria

Types of studies

We considered all systematic reviews and meta-analyses. We anticipated that many programs or interventions used to improve health care delivery and outcomes for lower back pain may not have been evaluated in randomised controlled trials, and therefore included systematic reviews of intervention studies of any design, quantitative or qualitative. Where there were two or more reviews that addressed the same question we included all reviews that meet inclusion criteria, but reporting focusses on the highest level of evidence and most recent search date. Only reviews published from 2015 were considered for inclusion.

Types of Participants

We considered all systematic reviews and meta-analyses where participants were human adults (age ≥ 16 years) of any gender.

Types of Interventions

We considered all systematic reviews and meta-analyses of evaluations of programs or interventions that aimed to improve health care delivery and outcomes for LBP. These may relate to diagnosis (risk assessment and risk stratification tools, imaging); non-invasive, non-pharmacological management (self-management, exercise, orthotics, manual therapies, acupuncture, electrotherapies, psychological therapy,

[1] CADTH Database systematic review/meta-analysis/health technology assessment search filter https://www.cadth.ca/resources/finding-evidence/strings-attached-cadths-database-search-filters

combined physical and psychological programs, return-to-work programs); pharmacological management; invasive, non-surgical management (spinal injections, radiofrequency denervation, epidurals); and invasive, surgical management (spinal decompression, spinal fusion, disc replacement).

We also considered all systematic reviews and meta-analyses of outcome measures or indicators of LBP care.

Types of Comparators
We considered all systematic reviews and meta-analyses of studies with and without comparators.

Types of Outcome measures
We considered all systematic reviews and meta-analyses of intervention studies that report health or service use outcomes as measures of effectiveness, including patient-reported experience and outcome measures (PREMs/PROMs).

Evidence in languages other than English
We did not apply any language restrictions to conduct searches of the literature. Studies in languages other than English were only considered where a full-text translation into English is available.

Assessing the eligibility of identified articles

We downloaded all titles and abstracts retrieved by electronic searching to the reference management database EndNote. We removed duplicates and examined all references for their relevance. Full text articles were sourced for all potentially eligible reviews/meta-analyses, and these were assessed against the eligibility criteria. We tabulated reasons for exclusion for all articles that did not meet the criteria.

Quality appraisal

Where available, we extracted quality appraisals of systematic reviews that met inclusion criteria from reviews of reviews that assessed methodological quality using the AMSTAR 2 measurement tool (see Appendix B). For potentially high-quality recent systematic reviews for which external quality appraisals could not be sourced, we conducted quality appraisals using AMSTAR 2.

Data extraction

Following an assessment for inclusion, we extracted data from each included systematic review/meta-analysis into evidence tables (see Appendix C). Where findings were specific to particular populations, this was noted.

3 Results

3.1 Current guideline recommendations and evidence base

Screening and quality appraisal

Prior to the current search, we were aware of three reviews of guidelines for LBP published in 2016-18,[2-4] summarising a total of 15 Australian and international guidelines released between 2011 and 2017.[5-8, 13-23] Each of these guidelines was checked, and no more recent updates were identified, except for a minor revision in 2017 to the 2015 Canadian guidelines. The database search for systematic reviews and meta-analyses identified an additional ten reviews of LBP guidelines (see section 3.2 below).[9-12, 24-29] Overall, the 13 reviews of guidelines included 16 guidelines published during the specified search period of 2015-2020. Of these, two were not available in English,[13, 19] and one provided recommendations on one management option only (osteopathic manipulative treatment)[30] based on a single systematic review; these were excluded.

Four of the reviews provided quality appraisals of the included guidelines using the AGREE-II instrument (See Table 1). Reviews reported domain scores (as a percentage of the total possible score for each domain), and overall assessment scores (as a percentage of the total possible score overall) calculated based on the appraisals of two,[12] three,[10, 11] or four[9] independent reviewers. No prior quality appraisal was identified for one guideline included in the current review[17]; one reviewer (JM) appraised this guideline. AGREE-II does not specify a method for assessing overall guideline quality (e.g. high/moderate/low quality), and this was determined differently for each review, so is not reported for each review here due to lack of comparability.[2] To include all guidelines of reasonable quality, we selected all those with an overall assessment of 60% or higher. This resulted in ten included guidelines, including three from the USA,[6, 31, 32] two from the UK,[5, 33] and one from each of Australia,[17] Belgium,[8] Canada,[21] Denmark,[7] and Germany.[23]

[2] Ng 2020 did not provide overall quality judgements. Lin 2020 classified high-quality guidelines as those that scored 50% or higher in stakeholder involvement, rigour of development, and editorial independence. Meroni 2019 considered guidelines with an average domain score of 75% or higher to be excellent, and those with a score below 60% to be fair/poor. Doniselli 2019 defined high quality as when 5 or more domains scored >60%, average when 3 or 4 domains scored >60%, and low quality when 2 domains or fewer scored >60%.

Table 1: Quality appraisal of guidelines (% domain scores and overall assessment from AGREE II based on reviews of guidelines)

Country/region; Organisation	Year	Review	Scope & purpose	Stakeholder involvement	Rigour of development	Clarity of presentation	Applicability	Editorial independence	**Overall assessment[a]**
UK (National Institute for Health and Care Excellence)[5]	2016	Ng 2020[12]	100.0	50.0	82.3	94.4	45.8	54.2	***(71)***
		Lin 2020[10]	89	78	85	93	83	72	**89**
		Meroni 2019[11]	96	83	82	94	72	97	**88**
		Doniselli 2018[9]	92	96	71	86	70	77	**83**
UK (Scottish Intercollegiate Guidelines Network)[33]	2019	Meroni 2019[11]	85	89	75	80	61	94	**81**
Denmark (Danish Health Authority)[7]	2017	Lin 2020[10]	87	65	77	80	32	64	**67**
		Doniselli 2018[9]	89	88	90	88	48	71	**92**
USA (American College of Physicians)[6]	2017	Ng 2020[12]	100.0	75.0	77.1	91.7	20.8	70.8	***(73)***
		Lin 2020[10]	91	46	78	80	18	58	**83**
		Meroni 2019[11]	93	61	69	85	11	75	**66**
		Doniselli 2018[9]	94	57	83	85	42	85	**79**
Germany (German Disease Management Guideline Group)[23]	2017	Ng 2020[12]	83.3	47.2	33.3	80.6	22.9	33.3	***(50)***
		Meroni 2019[11]	93	87	73	94	57	75	**80**
Canada (Institute of Health Economics Toward Optimized Practice)[21]	2017	Lin 2020[10]	72	31	17	74	19	0	**33**
		Meroni 2019[11]	94	87	94	91	68	97	**89**
		Doniselli 2018[9]	94	72	79	89	57	71	**79**
Australia (NSW Agency for Clinical Innovation)[17]	2016	-[b]	95	95	46	95	71	14	**67**

Country/region; Organisation	Year	Review	Scope & purpose	Stakeholder involvement	Rigour of development	Clarity of presentation	Applicability	Editorial independence	**Overall assessment[a]**
USA (Veterans Affairs/Department of Defense)[34]	2017	Meroni 2019[11]	76	67	64	94	15	83	**67**
Belgium (Belgian Health Care Knowledge Centre)[8]	2017	Ng 2020[12]	88.9	44.4	62.5	91.7	35.4	62.5	***(64)***
		Lin 2020[10]	87	56	70	80	60	64	**61**
USA (American College of Occupational and Environmental Medicine)[31, 32]	2019	Ng 2020[12]	100.0	55.6	61.5	83.3	22.9	50.0	***(62)***
USA (Council on Chiropractic Guidelines and Practice Parameters)[35]	2016	Ng 2020[12]	77.8	77.8	57.3	52.8	29.2	45.8	***(57)***
		Lin 2020[10]	67	54	60	39	25	61	**44**
		Meroni 2019[11]	81	28	48	41	6	81	**47**
China (China Association of Acupuncture-Moxibustion)[36]	2016	Ng 2020[12]	69.4	52.8	32.3	100.0	6.3	29.2	***(48)***
Italy[37]	2016	Doniselli 2018[9]	63	40	34	47	42	63	**46**

[a] Note that the overall assessment score does not necessarily represent a quality rating: AGREE-II does not specify a method for assessing overall guideline quality; while some authors base their judgement on this overall assessment score, others weight different domains more or less strongly to derive a quality rating.

Ng 2020[12] did not provide overall assessment scores; we have calculated the average domain score.

[b] Not included in any of the reviews that provided quality appraisals, appraised for the current review by one author.

Level of evidence

A majority of included guidelines used the GRADE framework to rate their confidence in the evidence on which their recommendations were based.[5, 7, 8, 31-34]

Box 1 – Levels of evidence according to the GRADE system[38]

Quality level	Definition	Methodological quality of supporting evidence
High	We are very confident that the true effect lies close to that of the estimate of the effect	RCTs without important limitations or overwhelming evidence from observational studies
Moderate	We are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different	RCTs with important limitations (inconsistent results, methodological flaws, indirect, or imprecise) or exceptionally strong evidence from observational studies
Low	Our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect	RCTs with very important limitations or observational studies or case series
Very low	We have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of the effect	

Consistency of recommendations

Recommendations from the guidelines were tabulated (see Tables 2-5). Consistency in recommendations varied, but there were several recommendations endorsed by a majority of guidelines. A recently published review of guidelines across musculoskeletal conditions (including four of the recent high-quality LBP guidelines included here) found eleven key recommendations that were consistent across musculoskeletal pain conditions (see Box 2). These recommendations were also consistently endorsed by the broader group of ten high-quality LBP guidelines summarised here.

Box 2: Consistent recommendations across musculoskeletal pain conditions (Lin 2020, p.6)[10]

1. Care should be patient centred. This includes care that responds to the individual context of the patient, employs effective communication and uses shared decision-making processes.
2. Screen patients to identify those with a higher likelihood of serious pathology/red flag conditions.
3. Assess psychosocial factors.
4. Radiological imaging is discouraged unless:
    a. Serious pathology is suspected.
    b. There has been an unsatisfactory response to conservative care or unexplained progression of signs and symptoms.
    c. It is likely to change management.
5. Undertake a physical examination, which could include neurological screening tests, assessment of mobility and/or muscle strength.
6. Patient progress should be evaluated including the use of outcome measures.
7. Provide patients with education/information about their condition and management options.
8. Provide management addressing physical activity and/or exercise.
9. Apply manual therapy only as an adjunct to other evidence-based treatments.
10. Unless specifically indicated (e.g. red flag condition), offer evidence-informed non-surgical care prior to surgery.
11. Facilitate continuation or resumption of work.

Diagnosis

Recommendations for diagnosis of LBP were largely consistent across guidelines, as summarised in Box 2, although guidelines reported that these recommendations were based on low (GRADE) level evidence at best (see Table 2). The only inconsistency related to the use of risk stratification tools to guide treatment choices, for example the STarT Back or Örebro tools. Four guidelines endorsed the use of one or both tools,[5, 8, 17, 23] the Canadian guideline stated that there was insufficient evidence to recommend for or against using the STarT back screening tool and its associated system of stratified care for chronic LBP,[21] and the Danish guideline stated that it is not good practice to routinely offer targeted treatment.[7]

Table 2: Recommendations of clinical guidelines for diagnosis of LBP

Recommendation for diagnosis	AUS (NSW) 2016[a]	BEL 2017[a]	CAN 2015[a]	DEN 2017[a]	GER 2017[a]	UK (NICE) 2016[a]	UK (SIGN) 2019	USA (ACP) 2017[a]	USA (ACOEM) 2019	USA (VA/DoD) 2017	% agreement	Highest level of evidence cited
History taking and physical examination to identify patients with specific disease/alternative diagnosis	✓	✓	✓		✓	✓	✓			✓	7/7 (100%)	Experts
Assessment of red/yellow flags	✓	✓	✓		✓					✓	5/5 (100%)	Experts
Use of risk stratification tool(s): STarT Back/Örebro	✓	✓	-	X	✓	✓					4/5 (80%)	Low
Against the use of routine imaging	✓	✓	✓	✓	✓	✓			✓	✓	8/8 (100%)	Low
Imaging only if serious pathology is suspected	✓		✓	✓	✓				✓	✓	*6/8 (75%)*	*Experts*
Imaging only when the results are likely to change or direct the treatment		✓	✓		✓	✓					*4/8 (50%)*	*Low*
Imaging only if pain persists beyond a period			✓								*1/8 (12.5%)*	*Experts*

[a] From Oliveira 2018.[4]

"✓" = The guideline recommended (considering) the approach. "X" = The guideline recommended against the approach. "-" = The guideline judged the evidence insufficient to justify a recommendation on the approach. "" The guideline did not mention the approach.

Management: non-invasive, non-pharmacological

Recent guidelines consistently recommend non-invasive, non-pharmacological management as the preferred option for LBP (see Table 3).[26] As summarised in Box 1, guidelines consistently recommend that patients are provided with education about their condition and management options, that management includes addressing physical activity and/or exercise, and that manual therapy should only be used as an adjunct to other (active) evidence-based treatments.[10] Multidisciplinary forms of rehabilitation are recommended, in particular for chronic LBP where patients have not shown improvement following monodisciplinary management. The four guidelines that consider self-applied heat recommend its use.

Guidelines consistently recommend against the use of several potential therapies: orthotics, traction, most electrotherapies (Percutaneous electrical nerve stimulation (PENS), interferential therapy, therapeutic ultrasound), and kinesiotaping.

There is inconsistency in recommendations regarding the use of acupuncture: seven of ten guidelines recommend its use, two recommend against it, and one stated that there was insufficient evidence to recommend for or against it.

Table 3: Recommendations of clinical guidelines for management of LBP: non-invasive, non-pharmacological

Recommendation for management	AUS (NSW) 2016[a]	BEL 2017[a]	CAN 2015[a]	DEN 2017[a]	GER 2017[a]	UK (NICE) 2016[a]	UK (SIGN) 2019	USA (ACP) 2017[a]	USA (ACOEM) 2019	USA (VA/DoD) 2017	% agreement	Highest level of evidence cited
Avoiding bed rest	✓		✓	✓	✓				✓		5/5 (100%)	High
Using patient education – advise to maintain normal activities	✓	✓	✓	✓	✓	✓		✓		✓	8/8 (100%)	Moderate
(Acute LBP)	✓		✓	✓	✓			✓			*5/8 (62.5%)*	*Moderate*
(Any duration of symptoms)		✓	✓		✓	✓					*4/8 (50%)*	*Moderate*
Using patient education – reassurance		✓	✓	✓		✓		✓	✓	✓	7/7 (100%)	Moderate
Using exercise therapy	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	9/10 (90%)	Moderate
(Acute LBP)	*X*		*X*	✓	✓				✓	-	*3/9 (33.3%)*	*Moderate*
(Chronic LBP)	-		✓		✓		✓	✓	✓	✓	*6/9 (66.7%)*	*Moderate*
Using psychosocial therapy	✓	✓	✓			✓	✓	✓		✓	7/7 (100%)	Moderate
(Chronic LBP)		✓	✓			✓	✓	✓		✓	*6/7 (85.7%)*	*Moderate*
Using multidisciplinary rehabilitation	✓	✓	✓		✓	✓		✓		✓	7/7 (100%)	Moderate
(Chronic LBP)	✓	✓	✓		✓	✓		✓		✓	*7/7 (100%)*	*Moderate*
(Patients not recovered after monodisciplinary approach)		✓			✓					✓	*3/7 (42.9%)*	*Moderate*
Using spinal manipulation		✓	✓	✓	✓	✓		✓	✓	✓	8/8 (100%)	High
(Acute LBP)			✓	✓	✓			✓	✓	✓	*6/8 (75%)*	*Low*
(Chronic LBP)			*X*		✓			✓	✓	✓	*4/8 (50%)*	*Low*
Using massage	X	✓	-		✓	✓	✓	✓	✓	-	6/9 (66.7%)	High

Recommendation for management	AUS (NSW) 2016[a]	BEL 2017[a]	CAN 2015[a]	DEN 2017[a]	GER 2017[a]	UK (NICE) 2016[a]	UK (SIGN) 2019	USA (ACP) 2017[a]	USA (ACOEM) 2019	USA (VA/DoD) 2017	% agreement	Highest level of evidence cited
Using acupuncture	✓	-	✓	✓	X	X	✓	✓	✓	✓	7/10 (70%)	High
Orthotics	X	X	-		X	X			X	-	5/7 (71.4%) *(Against)*	Moderate *(Against)*
Traction	X	X	X		X	X			X	-	6/7 (85.7%) *(Against)*	High *(Against)*
Transcutaneous electrical nerve stimulation (TENS)	X	X	X		X	X	✓	X	✓	-	6/9 (66.7%) *(Against)* 2/9 (22.2%) *(For)*	Low *(Against)* Moderate *(For)*
Percutaneous electrical nerve stimulation (PENS)	X	X			X	X			X		5/5 (100%) *(Against)*	Moderate *(Against)*
Interferential therapy	X	X	-		X	X			-		4/6 (66.7%) *(Against)*	High *(Against)*
Ultrasound	X	X	X		X	X		X	-	-	6/8 (75%) *(Against)*	Low *(Against)*
Laser therapy	X	-	-		X		✓	✓	X		3/7 (42.9%) *(Against)* 2/7 (28.6%) *(For)*	High *(Against)* Moderate *(For)*
Using heat			✓		✓			✓	✓		4/4 (100%)	Moderate
Kinesiotaping					X			X	X		3/3 (100%) *(Against)*	Low *(Against)*
Promoting (early) return to work	✓	✓	✓			✓	✓				5/5 (100%)	High

[a] From Oliveira 2018 (where provided).[4]

"✓" = The guideline recommended (considering) the approach. "X" = The guideline recommended against the approach. "-" = The guideline judged the evidence insufficient to justify a recommendation on the approach. "" The guideline did not mention the approach.

Management: non-invasive, pharmacological

A recent review of guideline recommendations on the pharmacological management of non-specific LBP in primary care included eight LBP guidelines published in 2016-18.[26] The review found:

- "Guidelines are universally moving away from recommending pharmacotherapy, presenting the prescription of analgesics as an option that may be considered if this is required by the patient.
- Although national clinical practice guidelines for the management of LBP are based on the same body of scientific evidence, there are differences between these guidelines in terms of attitude towards pharmacotherapy, analgesics of first choice and recommendations for or against the prescription of specific pharmacological treatments.
- Although best available evidence suggests paracetamol is ineffective for LBP, four out of eight guidelines still recommend prescribing paracetamol for acute LBP. However, two of these guidelines immediately state that no short-term effect of this medication is to be expected. It is important to consider that the best available evidence (Cochrane review) is mainly based on one large RCT. In the other four guidelines, NSAIDs have become the first choice analgesics in LBP.
- The American guideline is the only guideline currently recommending skeletal muscle relaxants as one of two first-choice options for the treatment of LBP (together with NSAIDs); the choice between these drugs should be based on patient preferences and risk profile. Other guidelines either make no recommendations about muscle relaxants or advise against benzodiazepines; however, SMRs aren't widely available in many European countries.
- Most guidelines recognize only limited indications for the prescription of antidepressants and anticonvulsants in LBP.
- Opioids are considered by all guidelines as a last resort option in case all other pharmacological options have failed; however, prescriptions of these medications have been increasing over recent years." (p.146)[26]

These conclusions hold for the current review: among the three additional guidelines, one recommends the use of paracetamol,[31] one recommends against,[34] and one is silent on this topic.[33] Similar to the American College of Physicians' guideline, the two additional US guidelines also recommend the use of muscle relaxants.[31, 34]

Only three guidelines considered the use of herbal medicines. The Canadian guideline specified that three herbal medicines could be considered as treatment options for acute exacerbations of chronic LBP:[21] an aqueous extract of Harpagophytum procumbens, a combination of extract of Salix daphnoides and Salix purpurea, or a plaster of Capsicum frutescens. Two of the American guidelines concluded that there was insufficient evidence upon which to form a recommendation regarding the use of herbal medicines,[31, 34] aside from the use of Salix, which one recommended against (stating that generic aspirin is preferable).[31]

Table 4: Recommendations of clinical guidelines for management of LBP: non-invasive, pharmacological

Recommendation for management	AUS (NSW) 2016[a]	BEL 2017[a]	CAN 2015[a]	DEN 2017[a]	GER 2017[a]	UK (NICE) 2016[a]	UK (SIGN) 2019	USA (ACP) 2017[a]	USA (ACOEM) 2019	USA (VA/DoD) 2017	% agreement	Highest level of evidence cited
NSAIDs	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	10/10 (100%)	Moderate
Consideration of risk factors for NSAIDs	✓	✓	✓		✓	✓	✓		✓	✓	*8/10 (80%)*	*Experts*
Paracetamol	✓	X	✓	✓	X	X		X	✓	X	4/9 (44.4%) *(For)* 5/9 (56.6%) *(Against)*	High *(For)* High *(Against)*
(Acute LBP)	✓	X	✓	✓	X	X		X		-	*3/4 (75%)*	*High*
(Chronic LBP)		X	✓	X	X	X		X		X	*1/4 (25%)*	*High*
Opioids	X	✓	✓	X	✓	✓	✓	✓	X	X	6/10 (60%) *(For)* 4/10 (40%) *(Against)*	Moderate *(For)* High *(Against)*
(Acute LBP)	X	✓	✓	X	✓	✓		X		-	*4/6 (66.7%)*	*Moderate*
(Chronic LBP)		X	X	X	✓	X	✓	✓			*3/6 (33.3%)*	*Moderate*
Antidepressants		X	✓			X	X	✓	✓	✓	4/7 (57.1%) *(For)* 3/7 (42.9%) *(Against)*	Moderate *(For)* Moderate *(Against)*
(Chronic LBP)		X	✓			X	X	✓	✓	✓	*4/4 (100%)*	*Moderate*
Muscle relaxants		X	✓					✓	✓	✓	4/5 (80%)	Moderate
(Acute LBP)		X	X					✓	X	✓	*2/4 (50%)*	*Moderate*
(Chronic LBP)		X	✓					X	✓	✓	*3/4 (75%)*	
Antibiotics		X	X					-	-		2/4 (0%) *(Against)*	Moderate *(Against)*
Herbal medicines			✓						-	-	1/3 (33.3%)	NR

[a] From Oliveira 2018.[4]

"✓" = The guideline recommended (considering) the approach. "X" = The guideline recommended against the approach. "-" = The guideline judged the evidence insufficient to justify a recommendation on the approach. "" The guideline did not mention the approach.

Management: invasive

Among guidelines that considered invasive options for management of LBP, there were inconsistencies in recommendations regarding non-surgical options.

There are many different types of spinal injections performed for LBP, including facet joint injections of anaesthetic or steroid, medial branch blocks of local anaesthetic, intradiscal therapy using steroids or NSAIDs, prolotherapy, and trigger point injections of local anaesthetics and a steroid, or botulinum toxin.[5] Four of the five guidelines that considered spinal injections recommended against them.[5, 8, 17, 23] The German guideline included a blanket recommendation against all percutaneous procedures for non-specific LBP.[23] The UK and Belgian guidelines recommended against all spinal injections with the exception of radiofrequency denervation (treated separately, see next paragraph).[5, 8] The NSW model of care only considered corticosteroid spinal injections, and recommended against their use in the primary care setting.[17]

For radiofrequency denervation, two guidelines recommended it be considered "for people with chronic LBP with suspected facet joint pain when: non-surgical evidence-based multimodal management has not worked for them, and the main source of pain is thought to come from structures innervated by the medial branch nerve and they have moderate or severe levels of localised back pain (rated as 5 or more on a numeric rating scale (NRS 0- 10)) at the time of referral."[5, 8] The Canadian guideline found insufficient evidence to recommend for or against radiofrequency denervation. Three guidelines recommended that epidural steroid injections could be considered for sub-acute LBP in some cases.[5, 8, 21]

Most of the included guidelines focused on non-surgical management options. There were two that considered surgical options in some detail: the Belgian guideline, which was largely based on the UK (NICE) guideline.[5] Unsurprisingly, recommendations regarding surgical management were the same in the two guidelines. Both recommended against spinal fusion and disc replacement for LBP, and recommended that spinal decompression could be considered "for people with sciatica when non-surgical treatment has not improved pain or function and their radiological findings are consistent with sciatic symptoms."[5, 8]

Table 5: Recommendations of clinical guidelines for management of LBP: invasive, non-surgical and surgical

Recommendation for management	AUS (NSW) 2016[a]	BEL 2017[a]	CAN 2015[a]	DEN 2017[a]	GER 2017[a]	UK (NICE) 2016[a]	UK (SIGN) 2019	USA (ACP) 2017[a]	USA (ACOEM) 2019	USA (VA/DoD) 2017	% agreement	Highest level of evidence cited
Spinal injections[b]	X	X	-		X	X					4/5 (80%) *(Against)*	Moderate *(Against)*
Radiofrequency denervation (for chronic LBP)		✓	-		X	✓					2/4 (50%)	Moderate
Epidural steroid injections (for subacute LBP)		✓	✓		X	✓					3/4 (75%)	Moderate
Surgery		X	-		X	X					3/4 (75%) *(Against)*	Experts *(Against)*
Spinal decompression		✓				✓					2/2 (100%)	Low
Spinal fusion		X				X					2/2 (100%) *(Against)*	Low *(Against)*
Disc replacement		X				X					2/2 (100%) *(Against)*	Low *(Against)*

[a] From Oliveira 2018.[4]

[b] facet joint injections of anaesthetic or steroid, medial branch blocks of local anaesthetic, intradiscal therapy using steroids or NSAIDs, prolotherapy, and trigger point injections of local anaesthetics and a steroid, or botulinum toxin

"✓" = The guideline recommended (considering) the approach. "X" = The guideline recommended against the approach. "-" = The guideline judged the evidence insufficient to justify a recommendation on the approach. "" The guideline did not mention the approach.

3.2 Evidence from systematic reviews

The literature search identified 232 systematic reviews published since 2015 related to diagnosis or management of LBP, as well as guidelines and reviews of guidelines included in the previous section, and reviews of indicators included in section 3.4 (see Figure 1).

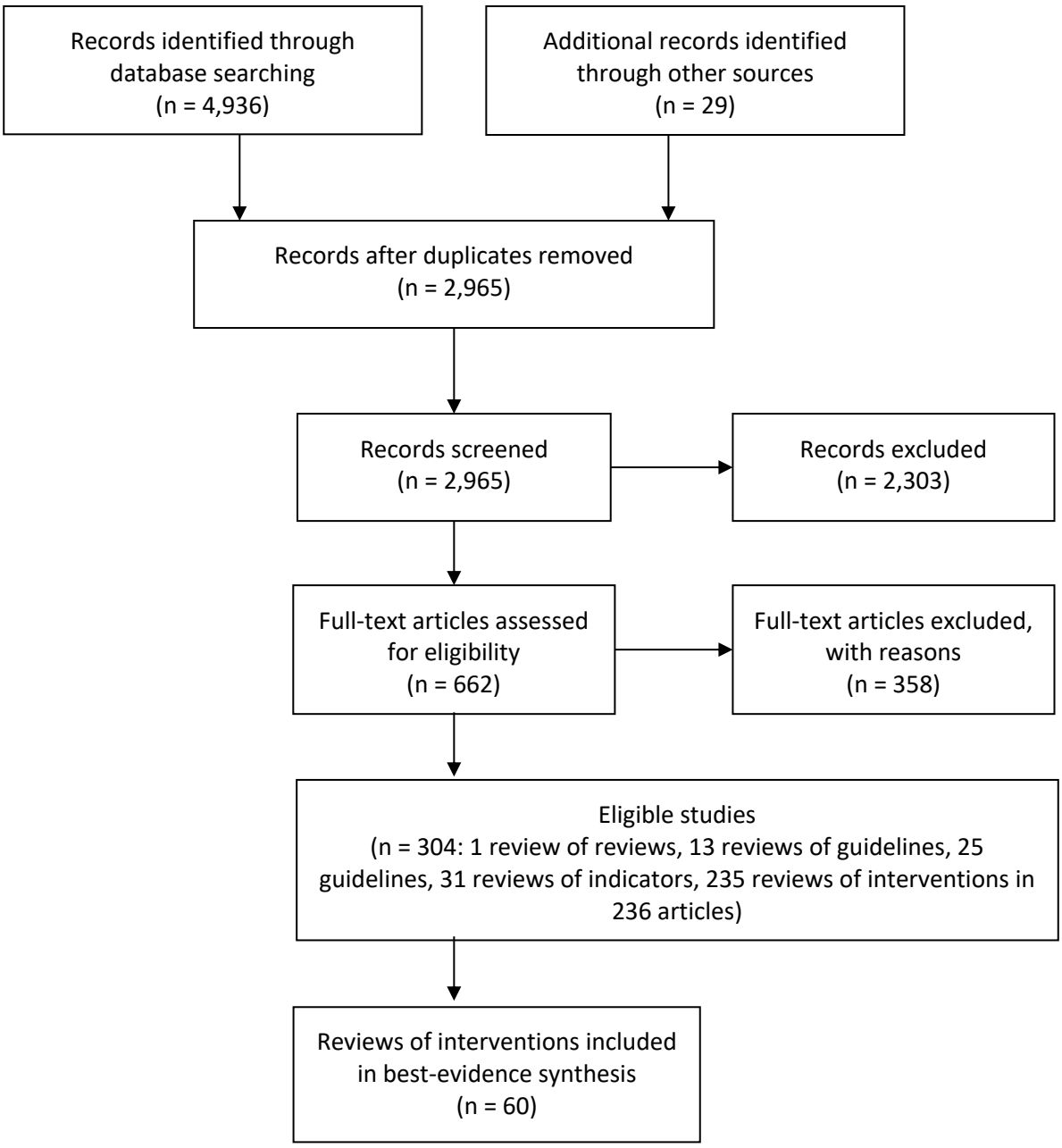

Figure 1: PRISMA flow diagram[1]

As this is a rapid review, we provide here a summary of the best available evidence on each diagnosis or management modality, presenting the most recent/highest quality systematic reviews, and provide evidence on broader categories of management types rather than focussing on comparisons of specific techniques. Note that many eligible systematic reviews were assessed as being of critically low-quality using the AMSTAR-2 tool (see Appendix B); in many cases this was due to a failure to include an explicit statement that the review methods were established prior to the conduct of the review, and to provide a list of excluded studies and justify the exclusions. We accessed supplementary material and protocols where publicly available, but it is possible that additional material may exist in unpublished form, and it is therefore unclear to what extent each critically low-quality appraisal reflects failings in reporting, or failings in the actual conduct of the reviews.

Diagnosis

Imaging

Guidelines consistently discourage imaging unless serious pathology is suspected or it is likely to change management, as it has not been shown to provide health benefits for LBP patients.[39] In addition to this, a recent systematic review found imaging in LBP may be associated with higher medical costs, increased healthcare utilization and more absence from work.[40]

A recent high-quality review focussing on MRI found insufficient high-quality evidence to recommend the use of MRI to identify patients with LBP or sciatica who respond better to particular interventions.[41]

Screening and stratification

Systematic reviews summarising the evidence base for screening and stratification tools were of low quality. Two examined the performance of commonly used screening tools, the STarT Back tool (SBST) and the Örebro Musculoskeletal Pain Screening Questionnaire (OMPSQ), and found that they perform poorly at assigning higher risk scores to individuals who develop chronic pain than to those who do not, but are better at predicting poor disability outcomes and prolonged absenteeism.[42, 43]

Guidelines commonly list “red flags” for underlying pathologies, which are recommended for use in guiding diagnosis and management.[27] However, there is an absence of evidence for their accuracy. A review of 13 red flags endorsed in a total of 16 guidelines published between 2000 and 2015 and 2 extra red flags not endorsed in any guideline, found that only 5 red flags had accuracy data from 2 or more studies, with only 2 (“history of malignancy” and “strong clinical suspicion”) considered to have acceptably high diagnostic accuracy for underlying malignancy.[28] Diagnostic clinical predication rules and clinical examination tests are similarly lacking in evidence of accuracy.[44, 45]

Table 6: Key systematic reviews to inform diagnosis (imaging)

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Lemmers 2019[40]	Imaging for LBP	LBP	-Oct 2017	N=14 (n=6 RCTs)	Critically low	Direct costs increase for patients undergoing X-ray (moderate-quality evidence). Early MRI may lead to an increase in costs (low-quality evidence). Performing MRI or imaging (MRI or CT) is associated with an increase in healthcare utilization (e.g., future injections, surgery, medication, etc.) (moderate-quality evidence). Performing X-ray or MRI is associated with an increase in healthcare utilization (low-quality evidence). No significant differences between X-ray or MRI groups compared with non-imaging groups on absence from work (moderate-quality evidence). However, significantly greater mean absence from work in the MRI groups in comparison with the non-imaging groups (low-quality evidence).
Steffens 2016[41]	Magnetic resonance imaging (MRI)	LBP/sciatica	-20 Jun 2015	N=8 RCTs	High	Review included studies which had used methods capable of identifying whether patients with a specific MRI finding had a different treatment effect than those without the MRI finding or with a different MRI finding. Although individual trials suggested that some MRI findings might be effect modifiers for specific interventions, none of these interactions were investigated in more than a single trial. As such, no recommendation for or against the use of MRI was made.

Table 7: Key systematic reviews to inform diagnosis (screening and stratification)

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Lheureux 2019[43]	STarT Back (SBST) and Örebro (OMPSQ) screening tools	LBP	1997-10 Oct 2017	N=28	Critically low	The OMPSQ best predicted a Pain NRS >= 3 at 3 months and at 6 months. The SBST and the OMPSQ are comparable to predict an Oswestry Disability Index >= 30% at 6 months. A single study showed no difference between the SBST and the OMPSQ to predict absenteeism >= 30 days at 6 months. The two questionnaires cannot be compared for ‘‘global recovery’’ outcomes.
Karran 2017[42]	Performance of screening instruments	Acute or subacute LBP	-Jun 2016	N=18	Critically low	SBST: performance for discriminating pain outcomes at follow-up was ‘non-informative’ and ‘acceptable’ for discriminating disability outcomes. OMPSQ: performance was ‘poor’ for discriminating pain outcomes, ‘acceptable’ for disability outcomes, and ‘excellent’ for absenteeism outcomes.
Verhagen 2017[28]	Diagnostic accuracy of red flags for malignancy	LBP	-Jul 2016	N=7	Critically low	Of 13 red flags endorsed in a total of 16 guidelines and 2 extra red flags not endorsed in any guideline, only 5 red flags had accuracy data from 2 or more studies, with only 2 (“history of malignancy” and “strong clinical suspicion”) considered to have acceptably high diagnostic accuracy for underlying malignancy.
Haskins 2015[44]	Diagnostic clinical prediction rules	LBP	-Jul 2013	N=15	Critically low	13 diagnostic CPRs for LBP have been derived. Only 1 tool for identifying lumbar spinal stenosis and 2 tools for identifying inflammatory back pain have undergone validation. Most diagnostic CPRs for LBP are in their initial development phase and cannot be recommended for use in clinical practice.
Hartvigsen 2015[45]	Clinical examination for prognosis	LBP	-Jun 2012	N=49	Critically low	Associations between clinical tests and outcomes (subsequent pain, disability, return to work, use of health care services or medication, or global improvement) inconsistent between studies. In more than one third of the tests, there was no evidence of the tests being associated with the outcome(s). Only two clinical tests demonstrated a consistent association with at least one of the outcomes: centralization and non-organic signs.

Management: non-invasive, non-pharmacological

Based on the evidence, guidelines consistently recommend non-invasive, non-pharmacological options as the first line of management of LBP.[10] Systematic review evidence broadly supported this approach. Outcomes measured vary, but most commonly included pain and/or function/disability measured using a number of common scales (Visual Analog Scale (pain intensity), Numerical Rating Scale (pain intensity), Oswestry disability questionnaire, Roland-Morris disability score, Quebec disability score) as well as a smaller number of reviews reporting on global recovery/improvement, mental health outcomes, quality of life, adverse events, and health service utilisation.

Education/self-management

There is some evidence for reassurance education in primary care, particularly when delivered by the primary care physician/GP.[46] One review summarized the evidence for care delivery by telephone, including delivery of advice, education, behaviour modification treatment, and ongoing support, and found that telephone-based interventions reduce pain and disability in patients with spinal pain compared to usual care, but telephone plus face-to-face interventions are no more effective than usual care or face-to-face interventions alone.[47]

Self-management interventions typically combine group education with exercise; a low-quality review found moderate-quality evidence that self-management programs have a moderate effect on pain intensity, and small to moderate effect on disability.[48] The “Back School” program is an example of a self-management intervention, with a combination of exercises and education, where lessons are given to groups of patients, supervised by a physical therapist or medical specialist. A high-quality review found only low to very low-quality evidence, so could draw no conclusions about the effectiveness of this type of intervention, although results of included studies tended to show no difference or only trivial differences in pain and disability.[49]

Education through mass media campaigns appears to be associated with positive effects on general public and health provider beliefs about LBP, but results for disability behaviour and health service utilisation are mixed.[50]

Exercise

A high-quality review conducted to inform the development of the American College of Physicians 2017 guideline found small to moderate effects on LBP and function associated with different types of exercise, including exercise overall, motor control exercise, tai chi, and yoga (see Table 9).[51] A more recent review and network meta-analysis of exercise interventions for non-specific chronic LBP found low-quality evidence that different forms of exercise were most effective in achieving specific outcomes.[52] The review found that pilates was the most effective treatment for pain, stabilisation/motor control and resistance training were the most effective treatments for physical function and resistance, and aerobic exercise training was the most effective treatment for mental health. The analysis also found that exercise training may also be more effective than therapist hands-on treatment. Physical activity may also be of benefit for older people with non-specific chronic LBP.[53]

Orthotics

No high-quality reviews were identified relating to the use of orthotics for the management of LBP. A recent low-quality review found that at best there was low-quality evidence for no significant difference in disability, pain, or quality of life associated with wearing unstable shoes.[54] Two other low-quality reviews found evidence from a small number of studies suggesting reductions in discomfort and improved quality of life associated with lumbar support,[55] and reductions in pain and disability associated with custom foot orthotics.[56]

Manual therapies

While there are high-quality reviews that summarise the evidence for different manual therapies, including spinal manipulation,[51, 57] massage,[51, 58] and muscle energy technique,[59] in general the quality of research relating to these types of interventions is poor, with small studies at high risk of bias, with mixed results and only isolated small positive effects.

Acupuncture

Recent reviews have found moderate-quality evidence for significant improvements in pain reduction, at least in the short term, but less evidence for improvements in function.[51, 60]

Electrotherapies

No high-quality reviews were identified relating to the use of electrotherapies for the management of LBP. Reviews of the evidence for transcutaneous electrical nerve stimulation (TENS) found that there was no difference in pain relief or functional disability outcomes compared with control treatment for acute[61] or chronic[62] LBP. Another review found no high-quality evidence to suggest that therapeutic ultrasound improves pain or quality of life for patients with chronic non-specific LBP.[63] There was moderate-quality evidence to support a clinically important benefit in low level laser therapy in the short term, for some participants (with shorter duration of back pain).[64]

Psychological therapies

There is some evidence to suggest small reductions in pain associated with psychological therapies such as Cognitive Behavioural Therapy added to physical therapy/exercise in management of chronic LBP.[51, 65, 66]

Combined physical and psychological therapies

Multidisciplinary biopsychosocial rehabilitation (MBR) is an integrated intervention that involves at least 2 of the following components: physical, psychological, social, and occupational, and is delivered by health professionals from at least two different backgrounds. Several systematic reviews investigated the evidence for this model of care and found that MBR was an effective model of care for treating chronic LBP.[51, 67-71] Recent high-quality reviews found low- to moderate-quality evidence that MBR was associated with moderate improvements in pain and small improvements in functional disability.[51, 69] An additional high-quality review of 41 RCTs found similar results, but cautioned that the improvements in pain are only observed in the short- and medium-term.[67, 68]

Table 8: Key systematic reviews to inform non-invasive, non-pharmacological management: self-management/education

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Traeger 2015[46]	Patient education in primary care	Acute, sub-acute LBP	-Jun 2014	N=14 RCTs and non-RCTs	Critically low	There is moderate- to high-quality evidence that patient education in primary care can provide long-term reassurance for patients with acute or subacute LBP. Interventions delivered by physicians were significantly more reassuring than those delivered by other primary care practitioners (eg, physiotherapist or nurse).
O'Brien 2018[47]	Telephone-based	Acute, chronic LBP	-May 2018	RCTs, and non-r=RCTs. N=2 acute, n=4 chronic	High	Moderately confident that telephone-based interventions reduce pain and disability in patients with spinal pain compared to usual care, but telephone plus face-to-face interventions are no more effective than usual care or face-to-face interventions alone.
Suman 2020[50]	Mass media campaigns	LBP	-17 Dec 2019	N=18	Low	All studies evaluating LBP beliefs in the general public detected positive effects. Health care provider beliefs also consistently improved. Results for behavioural outcomes (disability behaviour and health utilization) were mixed and appeared dependent on campaign characteristics and local context.
Du 2017[48]	Self-management programs (SMP)	Chronic LBP	-Jun 2015	N=13 RCTs	Critically low	There is moderate-quality evidence that SMP have a moderate effect on pain intensity, and small to moderate effect on disability.
Parreira 2017[49]	Back schools	Chronic non-specific LBP	-15 Nov 2016	N=30 RCTs and quasi-RCTs	High	Due to the low- to very low-quality of the evidence for all treatment comparisons, outcomes, and follow-up periods investigated, it is uncertain if Back School is effective for chronic LBP. Although the quality of the evidence was mostly very low, the results showed no difference or a trivial effect in favour of Back School.

Table 9: Key systematic reviews to inform non-invasive, non-pharmacological management: Exercise

Review	Topic	Acute, sub-acute, chronic	Search dates	Included trials	Review quality	Conclusions
Owen 2019[52]	Exercise training	Non-specific chronic LBP	-May 2019	N=89	Low	Low-quality evidence that pilates (for pain), stabilisation/motor control and resistance training (physical function and resistance), and aerobic exercise training (mental health) are the most effective treatments for each outcome. Exercise training may also be more effective than therapist hands-on treatment.
Chou 2017[51]	9 nonpharmacologic options inc. exercise, mind–body interventions (yoga, tai chi)	Acute, sub-acute, chronic non-radicular LBP	Jan 2008-Feb 2016	N=11 systematic reviews, n=99 RCTs	High	*All evidence is low strength unless specified* Chronic LBP: effect sizes *Exercise (vs. usual care):* Pain: Small (moderate strength) Function: Small (moderate strength) *Motor control (vs. minimal intervention):* Pain: Moderate; Function: Small *Tai chi vs. wait list or no tai chi:* Pain: Moderate; Function: Small *Yoga vs. usual care:* Pain: Moderate; Function: Moderate *Yoga vs. education:* Pain: Small/none; Function: Small/none Acute LBP *Exercise (vs. usual care):* Pain: No effect; Function: No effect
Vadala 2020[53]	Physical activity (in older people)	Non-specific chronic LBP	-Mar 2019	N=12 (n=7 RCT)	Critically low	Low-quality evidence: post-treatment data showed a trend in the improvement for disability and pain.
Arnold 2019[72]	Early (within 30 days) physical therapy (PT)	Acute LBP	-May 2018	N=11	Critically low	Five out of 6 studies that compared early PT to delayed PT found that early PT reduces future HSU. Random effects meta-analysis indicated a significant reduction in opioid use, spine injection, and spine surgery. Five studies compared early PT to usual care and reported mixed results.

Review	Topic	Acute, sub-acute, chronic	Search dates	Included trials	Review quality	Conclusions
Shi 2018[73]	Aquatic exercise	LBP	-Nov 2016	N=8 RCTs	Critically low	Results showed a relief of pain and physical function after aquatic exercise. However, there was no significant effectiveness with regard to general mental health in aquatic group.
Wieland 2017[74]	Yoga	Chronic non-specific LBP	-11 May 2016	N=12	High[75]	Yoga compared to non-exercise controls results in small to moderate improvements in back-related function at three and six months (low to moderate-quality evidence). Yoga may also be slightly more effective for pain at three and six months, however the effect size did not meet predefined levels of minimum clinical importance. It is uncertain whether there is any difference between yoga and other exercise for back-related function or pain, or whether yoga added to exercise is more effective than exercise alone.
Saragiotto 2016[76]	Motor control exercise (MCE)	Chronic	-Apr 2015	N=29 RCTs	Low[75]/High[77]	MCE has a clinically important effect compared with a minimal intervention (very low- to low-quality evidence). MCE has a clinically important effect compared with exercise plus EPA (very low- to low-quality evidence). MCE provides similar outcomes to manual therapies (moderate- to high-quality evidence) and provides similar outcomes to other forms of exercises (low- to moderate-quality evidence).

Table 10: Key systematic reviews to inform non-invasive, non-pharmacological management: Orthotics

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Bai 2019[54]	Unstable shoes	Chronic LBP	-Jun 2019	N=5	Critically low	No significant difference in disability, pain or quality of life (very low- to low-quality evidence).
Dissanguan 2018[55]	Lumbar support	LBP	-Dec 2017	N=8 (n=6 RCTs)	Critically low	Reduced discomfort and improved quality of life associated with the use of lumbar support.
Hogan 2016[56]	Custom foot orthotics	Chronic LBP	2005-Nov 2014	N=3 (n=1 RCT)	Critically low	Significant reductions in patient-reported pain and disability (moderate-quality evidence).

Table 11: Key systematic reviews to inform non-invasive, non-pharmacological management: Manual therapies

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Rubenstein 2019[57]	Spinal manipulative therapy (SMT)	Chronic LBP	-4 May 2018	N=47 RCTs	High	SMT has similar effects to other recommended therapies for short term pain relief and a small, clinically better improvement in function (moderate-quality evidence). Compared with non-recommended therapies SMT results in small, not clinically better effects for short term pain relief and small to moderate clinically better improvement in function (high-quality evidence). In general, results were similar for the intermediate and long term outcomes as were the effects of SMT as an adjuvant therapy.
Chou 2017[51]	9 nonpharmacologic options inc. spinal manipulation, massage	Acute, sub-acute, chronic non-radicular LBP	Jan 2008-Feb 2016	N=11 systematic reviews, n=99 RCTs	High	*All evidence is low strength unless specified* Chronic LBP: effect sizes *Spinal manipulation vs. sham:* Pain: No effect; Function: Unable to estimate *Spinal manipulation vs. inert:* Pain: Small effect *Massage vs. usual care:* Pain: No effect; Function: Unable to estimate Acute LBP *Spinal manipulation vs. sham:* Pain: Unable to estimate; Function: Small *Spinal manipulation vs. inert:* Pain/Function: No effect
Furlan 2015[58]	Massage	Acute, subacute, chronic LBP	-Aug 2014	N=25	High[78, 79]	Improvements in pain outcomes with massage only for short-term follow-up. Functional improvement was observed in participants with sub-acute and chronic LBP when compared with inactive controls, but only for short-term follow-up. (Low- to very low-quality evidence)
Franke 2015[59]	Muscle energy technique (MET)	Non-specific LBP	-May 2014	N=12 RCTs	High[78]	The quality of research related to testing the effectiveness of MET is poor. Studies are generally small and at high risk of bias due to methodological deficiencies. Studies conducted to date generally provide low-quality evidence that MET is not effective for patients with LBP.

Table 12: Key systematic reviews to inform non-invasive, non-pharmacological management: Acupuncture

Review	Topic	Acute, sub-acute, chronic	Search dates	Included trials	Review quality	Conclusions
Xiang 2020[60]	Acupuncture	Nonspecific LBP	-Dec 2016	N=14	Low	Statistically significant differences in pain reduction between acupuncture and sham or placebo therapy immediately after acupuncture treatment, but there were no differences in function. Significant differences in pain reduction at follow-up, but not in function (moderate-quality evidence).
Chou 2017[51]	9 nonpharmacologic options: acupuncture	Acute, sub-acute, chronic non-radicular LBP	Jan 2008-Feb 2016	N=11 systematic reviews, n=99 RCTs	High	*All evidence is low strength unless specified* Chronic LBP: effect sizes *Acupuncture vs. sham:* Pain: Moderate; Function: No effect *Acupuncture vs. none:* Pain: Moderate (moderate strength) Function: Moderate (moderate strength) Acute LBP *Acupuncture vs. sham:* Pain: Small; Function: No effect

Table 13: Key systematic reviews to inform non-invasive, non-pharmacological management: Electrotherapies

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Binny 2019[61]	Transcutaneous Electrical Nerve Stimulation (TENS)	Acute LBP	-May 2018	N=3	Critically low	One low-quality trial provides low-quality evidence that ~30 min treatment with TENS in an emergency-care setting provides clinically worthwhile pain relief for moderate to severe acute LBP in the immediate term compared with sham TENS. Two other studies which administered a course of TENS over 4–5 weeks, in more usual settings provide inconclusive evidence.
Wu 2018[62]	TENS	Chronic back pain	-Jun 2014	N=12	Critically low	The efficacy of TENS was similar to that of control treatment for providing pain relief. Other types of nerve stimulation therapies (NSTs) were more effective than TENS in providing pain relief. TENS was more effective than control treatment in improving functional disability only in patients with follow-up of less than 6 weeks. There was no difference in functional disability outcomes between TENS and other NSTs.
Noori 2019[63]	Ultrasound	Chronic non-specific LBP	-2018	N=6 RCTs	Critically low	Only three of six studies found significant improvement at the end of treatment in only one of several pain scales when therapeutic ultrasound was compared with placebo or exercise only. Sham (placebo) ultrasound also provided significant improvement in pain intensity. There is no high-quality evidence that therapeutic ultrasound improves pain or quality of life in patients with CNLBP.
Glazov 2016[64]	Low level laser therapy	Chronic non-specific LBP	-Aug 2014	N=15	Low[77]	A clinically important benefit in low level laser therapy for CNLBP in the short term, which was only seen following higher laser dose interventions and in participants with a shorter duration of back pain (moderate-quality evidence).

Table 14: Key systematic reviews to inform non-invasive, non-pharmacological management: Psychological therapies

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Zhang 2019[66]	Group-based physiotherapy-led behavioral psychological interventions (GPBPIs)	Chronic LBP	-Feb 2018	N=13	Critically low	Long-term follow-up evaluations (≥12 mos) showed large and significant effect sizes. Sub-group analysis indicated that GPBPIs group had greater short-, intermediate-, and long-term pain reduction than wait list or usual care. Compared with other active treatments, GPBPIs showed a small but significant long-term pain reduction in patients with chronic LBP.
Hajihasani 2019[65]	Cognitive Behavioral Therapy (CBT)	Chronic LBP	-Jan 2018	N=10	Low[77]	Although CBT + physical therapy (PT) was found to be superior to PT for pain, disability, quality of life, and functional capacity variables in some of the included studies, no extra benefit from CBT was documented in other investigations. The included studies also failed to show any advantage of CBT + PT over PT in reducing depression, and PT was even found to be superior to CBT + PT in one high-quality study.
Chou 2017[51]	9 nonpharmacologic options inc. psychological therapies	Acute, sub-acute, chronic non-radicular LBP	Jan 2008-Feb 2016	N=11 systematic reviews, n=99 RCTs	High	*All evidence is low strength unless specified* Chronic LBP: effect sizes *Operant therapy vs. wait list:* Pain: Small; Function: None *Cognitive-behavioral therapy vs. wait list:* Pain: Moderate; Function: No effect

Table 15: Key systematic reviews to inform non-invasive, non-pharmacological management: Combined physical and psychological therapies

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Salathe 2018[70]	Multidisciplinary biopsychosocial rehabilitation	Chronic non-specific LBP	Jan 2010-Jan 2017	N=13 RCTs, prospective/ retrospective studies, cost analyses	Critically low	MBR is an effective treatment for nonspecific LBP (moderate to large effect sizes/p values in pain reduction, reduction in functional disability), but there is room for improvement in cost-effectiveness and impact on sick leave, where the evidence was less compelling.
Marin 2017[69]	Multidisciplinary biopsychosocial rehabilitation	Sub-acute LBP	-13 Jul 2016	N=9 RCTs	High	People with subacute LBP who receive MBR will do better than if they receive usual care, but it is not clear whether they do better than people who receive some other type of treatment. Mainly low to very low-quality evidence.
Chou 2017[51]	9 nonpharmacologic options inc. multidisciplinary rehabilitation	Acute, sub-acute, chronic non-radicular LBP	Jan 2008-Feb 2016	N=11 systematic reviews, n=99 RCTs	High	*All evidence is low strength unless specified* *Multidisciplinary rehabilitation vs. none* Pain: Moderate effect; Function: Small effect *Multidisciplinary rehabilitation vs. usual care:* Pain: Moderate/small effect (moderate strength) Function: Small effect (moderate strength)
Van Erp 2019[71]	Multidisciplinary biopsychosocial rehabilitation	Chronic non-specific LBP	-1 Dec 2015	N=7 RCTs	Low[77]	MBR interventions more effective than education/advice and as effective as physical activity interventions. MBR interventions with a clear focus on psychosocial factors (understanding pain, unhelpful thoughts, coping styles, and goal setting) seem most promising.
Kamper 2015[68] Gianola 2018[67]	Multidisciplinary biopsychosocial rehabilitation	Chronic LBP	-Feb 2014	N=41 RCTs	High	MBR interventions more effective than usual care (moderate-quality evidence) and physical treatments (low-quality evidence) in decreasing pain and disability. Highly recommended for reducing pain in the short- and medium-term but cannot be recommended for long-term pain reduction since the benefit decays rapidly.

Management: non-invasive, pharmacological

A recent high-quality review of systemic pharmacologic therapies for LBP[80] was used as the basis for the recommendations on pharmacological management in the American College of Physicians' (ACP) 2017 guideline.[6] A more recent review of recommendations on the pharmacological management of non-specific LBP in primary care[26] identified reviews that represented the best available evidence (most recent review of at least moderate quality) available for anti-depressant use,[80] opioids,[81] NSAIDs,[82] paracetamol,[83] anticonvulsants,[84] and muscle relaxants as at May 2018.[85] These reviews are summarised in Tables 16-19, along with a small number of more recent relevant reviews.

NSAIDs

The results from the most recent high-quality review of the evidence including 32 RCTs[86] were similar to the review on which the ACP guideline was based[82]: there is moderate/high-quality evidence for small short-term reductions in pain and disability, but review authors express caution in that improvements are small and probably not clinically relevant.

Paracetamol

No relevant review more recent than that used as the basis for the ACP guideline[83] was identified; that review found high-quality evidence for no difference between paracetamol and placebo in pain or disability, quality of life, function, global impression of recovery, or sleep quality.

Opioids

The most recent high-quality review found very low to low-quality evidence that opioids can provide clinically relevant pain relief and reduction of disability, and suggests that opioids remain a treatment option for the long-term management of some carefully selected and monitored patients with CLBP, if the drug can induce a clinically relevant improvement of pain and/or function with an acceptable tolerability and safety.[87] These results and conclusions are similar to the previous best available evidence used to inform the ACP guideline.[81]

Anticonvulsants

The most recent review found high-quality evidence that anti-convulsants were not effective to reduce pain or disability in LBP or lumbar radicular pain, and were associated with an increased risk of adverse events.[88] This does not change the conclusions from the earlier review used as the basis for the ACP guideline.[84]

Muscle relaxants

No relevant review more recent than that used as the basis for the ACP guideline[85] was identified; that review found high-quality evidence that muscle relaxants provide short-term clinically significant pain relief for acute LBP.

Antidepressants

No relevant review more recent than that used as the basis for the ACP guideline[80] was identified; that review found moderate-quality evidence for small improvements in pain and function associated with duloxetine, but also moderate-quality evidence for no effect of tricyclic antidepressants or SSRIs.

Table 16: Key systematic reviews to inform non-invasive, pharmacological management: NSAIDs

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Chou 2017[80]	Systemic pharmacologic therapies including NSAIDs	Acute or chronic nonradicular or radicular LBP	Jan 2007-Nov 2016	N=46 RCTs	High[89]	New evidence found that nonsteroidal anti-inflammatory drugs had smaller benefits for chronic LBP than previously observed. For effective interventions, pain relief was small to moderate and generally short-term; improvements in function were generally smaller.
Van der Gaag 2020[86]	NSAIDs	Acute	-7 Jan 2020	N=32 RCTs	High	NSAIDs slightly more effective in short-term (≤ 3 weeks) reduction of pain intensity than placebo (moderate-quality evidence). Slightly more effective for short-term improvement in disability (high-quality evidence). Magnitude of effects is small and probably not clinically relevant. Slightly more effective for short-term global improvement (low-quality evidence), but substantial heterogeneity. No clear difference in adverse events when using NSAIDs (very low-quality evidence). No clear difference between the proportion of participants who could return to work after seven days (very low-quality evidence).
Rasmussen-Barr 2017[90]	NSAIDs	Sciatica	24 Jun 2015	N=10	High	Pooled mean difference showed comparable pain reduction in the NSAIDs and placebo groups (high heterogeneity, very low-quality evidence). NSAIDs are more effective than placebo regarding global improvement (low-quality evidence). NSAIDs are no more effective than placebo on disability (very low-quality evidence). Risk for adverse effects is higher in the NSAID group than for placebo (low-quality evidence).
Machado 2017[82]	NSAIDs	Acute or chronic spinal pain		N=35 RCTs	High (best available evidence for NSAIDs as at May 2018[26])	NSAIDs reduced pain and disability, but provided clinically unimportant effects over placebo. Six participants needed to be treated with NSAIDs, rather than placebo, for one additional participant to achieve clinically important pain reduction. NSAIDs increased the risk of gastrointestinal reactions.

Table 17: Key systematic reviews to inform non-invasive, pharmacological management: acetaminophen (paracetamol)

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Chou 2017[80]	Systemic pharmacologic therapies including acetaminophen (paracetamol)	Acute or chronic nonradicular or radicular LBP	Jan 2007-Nov 2016	N=46 RCTs	High[89]	New evidence found that acetaminophen was ineffective for acute LBP.
Saragiotto 2016[83]	Paracetamol	Non-specific LBP (acute)		N=2	High (best available evidence for paracetamol as at May 2018[26])	For acute LBP, no difference in pain or disability between paracetamol and placebo at 1 week, 2 weeks, 4 weeks, and 12 weeks (high-quality evidence). Paracetamol has no effect on quality of life, function, global impression of recovery, and sleep quality for all included time periods (high-quality evidence). No significant differences between paracetamol and placebo for adverse events, patient adherence, or use of rescue medication. No trials were identified evaluating patients with subacute or chronic LBP.

Table 18: Key systematic reviews to inform non-invasive, pharmacological management: opioids

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Chou 2017[80]	Systemic pharmacologic therapies including opioids, tramadol and tapentadol	Acute or chronic nonradicular or radicular LBP	Jan 2007-Nov 2016	N=46 RCTs	High[89]	For opioids, evidence remains limited to short-term trials showing modest effects for chronic LBP; trials were not designed to assess serious harms. For effective interventions, pain relief was small to moderate and generally short-term; improvements in function were generally smaller.
Petzke 2020[87]	Opioids	Chronic LBP	Oct 2013-May 2019	N=21 RCTs	High	Opioids provided no clinically relevant pain relief, but a reduction of disability compared to placebo in studies with a parallel and cross-over design (very low to low-quality evidence). There were no clinically relevant harms with regard to the drop out rate due to adverse and serious adverse events by opioids compared to placebo in these studies. Opioids provided a clinically relevant pain relief, but not a clinically relevant reduction of disability compared to placebo in studies with an enriched enrolment randomized withdrawal design (very low to low-quality evidence). There were also no clinically relevant harms with regard to the drop out rate due to adverse and serious adverse events by opioids compared to placebo in these studies.
Abdel Shaheed 2016[81]	Opioids	Chronic back pain	-Sep 2015	N=20 RCTs	Critically low (best available evidence for opioids as at May 2018[26])	There was moderate-quality evidence that opioid analgesics reduce pain in the short term, however clinically important pain relief was not observed within the dose range evaluated (40.0-240.0-mg morphine equivalents per day).

Table 19: Key systematic reviews to inform non-invasive, pharmacological management: other

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Chou 2017[80]	Systemic pharmacologic therapies including antidepressants, skeletal muscle relaxants, benzodiazepines, corticosteroids, and antiseizure	Acute or chronic nonradicular or radicular LBP	Jan 2007-Nov 2016	N=46 RCTs	High[89] (best available evidence for anti-depressants as at May 2018[26])	New evidence found that benzodiazepines were ineffective for radiculopathy. Skeletal muscle relaxants are effective for short-term pain relief in acute LBP but caused sedation. Systemic corticosteroids do not seem to be effective. For effective interventions, pain relief was small to moderate and generally short-term; improvements in function were generally smaller. Evidence is insufficient to determine the effects of antiseizure medications.
Enke 2018[88]	Anticonvulsants (topiramate, gabapentin (GB) or pregabalin (PG))	Nonspecific LBP, sciatica or neurogenic claudication of any duration	-Dec 2017	N=9 RCTs	Low	Anti-convulsants not effective to reduce pain or disability in LBP or lumbar radicular pain; e.g., no effect of GB vs. placebo on chronic LBP in the short term or for lumbar radicular pain in the immediate term (high-quality evidence). The lack of efficacy is accompanied by increased risk of adverse events from use of GB, for which the level of evidence is high.
Shantanna 2017[84]	Anticonvulsants	CLBP of 3 months or more	-20 Dec 2016	N=8	Low (best available evidence for anticonvulsants as at May 2018[26])	GB compared with placebo showed minimal improvement of pain. PG compared with other types of analgesic medication showed greater improvement in the other analgesic group. Studies using PG as an adjuvant were not pooled due to heterogeneity, but the largest of them showed no benefit of adding PG to tapentadol. No deaths or hospitalizations reported. The following adverse events were more commonly reported with GB than placebo: dizziness; fatigue; difficulties with mentation; and visual disturbances. Number needed to harm with 95% CI for dizziness, fatigue, difficulties with mentation, and visual disturbances were 7, 8, 6, and 6 respectively. GRADE evidence quality very low for dizziness and fatigue, low for difficulties with mentation, and moderate for visual disturbances. Functional and emotional improvements were reported by few studies and were not significant.

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Abdel Shaheed 2017[85]	Muscle relaxants	LBP	-Oct 2015	N=15	Critically low (best available evidence for as at muscle relaxants May 2018[26])	Muscle relaxants provide clinically significant pain relief in the short term for acute LBP (high-quality evidence). There was no information on long-term outcomes. The median adverse event rate in clinical trials for muscle relaxants was similar to placebo. There is no evidence for the efficacy of benzodiazepines in LBP. For chronic LBP, the efficacy of muscle relaxants is largely unknown. Prolonged use of these medicines in LBP cannot be guided by trial evidence.

Management: invasive, non-surgical

Spinal injections

A recent high-quality review of 25 RCTs found that epidural corticosteroid injections were probably slightly more effective than placebo in the short term at reducing leg pain and disability in patients with lumbosacral radicular pain, although treatment effects were small and potentially not clinically important.[91] A previous high-quality review which included 78 RCTs relating to epidural injections for LBP found similar results for radiculopathy, including that there was no effect on long-term risk of surgery.[92] The same review found limited evidence suggesting that epidural corticosteroid injections are not effective for spinal stenosis or nonradicular back pain. An additional 13 RCTs relating to facet joint injections were included, and provided limited evidence suggesting these are not effective for presumed facet joint pain.

Radiofrequency denervation

A recent review including 15 RCTs found that radiofrequency neurotomy was associated with significantly greater improvement in disability, pain, and quality of life compared with controls among patients with chronic lumbar/sacroiliac joint pain.[93] The review noted however that there was significant heterogeneity in the included evidence, and was itself rated as of critically low-quality due to a lack of a priori design and list of excluded studies with reasons.

Adhesiolysis

Two low-quality reviews found evidence for the effectiveness of percutaneous adhesiolysis in managing central lumber spinal stenosis[94] and chronic refactory low back and lower extremity pain.[95]

Table 20: Key systematic reviews to inform invasive, non-surgical management

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Oliveira 2020[91]	Epidural corticosteroid injections	Lumbosacral radicular pain	-25 Sep 2019	N=25	High	Epidural corticosteroid injections were probably slightly more effective compared to placebo in reducing leg pain at short-term follow-up (moderate-quality evidence). For disability, epidural corticosteroid injections were probably slightly more effective compared to placebo in reducing disability at short-term follow-up (moderate-quality evidence). The treatment effects are small, however, and may not be considered clinically important by patients and clinicians (i.e. MD lower than 10%).
Chou 2015[92]	Epidural, facet joint, and sacroiliac corticosteroid injections	LBP (lumbosacral radiculopathy, spinal stenosis, nonradicular back pain, or chronic postsurgical back pain)	-Oct 2014	N=92 RCTs (78 epidural injections, 13 facet joint injections, 1 sacroiliac joint injections.	High	Epidural corticosteroid injections for radiculopathy were associated with immediate improvements in pain and might be associated with immediate improvements in function, but benefits were small and not sustained, and there was no effect on long-term risk of surgery. Limited evidence suggested that epidural corticosteroid injections are not effective for spinal stenosis or nonradicular back pain and that facet joint corticosteroid injections are not effective for presumed facet joint pain. There was insufficient evidence to evaluate effectiveness of sacroiliac joint corticosteroid injections.
Chen 2019[93]	Radiofrequency neurotomy	Chronic lumbar and sacroiliac joint pain	-Mar 2019	N=15 RCTs	Critically low	Significantly greater improvement in ODI scores, pain scores and QoL measured by EQ-5D for RF neurotomy compared with controls; however, significant heterogeneity. Subgroup analyses: RF neurotomy significantly greater improvement in ODI scores compared with sham treatment. RF significantly greater improvement in pain scores compared sham treatment or medical treatment. For pain in the sacroiliac joint and in lumbar facet joints, RF neurotomy achieved a significantly greater improvement in ODI score and pain scores. The ODI score and pain score were improved after 2 months of follow up in the analyses stratified by follow-up duration.

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Manchikanti 2019[94]	Percutaneous adhesiolysis	Chronic LBP secondary to lumbar central spinal stenosis	1966-Jun 2019	N=2 RCTs and 4 observational studies	Low	The results showed Level II evidence for short-term and long-term improvement in pain and function with application of percutaneous adhesiolysis in managing central lumbar spinal stenosis.
Helm 2016[95]	Percutaneous and endoscopic adhesiolysis	Chronic refractory low back and lower extremity pain	1966-Sep 2015	Percutaneous: N=7 RCTs, 3 observational. Endoscopy: N=1 RCT, 3 observational.	Critically low	Based upon 7 randomized controlled trials showing efficacy, with no negative trials, there is Level I or strong evidence of the efficacy of percutaneous adhesiolysis in the treatment of chronic refractory low back and lower extremity pain. Based upon one high-quality randomized controlled trial, there is Level II to III evidence supporting the use of spinal endoscopy in treating chronic refractory low back and lower extremity pain.

Management: surgical

A low-quality review of 24 RCTs published in 2016 found that considered together, surgical management techniques for sciatica were associated with better outcomes in the short term for disc herniation, and for spondylolisthesis and spinal stenosis at short and long term.[96] No analysis of the effectiveness of individual techniques was conducted, however (including spinal decompression, fusion, and discectomy).

Spinal decompression

No recent reviews comparing spinal decompression with usual care or other management options were identified. The NICE recommendation that spinal decompression be considered for people with sciatica when non-surgical treatment has not improved pain or function and their radiological findings are consistent with sciatic symptoms is based on a review of evidence from nine RCTs and four cohort studies, all of low to very low quality.[5]

We did not review the comparative effectiveness of methods for discectomy. The NICE guideline notes there is controversy surrounding the choice of methods, and suggests that this be determined by the individual surgeon and by clinical appropriateness.[5]

Spinal fusion

A high-quality Cochrane review found no significant differences in pain relief or disability reduction for fusion in addition to decompression surgery, compared with decompression alone – which was associated with significantly less perioperative blood loss, and required shorter operations.[97]

A review of systematic reviews of lumbar spine fusion published in 2018 included 60 reviews published between 2005 and 2017, of which 33 compared fusion to non-operative care for LBP and/or degenerative spine conditions.[98] Three of the included reviews were moderate quality; the remainder were assessed as being of low to critically low quality. Most included the same set of four trials. The most recent included review[99] (of critically low quality) included n=6 relevant RCTs (n=609 participants), and found that lumbar fusion was not superior to an intensive, structured exercise and CBT program at reducing pain at 1 year or disability at 1-2 years. Another critically low-quality review[100] included an additional favourable trial in their meta-analysis, and also reported no benefit of fusion in reducing disability. The most recent included review of moderate quality was published in 2009, and therefore was not included in the current search. That review also concluded that there was ‘fair’ evidence for no benefit of fusion.

Disc replacement

One review of critically low quality found evidence from a mixed-treatment comparison for a small difference favouring total disc replacement (TDR) over exercise and cognitive behavioural therapy (CBT), although the review included only one trial that compared TDR and exercise/CBT directly.[99]

The NICE recommendation that disc replacement surgery should not be offered to people with LBP is based on a review of evidence from five RCTs and two cohort studies, all of low to very low quality.[5]

Table 21: Key systematic reviews to inform surgical management

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
Fernandez 2016[96]	Surgery: microdiscectomy, open discectomy fluoroscopic-guided percutaneous disc decompression for disc herniation; decompressive laminectomy, posterior-lateral fusion for spondylolisthesis; partial or total laminectomy, medial facetectomy, discectomy, osteophyte removal, hypertrophic ligament removal or fusion for spinal stenosis.	Sciatica	-15 May 2013	N=12	Low	In the short term, surgery provided better outcomes than physical activity for disc herniation: disability, leg pain and back pain; for spondylolisthesis: disability, leg pain, and back pain and spinal stenosis: disability, leg pain and back pain. Long-term and greater than 2-year post-randomisation results favoured surgery for spondylolisthesis and stenosis, although the size of the effects reduced with time. For disc herniation, no significant effect was shown for leg and back pain comparing surgery to physical activity.
Machado 2016[97]	Surgery (decompression surgery, interspinous process spacer devices)	Lumbar spinal stenosis	-16 Jun 2016	N=24 RCTs	High	For the effects of fusion in addition to decompression surgery, no significant differences in pain relief at long-term, or in disability reduction in the long-term. Decompression alone had significantly less perioperative blood loss and required shorter operations. For interspinous process spacer devices compared with conventional bony decompression, similar reductions in pain and disability.

Review	Topic	Diagnosis	Search dates	Included trials	Review quality	Conclusions
						At present, decompression plus fusion and interspinous process spacers have not been shown to be superior to conventional decompression alone.
Wang 2016[100]	Lumbar surgery (disc prosthesis, lumbar fusion)	Chronic LBP	Jan 1970-Dec 2013	N=6 RCTs (n=5 lumbar fusion)	Critically low	Pooled data revealed that, compared with surgical treatment, nonsurgical treatment was associated with better Oswestry Disability Index scores. Both groups had similar Visual Analogue Scale and Emotional Distress Scale scores as well as General Function Scores.
Rihn 2017[99]	Lumbar fusion; total disc replacement (TDR)	Chronic LBP	1990-Jan 2014	N=12 RCTs: 5 TDR vs. fusion; 1 TDR vs. exercise and CBT; 5 fusion vs. exercise and CBT; 1 fusion vs physical therapy	Critically low[98]	On the basis of mixed-treatment comparison, with respect to ODI change scores, the pooled mean difference favoring fusion over exercise and CBT was 2.0 points. The pooled mean difference favoring TDR over exercise and CBT was 6.4 points. The pooled mean differences favoring TDR over fusion was 4.4 points. TDR may be the most effective treatment.

3.3 Health care delivery for lower back pain in Australia

We searched websites of Commonwealth, State and Territory health departments and additional websites listed in the methods section for policies, reports and papers relating to:

- Variation in health care delivery and outcomes for lower back pain in Australia. This might include health care delivery outcomes for lower back pain including patient experience, clinical outcomes, and use of health care resources [e.g. length of stay, cost, health service utilisation]
- Contributors to variations in care, including service models, patient preferences or clinical knowledge or skills.
- Descriptions or evaluations of programs or interventions used to improve health care delivery and outcomes for lower back pain.

National

Medicare Benefits Schedule Review Taskforce: Imaging

The Diagnostic Imaging Clinical Committee – Low Back Pain conducted a review in 2016.[101] The review found:

1. Patients with recent onset non-specific LBP do not need imaging.
2. Unnecessary imaging of the lower back is being requested by primary health care practitioners (high level of multiple imaging, by wide variations in imaging by geographical region and by evidence from the BEACH study showing requests for imaging for more than 25% of general practice patients with initial presentations of LBP)
3. While the published literature does not reveal a clear benefit for Magnetic Resonance Imaging (MRI) over computed tomography (CT) in terms of diagnostic accuracy for patients presenting with LBP, expert consensus suggests that MRI offers better sensitivity and specificity and a superior safety profile.
4. Improvements could be made in the application of individual modalities for imaging of LBP
5. There are significant variations, by state and region, of requesting for individual modalities
6. There was insufficient evidence to inform an economic analysis of the use of the available modalities in the primary care setting

Based on these findings, the Working Group recommended:

1. Consider GP-requested MRI of the lumbar-sacral spine, for defined indications, with strategies for ensuring appropriate requesting by clinicians.
2. Consider limiting CT requesting by GPs.
3. Consider amending item descriptors to clarify the indications for low back imaging for each modality. In particular, plain x-rays of lower back could be limited to suspected fracture or inflammatory spondyloarthritis.
4. Limit use of multi-region radiography of the spine and, in particular, three or four area imaging on the same day.

NPS MedicineWise: Imaging

NPS MedicineWise provides resources and advice for health professionals who work with patients with LBP. They recommend against imaging, and provided clinicians with their own data for referrals for lumbosacral X-rays and CT scans, benchmarked against their peers, in a 2018 initiative designed to reduce unnecessary imaging. In line with most current guidelines, they also recommend:

- "A risk stratification approach can help reduce the risk of a patient developing chronic pain and disability.
- Education, reassurance and advice to stay active is first-line therapy for all patients. Medicines have a limited role, but can be an adjunct to support activity."

ACSQHC: Imaging

The First Australian Atlas of Healthcare Variation (2015) found that "the number of MBS-funded services for CT imaging of the lumbar spine across 320 local areas ranged from 209 to 2,464 per 100,000 people. The number of services was 11.8 times higher in the area with the highest rate compared to the area with the lowest rate. The average number of services varied across states and territories, from 720 per 100,000 people in the Northern Territory, to 1,407 in New South Wales."(p.92)[102]

ACSQHC: Surgery

The Second Australian Atlas of Healthcare Variation (2017) found that "the number of hospitalisations for lumbar spinal decompression across 322 local areas ranged from 30 to 156 per 100,000 people aged 18 years and over. The rate was 5.2 times as high in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 53 per 100,000 people aged 18 years and over in the Australian Capital Territory and the Northern Territory to 103 in Western Australia."(p.259)[103] For lumbar spinal fusion, the number of hospitalisations "ranged from 10 to 69 per 100,000 people aged 18 years and over. The rate was 6.9 times as high in the area with the highest rate compared to the area with the lowest rate. The number of hospitalisations varied across states and territories, from 12 per 100,000 people aged 18 years and over in the Northern Territory to 41 in Tasmania."(p.271)[103]

Central Australian Rural Practitioners Association (CARPA) manual

The CARPA treatment manual is reported to be commonly used in Aboriginal Medical Centres for pain management.[104] It does not provide specific guidance for back pain, but provides recommendations for managing acute, nerve and chronic pain. Recommendations are:

- Aim to treat the cause of pain: Includes reassuring person, managing anxiety about pain, encouraging active self-management, physical activity (if safe) and appropriate medicine.
- Pharmacological pain relief dependent on pain level and acuteness:
    - Acute/mild: paracetamol, ibuprofen if needed
    - Acute/moderate: paracetamol-codeine
    - Acute/severe: morphine
    - Nerve pain: Tricyclic antidepressants/anti-convulsants/SNRI antidepressants. Medical consult for advice to change treatment.
    - Chronic: Address psychosocial issues, analgesics (not strong opioids), exercise and behavioural change, hospital assessment by pain specialists.

While the encouragement of active self-management and physical activity is in line with current guidelines, the recommendations on the provision of pharmacotherapy are different to those commonly provided for LBP[26]: paracetamol is recommended as a first line therapy, despite the evidence that this is ineffective for LBP, and NSAIDs are recommended only as an adjunct therapy, instead of first choice analgesics. While there are cautions around the use of opioids, they are not framed as a last resort option for specific patients when all other options have failed, unlike in most LBP guidelines.

National Strategic Action Plan for Pain Management

The Australian Government Department of Health produced this national strategic action plan in 2019.[105] A companion document prepared by Pain Australia outlines the evidence base for the plan.[106] The plan includes lower back pain, which it notes is the leading cause of disability worldwide. In line with current guidelines, the plan recommends patient-centred interdisciplinary assessment and pain care, which minimises the reliance on prescribing pain medications for chronic pain. In particular, it advocates for a biopsychosocial approach, with multidisciplinary teams including a physician, clinical psychologist or psychiatrist, physiotherapist or other allied health professional such as occupational therapist, pharmacist and may include a dietician and social worker or counsellor. Nurses are also an important part of the multidisciplinary team. The plan notes evidence from the Electronic Persistent Pain Outcomes Collaboration: “Patient outcomes of 60 pain services in Australia and New Zealand that apply interdisciplinary approaches are showing significant reductions in medication use and 75% of patients improved mental health or reduced interference in the quality of life caused by their pain.”(p.11)[105]

Among the actions to achieve the goals in the plan, is to develop national clinical guidelines on pain and support for health providers to provide best practice pain management. The plan also includes developing best practice ‘models of care’ to provide pathways for pain management in all communities, even those without pain services.

A companion document to the plan prepared by Pain Australia provides a stocktake of existing initiatives implemented by state and territory governments, primary health networks, and other key bodies (Australian Pain Society, Faculty of Pain Medicine, Pain Management Research Institute).[107]

State-based initiatives

Several state-based initiatives exist relating to the management of LBP, although many of these date from before the search period for this review.

The NSW Model of Care for the management of people with acute LBP is included in international reviews of clinical practice guidelines for LBP and in the section on guidelines earlier in this report.[17] An earlier NSW initiative from the Therapeutic Assessment Group provides prescribing guidelines for LBP for primary care clinicians.[108] In line with current guidelines, these recommend assessment of red and yellow flags, referral to a multidisciplinary treatment program for chronic LBP, and limited use of opioids. However, paracetamol is supported as first line therapy for acute LBP, and the use of NSAIDs as first line therapy is not recommended.

South Australia developed a series of recommendations and tools to support LBP care in 2011.[109] Clinical decision tools and resources provide guidance including:

- Assess red and yellow flags.
- Imaging (preferably MRI) only when serious underlying condition suspected or pain present for more than 4-6 weeks and severe enough to consider surgery.
- Provide reassurance and education.
- Encourage to stay active and avoid bed rest.
- Prescribe paracetamol and short-term NSAIDs, if poorly controlled can consider addition Tramadol or Panadeine Forte or short-term opioid.
- Structured exercise or manual therapy or acupuncture may be worthwhile for sub-acute LBP.
- Refer to psychologist for CBT if yellow flags predominant.

Western Australia has a model of care for spinal pain prepared in 2009.[110] The model of care is principally centred around recommending self-management of spinal pain, with information, advice and facilities provided by health services, the voluntary sector and other agencies. Self-management should include a multidisciplinary assessment and management plan, group education and training, and slow and steady weaning from over-reliance on medication. The Western Australian model of care notes local initiatives to improve care for people with spinal pain, including “Back to Activity” group education and exercise delivered by physiotherapists, and hospital-based physiotherapy triage and multidisciplinary assessment to reduce surgeon referrals.

In Victoria, a new, primary care-based specialist service was first trialled in 2014-15 for assessing and managing LBP referrals to public hospitals.[111] The service ordered far fewer MRI scans than traditional spinal surgical clinics, with associated cost-savings and high patient and staff satisfaction. The pilot service was awarded a further grant from DHHS to mentor other hospitals to implement similar projects.

The MyBackPain.org website, produced by Arthritis Australia and the University of Queensland is a consumer-facing website that provides information on acute and chronic LBP, including tailored advice and videos on imaging and management: including exercise, medication, and multidisciplinary treatment.

3.4 Indicators for care improvement for lower back pain

We scanned the peer-reviewed and grey literature for audits, indicators and data collection mechanisms to support the measurement of care improvement for lower back pain. Note that this scan focussed on indicators specific to LBP, and not general patient experience or outcomes. The indicators listed here should be considered in conjunction with non-condition specific indicators such as general PREMs and PROMs such as treatment satisfaction, satisfaction with care, HRQoL, and health status assessments,[112] and general indicators for primary health care such as indicators of accessibility, appropriateness, acceptability, effectiveness, coordination of care, continuity of care and safety.[113]

Indicators from guidelines

Most of the guidelines did not include indicators to support the measurement of care improvement for lower back pain. The UK's NICE provides a baseline audit tool which services can use to track implementation of the guidance.[5] The tool lists each recommendation, and provides fields for each for services to note their current activity, and actions needed to implement recommendations that have not yet been met. Three other guidelines provided monitoring indicators (see Table 22).

Table 22: Monitoring indicators from high-quality guidelines

Guideline	Recommendations
Australia (NSW)[17]	The number of people who present to their GP or emergency department for the first time with Acute low back pain (ALBP). The number of people who participate in a person-focussed needs assessment leading to development of an appropriate and agreed care plan consistent with the Model of Care (MoC) for ALBP. The number of people participating in a review of their progress and adjustment of the care plan, as appropriate to their needs, by 12 weeks after the initial assessment. Improved primary care satisfaction in treating ALBP. Patient satisfaction with their experience of participation in the care provided according to this MoC.
Canada[21]	Changes in physician behaviour including: • improvement in assessing red flags • reduction in inappropriate ordering of diagnostic imaging tests • increase in provision of appropriate education and reassurance to patients • reduction of inappropriate recommendations regarding sick leave, bed rest, and continuing activity • increase in provision of correct recommendations for steroids, antidepressants, and muscle relaxants • reduction of inappropriate prescription of passive physiotherapy and injection therapy • increase in provision of appropriate recommendations for spinal manipulation • increase in the appropriate prescription of physiotherapy, active rehabilitation, and patient self-management programs • increase in the appropriate referral of patients to multidisciplinary pain clinics • reduction in recommendations for traction • reinforcement of the correct use of and adherence to guidelines for history taking and physical examination; prescribing of non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen; and administration of heat and ice, therapeutic ultrasound, and massage therapy
UK (SIGN)[33]	The number of patients presenting with chronic pain The number of patients using analgesics to manage chronic pain who receive an annual review The number of patients on opioids and gabapentinoids who receive an annual review of their medications The number of patients on >180 mg/day morphine or equivalent referred for specialist assessment The number of patients referred for self-management.

Indicators from peer-reviewed literature

Core outcome set for research and clinical practice

Several reviews and discussions of outcome measures for LBP were identified through the peer-reviewed literature search including a series of papers from a recent initiative[114-122] to update an early core outcome set for LBP for research and clinical practice.[123] The research group was international and multidisciplinary, and included researchers, clinicians, and patient representatives. The group first engaged in a consensus process to determine the core outcome domains: physical functioning, pain intensity, health-related quality of life (HRQoL), and number of deaths.[115] Second, the group reviewed the measurement properties of all recommended instruments for these domains in patients with LBP (see Appendix E), highlighting evidence in support of each tool and identifying limitations.[114, 117, 119, 121] Based on these reviews, and through the multi-round Delphi consensus process, a core outcome set was agreed upon (see Table 23).[114, 115]

Table 23: Core outcome measurement instruments for clinical trials in nonspecific LBP (Chiarotto 2018, p.490)[114]

Core outcome domain	Instrument	Free of charge?	Availability
Physical functioning	Oswestry Disability Index version 2.1a (ODI 2.1a) 24-item Roland Morris Disability Questionnaire (RMDQ-24)	Yes for not funded academic users; no for funded academic and commercial users Yes	https://eprovide.mapi-trust.org/instruments/oswestry-disability-index http://www.rmdq.org/download.htm
Pain intensity	Numeric Rating Scale (NRS): LBP intensity over the past week (0=no pain, 10=worst imaginable pain)	Yes	Included as supplemental content at http://links.lww.com/PAIN/A511
Health-related quality of life	Short Form Health Survey 12 (SF12) 10-item PROMIS Global Health (PROMIS-GH-10)	No, costs are established on a per study basis Yes	https://campaign.optum.com/optum-outcomes/ what-we-do/health-surveys/sf-12v2-health-survey.html http://www.healthmeasures.net/administrator/components/com_instruments/uploads/Global%20Health%20Scale%20v1.2%2008.22.2016.pdf
No. of deaths	A simple statement on the number of deaths occurring in the trial	Yes	

Indicators from grey literature

We searched national and international websites as listed in the methods section for audits, indicators and data collection mechanisms to support the measurement of care improvement for lower back pain.

LBP care: NICE quality standard

The NICE guideline reviewed in previous sections[5] has an associated quality standard that includes quality indicators for monitoring and audit.[124]

Table 24: Quality indicators for NICE quality standard for acute LBP care[124]

Quality statement	Indicators
Primary care services have an approach to risk stratification for people[a] presenting with a new episode of LBP with or without sciatica.	*Structure:* Evidence of a locally defined approach to risk stratification and of systems in place to make staff aware of the approach.
People with LBP with or without sciatica do not have imaging requested by a non-specialist service unless serious underlying pathology is suspected.	*Structure:* Evidence of local arrangements for people with LBP with or without sciatica to be referred for specialist opinion. *Structure:* Evidence of local protocols outlining serious underlying pathology in relation to presentations of LBP with or without sciatica. *Process:* Proportion of people with LBP with or without sciatica who have imaging requested by a non-specialist service when no serious underlying pathology is suspected.
People with LBP with or without sciatica are given advice and information to self-manage their condition.	*Structure:* Evidence of local arrangements to ensure that staff have access to information and the knowledge needed to signpost to other services for people with LBP with or without sciatica. *Process:* Proportion of people with LBP with or without sciatica who are given advice and information to self-manage their condition. *Outcome:* # of repeat GP appointments for people with LBP with or without sciatica. *Outcome:* Levels of satisfaction amongst people with the management of their LBP with or without sciatica.
People are not given paracetamol alone, anticonvulsants or antidepressants to LBP without sciatica.	*Structure:* Evidence of local arrangements to ensure that no GP prescriptions include paracetamol alone, anticonvulsants or antidepressants to treat people with LBP without sciatica unless the person has other indications for those medicines. *Process:* Proportion of people with LBP without sciatica, who are given anticonvulsants and have no other indications for them. *Process:* Proportion of people with LBP without sciatica, who are given antidepressants and have no other indications for them. *Process:* Proportion of people with LBP without sciatica, who are given paracetamol alone and have no other indications for it. *Outcome:* Number of medicines-related adverse events for people with LBP without sciatica.
People are not given opioids to treat chronic LBP without sciatica.	*Structure:* Evidence of local arrangements to ensure that no GP prescriptions include opioids to treat people with chronic LBP without sciatica unless they have other indications for those medicines *Process:* Proportion of people who are given opioids to treat chronic LBP without sciatica and have no other indications for them. Outcome: Number of opioids-related adverse events for people with chronic LBP without sciatica.
People do not have spinal injections for LBP without sciatica with the exception of radiofrequency denervation for people who meet the criteria.	*Structure:* Evidence of local arrangements to ensure that spinal injections are not given to people to treat LBP without sciatica, with the exception of radiofrequency denervation for people who meet the criteria. *Process:* Proportion of people who have spinal injections for LBP without sciatica who meet the criteria for radiofrequency denervation.

[a]Throughout this table, "people" refers to the target group of young people and adults (aged over 16 years)

LBP care: Health Quality Ontario quality standards

Health Quality Ontario published quality standards for acute LBP care in January 2019, together with associated quality indicators (see Table 25).[125]

Table 25: Quality indicators for Health Quality Ontario quality standards for acute LBP care[125]

Domain	Quality statement	Indicators
1. Clinical Assessment	People with acute LBP who seek primary care receive a prompt comprehensive assessment	*Process:* # days from when people with LBP seek primary care to when they receive a comprehensive assessment from their primary care provider *Process:* % of people with acute LBP who are referred to a spine-focused provider for any of the following: 1. Unmanageable disabling back or leg pain, 2. Limitations from back pain that are ongoing and substantial, 3. Symptoms that worsen with physical activity and exercise *Structural:* Local availability of rapid access clinics for people with LBP
2. Diagnostic Imaging	People with acute LBP do not receive diagnostic imaging tests unless they present with red flags that suggest serious pathological disease	*Process:* % of people who seek physician or emergency department care for acute LBP who undergo diagnostic imaging (x-ray, CT scan, MRI, bone scan) of the spine
3. Patient Education and Self-Management	People with acute LBP are offered education and ongoing support for self-management that is tailored to their needs.	*Process:* % of people with acute LBP who receive education and ongoing support for self-management *Outcome:* % of people with acute LBP who report feeling confident about self-managing their LBP
4. Maintaining Usual Activity	People with acute LBP are encouraged to stay physically active by continuing to perform activities of daily living, with modification if required.	*Process:* % of people with acute LBP who have documented discussions in their medical record about staying physically active by continuing activities of daily living, with modifications if required *Process:* % of people with acute LBP who have documented discussions in their medical record about continuing work or returning to work, with appropriate modifications *Process:* # days from when people with acute LBP take a leave of absence from work to when they return to work
5. Psychosocial Information and Support	People with acute LBP who have psychosocial barriers to recovery (yellow flags) identified during their comprehensive assessment are offered further information and support to manage the identified barriers.	*Outcome:* % of people with acute LBP with identified psychosocial barriers to recovery who report that their health care professional has given them information and support to manage their identified psychosocial barriers
6. Pharmacological Therapies	People with acute LBP whose symptoms do not adequately improve with physical activity, education, reassurance, and self-management support are offered information on the risks and benefits of nonopioid analgesics to improve mobility and function.	*Process:* % of people with acute LBP whose symptoms are not improving with nonpharmacological therapies (physical activity, education, reassurance, and self-management support) who are given information by their health care provider on the risks and benefits of nonopioid analgesics for their acute LBP *Process:* % of people who seek physician or emergency department care for acute LBP who are prescribed an opioid medication
7. Additional Nonpharmacological Therapies	People with acute LBP whose symptoms do not adequately improve with physical activity, education, reassurance, and self-management support are offered information on the risks and benefits of additional nonpharmacological therapies to improve mobility and function.	*Process:* % of people with acute LBP whose symptoms do not adequately improve with physical activity, education, reassurance, and self-management support who receive one or more additional nonpharmacological therapies

LBP care: CareTrack Australia

CareTrack is part of a National Health & Medical Research Council (NHMRC) program grant that examined the appropriateness of the care provided in Australia, for 22 common conditions including LBP.[126] Ten indicators for LBP care were developed based on clinical indicators sourced from the USA and refined and ratified by Australian rheumatologists.

- Patients presenting with LBP had their medical history documented at presentation
- Patients presenting with LBP had a physical examination performed and documented at presentation
- Patients presenting with LBP had been asked about/ assessed for spine fractures (trauma, history of previous fracture, prolonged use of steroids)
- Patients presenting with LBP had been asked about/ assessed for cancer (history of cancer, unexplained weight loss, immunosuppression)
- Patients presenting with LBP had been asked about/ assessed for infection (fever, IV drug use)
- Patients presenting with LBP had a neurological examination performed – (strength, sensation and reflexes in lower limbs)
- Patients presenting with LBP had been asked about/ assessed for Cauda equina syndrome which involves one of the following: acute onset of urinary retention, overflow incontinence, loss of anal sphincter tone, faecal incontinence, saddle anaesthesia
- Patients with acute LBP were NOT prescribed any of the following medications: dexamethasone; other oral steroids; colchicine; or antidepressants
- Patients with acute LBP DID NOT receive any of the following treatments: transcutaneous electrical nerve stimulation (TENS), lumbar corsets and support belts, spinal traction
- Patients with acute LBP were NOT advised to rest in bed

Pain

The University of Wollongong Electronic Persistent Pain Outcomes Collaboration aims to improve the quality of outcomes and services for people experiencing chronic pain. The ePPOC dataset[127] consists of five levels of linked information for standardised recording of care by pain management services – Patient, Episode, Pathway, Service Event and Patient-Reported Outcome Measures. The PROMs include:

- pain description (frequency);
- rating of overall change following treatment at the pain management service;
- rating of change in physical abilities following treatment at the pain management service;
- work status and productivity (hours missed from work due to pain, effect of pain on work productivity);
- utilisation of health services for pain over past three months (GPs, specialists, allied health, ED, hospital admissions, diagnostic tests;
- intensity of pain (worst, least, on average, right now);
- interference of pain in past week with: general activity, mood, walking ability, normal work, relations with other people, sleep, enjoyment of life;

- DASS21 (depression, anxiety, stress);
- Pain self-efficacy;
- Pain catastrophising;
- Medication use.

The Australian Government Department of Health National Strategic Action Plan for Pain Management (2019)[105] also intends in 2018-21 to "Develop a broad national approach to assessment and monitoring, involving an integrated suite of validated assessment and monitoring tools for chronic pain use by GPs, practice nurses etc. across Australia, that combines existing best practice assessment techniques and the sociopsychobiomedical approach. This includes consideration of assessment and monitoring tools for priority population groups, e.g. CALD, Indigenous Australians, children and young people."(p.16)

Imaging

The Canadian Institute for Health Information provided their methodology for monitoring unnecessary imaging for LBP. Rate of imaging was defined as the rate of patients with at least one diagnostic image (defined by billing code data for X-rays, CT scans and MRI scans) within 3/6/12 months of a family physician visit for LBP (identified by ICD-9 diagnosis codes), excluding patients with codes for red flags (e.g. cancer, neurological problems, specific infections, vertebral compression fractures.[128]

Opioids

The New Zealand Health Quality and Safety Commission New Zealand has opioid Quality and Safety Markers (QSMs):[129]

- Process 1: Percentage of patients with documented sedation scores
- Process 2: Percentage of patients with documented bowel function monitored
- Balance: Percentage of patients with uncontrolled pain
- Outcome: Percentage of patients with opioid-related adverse drug events

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Appendix A: AGREE quality appraisal tools

The AGREE-REX includes two evaluation statements for each item: one to assess overall quality (required) and one to asses suitability for use (optional). All items are rated using a 7-point scale (1 [lowest quality] to 7 [highest quality]). It also includes two overall assessment statements to apply to the whole guideline (again, one required and one optional).

Item 1. Evidence In order for recommendations to be of high quality, they should be based on a thorough review of the quality and results of the available evidence. In formulating the recommendations and developing the guideline, the following issues should be addressed:
Criteria • The guideline assesses any risk of bias related to the study designs of the supporting evidence. • The guideline describes the consistency of the results (i.e., similarity of results across studies). • The guideline addresses the directness of the evidence (i.e., addresses the exact interventions, populations and outcomes of interest) to the clinical/health problem. • The guideline indicates the precision of the results (e.g., width of confidence intervals of individual studies or meta-analyses). • The guideline describes the magnitude of the benefits and harms. • The guideline assesses the likelihood of publication bias. • The guideline addresses the possibility of confounding factors (if applicable). • The guideline indicates the dose-response gradient (if applicable).
Item 2. Applicability to Target Users This item evaluates the degree to which the recommendations are applicable to the guideline's target users' practice context. In formulating the recommendations and developing the guideline, the following issues should be addressed:
Criteria: • The guideline addresses a clinical/health problem that is relevant to the intended target user(s). • There is an alignment between o target user's scope of practice and targeted patients/populations. o target user's scope of practice and recommended actions. o the direction of the recommendations (i.e., in favour of or against a particular action) and the trade-offs between harms and benefits. o the definitiveness or strength of the recommendations and the trade-offs between harms and benefits.
Item 3. Applicability to Patients/Populations This item assesses the extent to which the anticipated outcomes of the recommended action are relevant for, and valued by, the intended patients/populations. In formulating the recommendations and developing the guideline, the following issues should be addressed:
Criteria: • The guideline includes outcomes that are relevant to the targeted patients/populations. These outcomes are often referred to as patient important outcomes, patient centered outcomes, patient reported outcomes, or patient experience. o Relevant outcomes were considered in the development of the evidence base. o Recommended actions have the potential to impact outcomes relevant to patients/populations (e.g., improve desirable patient-relevant outcomes, mitigate undesirable patient-relevant outcomes). • The guideline reports how the importance of outcomes to patients was determined. • The guideline describes how to tailor recommendations for application to individual (or subsets of) patients or populations (e.g., based on age, sex, ethnicity, comorbidities).
Item 4. Values and Preferences of Target Users Values and preferences of target users refers to the relative importance that the target users of the guidelines (e.g., health care providers, policy-makers, administrators) place on the outcomes of interest (e.g., survival, adverse effects, quality of life, cost, convenience). Target user values and preferences are important to consider during the guideline development process because they influence whether the recommendations are acceptable and adopted into practice. In formulating the recommendations and developing the guideline, the following issues should be addressed:
Criteria

• Values and preferences of guideline target users, as it relates to the recommended actions, have been sought and considered. • Factors related to target user acceptability of the recommended actions have been considered (e.g., the acceptability of learning new clinical skills or the need to adapt current routine). • The guideline differentiates between recommended actions for which clinical flexibility and individual patient tailoring is more appropriate in the decision-making process and those for which it is less appropriate. • The guideline describes the range of recommended actions that are acceptable to the clinical community, including the preferred option (if relevant), and describing why it is the preferred choice.
Item 5. Values and Preferences of Patients/Populations Values and preferences of patients/populations refers to the relative importance that the recipients of the recommended actions place on the outcomes of interest (e.g., survival, adverse effects, quality of life, cost, convenience). Patient or population values and preferences are important to consider during the guideline development process because they influence whether the recommendations are acceptable and adopted into practice. In formulating the recommendations and developing the guideline, the following issues should be addressed:
Criteria: • Values and preferences of the target population (including patients, family and caregivers, if appropriate) have been sought and considered. • Factors related to patient/population acceptability of the recommended actions have been considered (e.g., motivation, ability to achieve outcomes, expectations, perceived effectiveness). • The guideline differentiates between recommended actions for which patient choice and/or values are likely to play a large part in the decision-making process and those for which they are likely to play a small role. • The guideline states whether tools to assist in patient decision-making would be beneficial.
Item 6. Values and Preferences of Policy/Decision-Makers Values and preferences of policy/decision-makers refers to the relative importance that policy stakeholders place on the outcomes of interest (e.g., survival, adverse effects, quality of life, cost, convenience). The values and preferences of policy stakeholders can affect the implementation of guideline recommendations in the health care system (e.g., provision of resources or funding to support the recommended actions). In formulating the recommendations and developing the guideline, the following issues should be addressed:
Criteria: • Information about the needs of policy and decision-makers has been sought and considered in the formulation of the recommendations. • The impact of the recommendations on policy and system-level decision-making has been considered in the formulation of the recommendations. • The impact of the recommendations on health equities has been considered in the formulation of the recommendations. • The guideline describes where changes to policy should be made to align with the recommendations.
Item 7. Values and Preferences of Guideline Developers Values and preferences of guideline developers refers to the relative importance that developers place on the outcomes of interest (e.g., survival, adverse effects, quality of life, cost, convenience). Guideline developer values can influence the selection of outcomes of interest, the choice of guideline development methods, the approach to integrating varying stakeholder perspectives, and the interpretation of the balance between benefits and harms. In formulating the recommendations and developing the guideline, the following issues should be addressed:
Criteria: • There is a clear description of the values and preferences that guideline developers brought to the development process. • There is a clear description of how guideline developer values and preferences influenced their interpretation of the balance between benefits and harms. • The method used to integrate values and preferences, including when they differ between stakeholders (e.g., target users, patients/population, policymakers), is described.
Item 8. Purpose Practice guidelines can be developed to achieve several implementation goals, such as to influence health care decisions, to promote discussion in the clinical encounter, to provide rationale to create or refine clinical policy, or to identify actions that reflect clinical or population health goals. In formulating the recommendations and developing the guideline, the following issues should be addressed:

Criteria: • The guideline recommendations align with the implementation goals of the guideline (e.g., for advocacy, policy change, etc.). • The anticipated impacts of recommendation adoption on individuals (e.g., patients, populations, target users), organizations, and/or systems are described.
Item 9. Local Application and Adoption This item assesses the suitability of the guideline recommendations for the setting, patients/population, and/or the health care system in which they are being implemented. Guidelines that include advice or tools and resources to facilitate the implementation of the recommendations are easier to adopt in practice. In formulating the recommendations and developing the guideline, the following issues should be addressed:
Criteria: • The guideline describes the types and degree of change required from current practice. • The guideline differentiates between recommendations for which local adaptation may be more or less relevant. • The guideline articulates relevant factors important to its successful dissemination. • The guideline developers considered the issues that can influence the adoption of the recommendations and provided tools and/or advice for guideline implementers related to: o How to tailor recommendations for the local setting. o Resource considerations needed to implement the recommendations (e.g., human resources, equipment) and their associated costs. o Economic analysis (e.g., cost-effectiveness or cost-utility) of recommended actions (if appropriate). o Competencies and/or training of personnel required to implement the recommended actions. o Data required to implement and monitor the adoption of recommended actions. o Strategies to overcome barriers related to provider acceptability and/or patient/population and/or policy acceptability of the recommended actions. o Criteria that can be used to measure recommendation implementation and quality improvement.
OVERALL
1. I would recommend these guideline recommendations for use **in the appropriate context**. Yes Yes, with modifications No
2. I would recommend these guideline recommendations for use **in my context** (optional). Yes Yes, with modifications No

Appendix B: AMSTAR 2 quality appraisal tool

Domains marked * are considered critical domains by the authors of the AMSTAR 2.

1. Did the research questions and inclusion criteria for the review include the components of PICO?		
For Yes: □ Population □ Intervention □ Comparator group □ Outcome	Optional (recommended) □ Timeframe for follow-up	□ Yes □ No
*2. Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?		
For Partial Yes: The authors state that they had a written protocol or guide that included ALL the following: □ review question(s) □ a search strategy □ inclusion/exclusion criteria □ a risk of bias assessment	For Yes: As for partial yes, plus the protocol should be registered and should also have specified: □ a meta-analysis/synthesis plan, if appropriate, *and* □ a plan for investigating causes of heterogeneity □ justification for any deviations from the protocol	□ Yes □ Partial Yes □ No
3. Did the review authors explain their selection of the study designs for inclusion in the review?		
For Yes, the review should satisfy ONE of the following: □ *Explanation for* including only RCTs □ OR *Explanation for* including only NRSI □ OR *Explanation for* including both RCTs and NRSI		□ Yes □ No
*4. Did the review authors use a comprehensive literature search strategy?		
For Partial Yes (all the following): □ searched at least 2 databases (relevant to research question) □ provided key word and/or search strategy □ justified publication restrictions (eg, language)	For Yes, should also have (all the following): □ searched the reference lists/bibliographies of included studies □ searched trial/study registries □ included/consulted content experts in the field □ where relevant, searched for grey literature □ conducted search within 24 months of completion of the review	□ Yes □ Partial Yes □ No
5. Did the review authors perform study selection in duplicate?		
For Yes, either ONE of the following: □ at least two reviewers independently agreed on selection of eligible studies and achieved consensus on which studies to include □ OR two reviewers selected a sample of eligible studies and achieved good agreement (at least 80 per cent), with the remainder selected by one reviewer		□ Yes □ No
6. Did the review authors perform data extraction in duplicate?		
For Yes, either ONE of the following: □ at least two reviewers achieved consensus on which data to extract from included studies □ OR two reviewers extracted data from a sample of eligible studies and achieved good agreement (at least 80 per cent), with the remainder extracted by one reviewer		□ Yes □ No

*7. Did the review authors provide a list of excluded studies and justify the exclusions?		
For Partial Yes: □ provided a list of all potentially relevant studies that were read in full text form but excluded from the review	For Yes, must also have: □ Justified the exclusion from the review of each potentially relevant study	□ Yes □ Partial Yes □ No
8. Did the review authors describe the included studies in adequate detail?		
For Partial Yes (ALL the following): □ described populations □ described interventions □ described comparators □ described outcomes □ described research designs	For Yes, should also have ALL the following: □ described population in detail □ described intervention and comparator in detail (including doses where relevant) □ described study's setting □ timeframe for follow-up	□ Yes □ Partial Yes □ No
*9. Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review?		
RCTs For Partial Yes, must have assessed RoB from □ unconcealed allocation, and □ lack of blinding of patients and assessors when assessing outcomes (unnecessary for objective outcomes such as all cause mortality)	For Yes, must also have assessed RoB from: □ allocation sequence that was not truly random, and □ selection of the reported result from among multiple measurements or analyses of a specified outcome	□ Yes □ Partial Yes □ No □ Includes only NRSI
NRSI For Partial Yes, must have assessed RoB: □ from confounding, *and* □ from selection bias	For Yes, must also have assessed RoB: □ methods used to ascertain exposures and outcomes, *and* □ selection of the reported result from among multiple measurements or analyses of a specified outcome	□ Yes □ Partial Yes □ No □ Includes only RCTs
10. Did the review authors report on the sources of funding for the studies included in the review?		
For Yes □ Must have reported on the sources of funding for individual studies included in the review. Note: Reporting that the reviewers looked for this information but it was not reported by study authors also qualifies		□ Yes □ No
*11. If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?		
RCTs For Yes: □ The authors justified combining the data in a meta-analysis □ AND they used an appropriate weighted technique to combine study results and adjusted for heterogeneity if present □ AND investigated the causes of any heterogeneity		□ Yes □ No □ No meta-analysis conducted
NRSI For Yes: □ The authors justified combining the data in a meta-analysis □ AND they used an appropriate weighted technique to combine study results and adjusted for heterogeneity if present □ AND they statistically combined effect estimates from NRSI that were adjusted for confounding, rather than combining raw data, or justified combining raw data when adjusted effect estimates were not available □ AND they reported separate summary estimates for RCTs and NRSI separately when both were included in the review		□ Yes □ No □ No meta-analysis conducted

12. If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis?	
For Yes: □ included only low risk of bias RCTs □ OR, if the pooled estimate was based on RCTs and/or NRSI at variable RoB, the authors performed analyses to investigate possible impact of RoB on summary estimates of effect	□ Yes □ No □ No meta-analysis conducted
*13. Did the review authors account for RoB in individual studies when interpreting/discussing the results of the review?	
For Yes: □ included only low risk of bias RCTs □ OR, if RCTs with moderate or high RoB, or NRSI were included the review provided a discussion of the likely impact of RoB on the results	□ Yes □ No
14. Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?	
For Yes: □ There was no significant heterogeneity in the results □ OR if heterogeneity was present the authors performed an investigation of sources of any heterogeneity in the results and discussed the impact of this on the results of the review	□ Yes □ No
*15. If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?	
For Yes: □ performed graphical or statistical tests for publication bias and discussed the likelihood and magnitude of impact of publication bias	□ Yes □ No □ No meta-analysis conducted
16. Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?	
For Yes: □ The authors reported no competing interests OR □ The authors described their funding sources and how they managed potential conflicts of interest	□ Yes □ No

Rating overall confidence in the results of the review			
High *No or one non-critical weakness:* the systematic review provides an accurate and comprehensive summary of the results of the available studies that address the question of interest	**Moderate** *More than one non-critical weakness**: the systematic review has more than one weakness but no critical flaws. It may provide an accurate summary of the results of the available studies that were included in the review	**Low** *One critical flaw with or without non-critical weaknesses*: the review has a critical flaw and may not provide an accurate and comprehensive summary of the available studies that address the question of interest	**Critically low** *More than one critical flaw with or without non-critical weaknesses*: the review has more than one critical flaw and should not be relied on to provide an accurate and comprehensive summary of the available studies

Appendix C: Evidence tables – guidelines

Data extraction table: guideline		
Bibliographic reference	NSW Agency for Clinical Innovation. Management of people with acute low back pain: model of care. Chatswood, NSW: Agency for Clinical Innovation; 2016.	
Scope (country)	Australia (NSW)	
Institution	Agency for Clinical Innovation	
Last search for evidence	2014	
Patient population	Patients aged 16 years and over attending a primary healthcare location (such as general practice, emergency departments, community nursing services and private allied health providers) reporting recent onset of LBP that has duration of less than three months.	
Diagnostic classification	Acute low back pain	
Monitoring indicators	The number of people who present to their GP or emergency department for the first time with Acute low back pain (ALBP). The number of people who participate in a person-focussed needs assessment leading to development of an appropriate and agreed care plan consistent with the MoC for ALBP. The number of people participating in a review of their progress and adjustment of the care plan, as appropriate to their needs, by 12 weeks after the initial assessment. Improved primary care satisfaction in treating ALBP. Patient satisfaction with their experience of participation in the care provided according to this MoC.	
Recommendations for diagnosis		**Level of evidence**
Alternative diagnoses	A systematic and formal history and examination including the consideration of red flags is required at the outset to determine the pathway of care for each individual patient.	NR
Risk assessment & stratification tools	Prognostic risk stratification tools, such as the STarT Back and Örebro questionnaires, stratify patients into low, medium or high risk groups, determining the amount and type of treatment that they require.	NR
Imaging	Imaging is only indicated when a thorough patient history and physical examination indicates that there may be a medically serious cause for the lower back pain.	NR
Recommendations for management: non-invasive, non-pharmacological		**Level of evidence**
Self-management	From the first assessment, each person will receive one-on-one discussion and support of self-management, along with electronic and paper-based education packs that detail the best practice management.	NR
Exercise	Physical therapies will primarily be a 'hands off' approach. The emphasis is on self-management assisting the patient to understand their condition and a staged resumption of normal activities. Consultation with team members may include a physiotherapist or practice nurse.	NR
Orthotics	Acupuncture, electrotherapy modalities, massage, traction and lumbar supports should be avoided, as evidence suggests they offer no benefit for the person with ALBP and their passive nature conflicts with the contemporary active approach.	
Manual therapies		NR
Acupuncture		
Electrotherapies		
Psychological therapy	The principles of cognitive behavioural therapy are used to ensure the patient is supported to understand the relationship between beliefs and behaviours, and to develop a goal-orientated plan of care.	NR

Combined physical and psychological	Evidence shows improved outcomes for people with ALBP when CBT is used to inform the delivery of physical and other therapy, helping to modify any psychosocial drivers for pain.	NR
Return-to-work	Recommended language to use with patients: 'Getting back to work as you are able, even part-time at first, will help you recover'	NR
Other	Review each individual's progress at two, six and twelve weeks. If there has been insufficient progress then change the treatment plan as outlined in the MoC. If the patient has not recovered by twelve weeks arrange for review by a musculoskeletal specialist as outlined in the MoC.	NR
Recommendations for management: non-invasive, pharmacological		**Level of evidence**
NSAIDs	Non-steroidal anti-inflammatory medications can be used for short time-frames after consideration of possible adverse reactions.	NR
Opioids	Opiates are less effective in this patient group, and should be avoided.	NR
Paracetamol	Regular paracetamol is recommended for acute LBP. However, both clinician and patients should be mindful that a recent trial demonstrated it was no more effective than a placebo plus 'best evidence education'.	NR
Other	In the presence of persisting severe leg pain, some complex medication regimens may support pain control. These include tricyclic anti-depressants, anticonvulsant agents and serotonin noradrenaline reuptake inhibitors. However, caution is required considering the impact of potential mood changes and somnolence.	NR
Recommendations for management: invasive, non-surgical		**Level of evidence**
Spinal injections	Corticosteroid spinal injections offer only short-term pain relief and should not be initiated in the primary care setting.	NR
Radiofrequency denervation	-	
Epidurals	-	
Other	-	
Recommendations for management: invasive, surgical		**Level of evidence**
Surgery and prognostic factors	-	
Spinal decompression	-	
Spinal fusion	-	
Disc replacement	-	
Other	-	
Quality appraisal (AGREE-II)		**%**
1. Scope & purpose		95
2. Stakeholder involvement		95
3. Rigour of development		46
4. Clarity of presentation		95
5. Applicability		71
6. Editorial independence		14
Overall assessment		67
Overall quality		High
Quality appraisal (AGREE-REX)		**Score (1-7)**
1. Evidence		3
2. Applicability to target users		7
3. Applicability to patients/populations		5
4. Values and preferences of target users		5

5. Values and preferences of patients/populations	3
6. Values and preferences of policy/decision-makers	3
7. Values and preferences of guideline developers	3
8. Purpose	6
9. Local application and adoption	4
Recommended in the context for which they were developed?	Y
Recommended in the Australian context?	Y

Data extraction table: guideline		
Bibliographic reference	Van Wambeke P, Desomer A, Ailliet L, Berquin A, Demoulin C, Depreitere B, et al. Low back pain and radicular pain: Assessment and management. Brussels: Good Clinical Practice (GCP); 2017.	
Scope (country)	Belgium	
Institution	Belgian Health Care Knowledge Centre	
Last search for evidence	August 2015	
Patient population	Aged 16 or over with low back pain without serious underlying cause or radicular pain.	
Diagnostic classification	Low back pain without serious underlying cause: pain in the back between the bottom of the rib cage and the buttock creases. Including acute phase from 0 to 6 weeks, sub-acute from 6 to 12 weeks and chronic from 12 weeks. Radicular pain (including neurogenic claudication)	
Monitoring indicators	A KCE project on PROMs and PREMS indicators has started in 2016 with a part dedicated to low back pain. This project should provide a list of indicators to be recorded in order to monitor the quality of care delivered to low back pain patients. More information will be available at the end of 2017 on the KCE website. *(NB: reports on the project do not provide lists of indicators, but recommend their use and outline steps to be taken to develop and implement a PROMs/PREMs initiative)*	
Recommendations for diagnosis		**Level of evidence**
Alternative diagnoses	Always take into account differential diagnoses when examining or reviewing patients with low back or radicular pain, particularly if they develop new or changed symptoms. Exclude signs suggestive of possible serious underlying pathology (identified as red flags)*, for example, cancer, infection, trauma, inflammatory disease such as spondyloarthritis, or severe neurological problems such as cauda equina syndrome.	Not applicable (Strength of recommendation: Experts opinion)
Risk assessment & stratification tools	Consider using risk stratification (with for example the STarT Back risk assessment tool or the Örebro Musculoskeletal Pain Screening Questionnaire, short version) for each new episode of low back pain with or without radicular pain. This risk stratification should not be performed during the first 48h after the pain onset*. The aim of the risk stratification is to inform shared decision-making about stratified management. *It is advised to perform the risk stratification during the second consultation, approximately 2 weeks after onset.	Low to very low (Strength of recommendation: Weak (RCTs))
	Based on risk stratification, consider: o Simpler and less intensive support for partients with low back pain with or without radicular pain likely to improve quickly and have a good outcome (for example, reassurance, advice to keep active and guidance on self-management) o More complex and intensive support for patients with low back pain with or without radicular pain at higher risk of a poor outcome (for example, exercise programmes with or without manual techniques and a psychological intervention such as cognitive-behavioral approach).	Low to very low (Strength of recommendation: Weak (RCTs))
Imaging	In the absence of red flags, do not routinely offer imaging for people with low back pain with or without radicular pain. Only prescribe imaging if its expected result may lead to change management, e.g. when an invasive intervention is being considered.	Low to very low (Strength of recommendation: Weak (RCTs))
	Explain to people with low back pain with or without radicular pain that they may not need imaging, even if they are being referred for a specialist opinion.	Not applicable (Strength of

		recommendation: Experts opinion)
Recommendations for management: non-invasive, non-pharmacological		**Level of evidence**
Self-management	Provide each patient with advice and information, tailored to their needs and capabilities, to help them self-manage their low back pain with or without radicular pain, at all steps of the treatment pathway. Include: o Information on the benign nature of low back pain and radicular pain o Encouragement to continue with normal activities, exercise included.	Moderate to very low (Strength of recommendation: Experts opinion)
Exercise	Consider an exercise programme (specific exercises or a combination of approaches) for people with low back pain with or without radicular pain. Take patient's specific needs, capabilities and preferences into account when choosing the type of exercise programme.	Moderate to low (Strength of recommendation: Weak (RCTs))
Orthotics	Do not offer foot orthotics for managing low back pain with or without radicular pain.	Very low to moderate (Strength of recommendation: Strong (RCTs & cohort studies))
	Do not offer rocker sole shoes for managing low back pain with or without radicular pain.	Very low to moderate (Strength of recommendation: Strong (RCTs))
	Do not offer belts or corsets for managing low back pain with or without radicular pain.	Very low to low (Strength of recommendation: Strong (RCTs))
Manual therapies	Do not offer traction for managing low back pain with or without radicular pain.	Very low to high (Strength of recommendation: Strong (RCTs))
	Consider manipulation, mobilisation, or soft-tissue techniques for managing low back pain with or without radicular pain, but only as part of a multimodal treatment with a supervised exercise programme.	High to very low (Strength of recommendation: Weak (RCTs))
Acupuncture	No recommendation on acupuncture has been formulated.	NA
Electrotherapies	Do not offer transcutaneous electrical nerve stimulation (TENS) for managing low back pain with or without radicular pain.	Low to very low (Strength of recommendation: Strong (RCTs))
	Do not offer percutaneous electrical nerve stimulation (PENS) for managing low back pain with or without radicular pain.	Moderate to very low (Strength of recommendation: Strong (RCTs))
	Do not offer interferential therapy for managing low back pain with or without radicular pain.	High to low (Strength of recommendation: Strong (RCTs))
	Do not offer ultrasound for managing low back pain with or without radicular pain.	Very low to low (Strength of recommendation: Strong (RCTs))

	Monitoring of new high quality trials laser therapy in the management of low back pain and radicular pain.	NA
Psychological therapy	Consider a psychological intervention using a cognitive behavioural approach for managing low back pain with or without radicular pain, but only as part of a multimodal treatment* with a supervised exercise programme. **Psychological interventions are optional and are only applied to certain patients at certain time period and depending on their risk stratification*	Moderate to very low (Strength of recommendation: Strong (RCTs))
Combined physical and psychological	Consider a psychological intervention using a cognitive behavioural approach for managing low back pain with or without radicular pain, but only as part of a multimodal treatment* with a supervised exercise programme. **Psychological interventions are optional and are only applied to certain patients at certain time period and depending on their risk stratification*	Moderate to very low (Strength of recommendation: Strong (RCTs))
	Consider a multidisciplinary rehabilitation programme, which combines a physical and a psychological component, incorporating a cognitive behavioural approach, and which takes into account a person's specific needs and capabilities, for people with persistent low back pain or radicular pain: o when they have psychosocial obstacles to recovery or o when previous evidence-based management has not been effective	Moderate to very low (Strength of recommendation: Strong (RCTs))
Return-to-work	Promote and facilitate return to work or normal activities of daily living as soon as possible for people with low back pain with or without radicular pain.	High to very low (Strength of recommendation: Experts opinion)
Other	No recommendation was formulated on postural therapies.	NA
	No recommendation was formulated on Alexander technique lessons.	NA
Recommendations for management: non-invasive, pharmacological		**Level of evidence**
NSAIDs	If a medication is required for managing low back pain with or without radicular pain (e.g. due to severity of the pain and patients' preferences), consider oral NSAIDs taking into account potential differences between NSAIDs in gastrointestinal, liver and cardio-renal toxicity and the person's risk factors, including age.	Moderate to very low (Strength of recommendation: Weak (RCTs))
	When prescribing oral NSAIDs for low back pain, think about appropriate clinical assessment, ongoing monitoring of the evolution of risk factors, and the use of gastro protective treatment.* ** The Belgian GDG emphasises that gastro protective treatment is not always needed. It depends on the kind of NSAID (usually not for coxib), the treatment duration (usually not in short term), and the patient' characteristics.*	NA (Strength of recommendation: Experts opinion)
	When prescribing oral NSAIDs for low back pain, select the lowest effective dose for the shortest possible period of time.** ***The lowest effective dose means the lowest dose that has an effect according to each individual patient. The Belgian GDG stresses the risk of under- or over-dose and*	NA (Strength of recommendation: Experts opinion)

	suggests to start in most situations with a recommended dose, to assess the result and in case of improvement to test a decrease of this dose.	
Opioids	Think about weak opioids (with or without paracetamol) for the shortest period possible for managing acute low back pain with or without radicular pain only if an NSAID is contraindicated, not tolerated or has been ineffective.	NA (Strength of recommendation: Experts opinion)
	Do not routinely offer opioids for managing chronic low back pain with or without radicular pain.	High to very low (Strength of recommendation: Weak (RCTs))
Paracetamol	Do not routinely offer paracetamol (as single medication) for managing low back pain with or without radicular pain.	High to very low (Strength of recommendation: Weak (RCTs))
Other	Do not offer selective serotonin reuptake inhibitors (SSRI) for managing low back pain with or without radicular pain.	Moderate to very low (Strength of recommendation: Strong (RCTs))
	Do not routinely offer tricyclic antidepressants or non-selective serotonin–norepinephrine reuptake inhibitors (SNRI) for managing low back pain with or without radicular pain. This recommendation is applicable only for chronic pain; the use of antidepressants is not recommended in acute pain.	Moderate to very low (Strength of recommendation: Weak (RCTs))
	Do not offer anticonvulsants for managing low back pain with or without radicular pain in absence of a neuropathic pain component.	Moderate to low (Strength of recommendation: Strong (RCTs & cohort studies))
	Do not offer skeletal muscle relaxants for managing low back pain with or without radicular pain.	Moderate to very low (Strength of recommendation: Strong (RCTs))
	Do not offer antibiotics for managing low back pain with or without radicular pain	Moderate to low (Strength of recommendation: Strong (RCTs))
Recommendations for management: invasive, non-surgical		**Level of evidence**
Spinal injections	Do not offer spinal injections for managing low back pain. *No clear recommendation could be formulated on the potential use of facet joint injections for facet joint pain syndrome, due to the low level of evidence on the benefits and potential harms of these injections.	Very low to moderate (Strength of recommendation: Strong)
Radiofrequency denervation	Consider assessment for radiofrequency denervation for people with chronic low back pain with suspected facet joint pain when: non-surgical evidence-based multimodal management has not worked for them, and the main source of pain is thought to come from structures innervated by the medial branch nerve and they have moderate or severe levels of localised back pain (rated as 5 or more on a numeric rating scale (NRS 0- 10)) at the time of referral. Imaging for people with low back pain with specific facet joint pain is NOT a prerequisite for radiofrequency denervation.	Moderate to very low (Strength of recommendation: Weak (RCTs))

	Only do radiofrequency denervation in people with chronic low back pain after a positive response to a diagnostic medial branch block.	NA (Strength of recommendation: Experts opinion)
Epidurals	Consider epidural injections of local anaesthetic and steroid* in people with (sub)acute (at least 2-3 weeks) and severe** radicular pain. * Since the 1st of November 2016, only image-guided radicular and transforaminal injections are reimbursed in Belgium. **Severe radicular pain should be defined on an individual basis with the patient but a score rated as 5 or more on a numeric rating scale (NRS 0-10) could be considered as a reasonable yardstick.	Moderate to very low (Strength of recommendation: Weak (RCTs))
Other	-	
Recommendations for management: invasive, surgical		**Level of evidence**
Surgery and prognostic factors	-	
Spinal decompression	Consider spinal decompression for people with radicular pain (at least 6-12 weeks after the onset) when non-surgical evidence-based multimodal management has not improved pain or function and their radiological findings are consistent with the current clinical symptoms.	Low to very low (Strength of recommendation: Weak (RCTs & cohort studies))
Spinal fusion	Do not offer spinal fusion for people with low back pain unless within following preconditions: o after failure of a non-surgical evidence-based multimodal management, and o after evaluation in a multidisciplinary consultation and o preferably with data registration in a register)	Low to very low (Strength of recommendation: Strong (RCTs & cohort studies))
Disc replacement	Do not offer disc replacement in people with low back pain.	Low to very low (Strength of recommendation: Strong (RCTs))
Other	-	

Quality appraisal (AGREE-II)	**Ng 2020**	**Lin 2020[3]**
1. Scope & purpose	88.9	87
2. Stakeholder involvement	44.4	56
3. Rigour of development	62.5	70
4. Clarity of presentation	91.7	80
5. Applicability	35.4	60
6. Editorial independence	62.5	64
Overall assessment	-	61
Overall quality	-	High

Quality appraisal (AGREE-REX)	**Score (1-7)**
1. Evidence	7
2. Applicability to target users	7
3. Applicability to patients/populations	4
4. Values and preferences of target users	7
5. Values and preferences of patients/populations	4
6. Values and preferences of policy/decision-makers	4
7. Values and preferences of guideline developers	5
8. Purpose	6
9. Local application and adoption	5
Recommended in the context for which they were developed?	Yes
Recommended in the Australian context?	Yes

[3] Lin 2020 classified high-quality guidelines as those that scored 50% or higher in stakeholder involvement, rigour of development, and editorial independence.

Data extraction table: guideline		
Bibliographic reference	Toward Optimized Practice (TOP) Low Back Pain Working Group. Evidence-informed primary care management of low back pain: Clinical practice guideline. Edmonton, Alberta: Toward Optimized Practice; 2015.	
Scope (country)	Canada	
Institution	Institute of Health Economics	
Last search for evidence	2014	
Patient population	Adults 18+	
Diagnostic classification	Acute, subacute, and chronic low back pain	
Monitoring indicators	Changes in physician behaviour including: • improvement in assessing red flags • reduction in inappropriate ordering of diagnostic imaging tests • increase in provision of appropriate education and reassurance to patients • reduction of inappropriate recommendations regarding sick leave, bed rest, and continuing activity • increase in provision of correct recommendations for steroids, antidepressants, and muscle relaxants • reduction of inappropriate prescription of passive physiotherapy and injection therapy • increase in provision of appropriate recommendations for spinal manipulation • increase in the appropriate prescription of physiotherapy, active rehabilitation, and patient self-management programs • increase in the appropriate referral of patients to multidisciplinary pain clinics • reduction in recommendations for traction • reinforcement of the correct use of and adherence to guidelines for history taking and physical examination; prescribing of non-steroidal anti-inflammatory drugs (NSAIDs) and acetaminophen; and administration of heat and ice, therapeutic ultrasound, and massage therapy	
Recommendations for diagnosis		**Level of evidence**
Alternative diagnoses	If serious spinal pathology is excluded, manage as non-specific low back pain.	Systematic review
	Consider a diagnosis of ankylosing spondylitis, particularly in younger adults who, in the absence of injury, present with a history of needing to get out of bed at night and reduced side bending.	Systematic review
	Refer patient with red flags indicating a high likelihood of serious underlying pathology for immediate evaluation and treatment to an appropriate resource depending on what is available in your region (e.g., emergency room, relevant specialist). The presence of Cauda Equina Syndrome is considered to be a surgical emergency.	Expert opinion
	Schedule an urgent appointment with a physician if any of the red flags are present.	Expert opinion
	Order AP and lateral plain film imaging for low back pain when compression or other fracture is suspected. Oblique x-rays should not be done in this circumstance.	Systematic review & expert opinion
Risk assessment & stratification tools	The first qualified practitioner with the ability to do a full assessment (i.e., history, physical and neurological red flags, and psychosocial yellow flags) should assess the patient and undertake diagnostic triage.	Systematic review
	Assess for psychosocial risk factors (yellow flags) and conduct a detailed review if there is no improvement. Psychosocial risk factors include fear, financial problems, anger, depression, job dissatisfaction, family problems, or stress.	Systematic review
	Reassess patients whose symptoms are not resolving. Follow-up in one week if pain is severe and has not	Guideline

	subsided. Follow-up in six weeks if not substantially recovered. Consider further appropriate management if serious pathology (red flag) is identified. Identify psychosocial risk factors (yellow flags) and address appropriately.	
	There is insufficient evidence to recommend for or against using the STarT back screening tool and its associated system of stratified care for chronic low back pain.	Expert opinion
	There is inconclusive evidence to recommend for or against using the CORE back tool for chronic low back pain.	Systematic review
Imaging	DO NOT order diagnostic imaging test, including x-ray, CT, and MRI for acute low back pain (no red flags). In the absence of red flags, routine use of x-rays is not justified due to the risk of high doses of radiation and lack of specificity.	Systematic review
	DO NOT order imaging where the results are not going to affect treatment.	Expert opinion
	Only order imaging to clarify anatomy where the results will direct treatment. Imaging is typically not useful except for the following indications: MRI indications: Major or progressive neurologic deficit (e.g., foot drop or functionally limiting weakness such as hip flexion or knee extension); Cauda Equina Syndrome (sudden or progressive onset of new urinary retention, fecal incontinence, saddle [perineal] anesthesia radicular [leg] pain often bilateral, loss of voluntary rectal sphincter contraction); Progressively severe pain and debility despite non-interventional therapy; Severe or incapacitating back or leg pain (e.g., requiring hospitalization, precluding walking, or significantly limiting the activities of daily living); Clinical or radiological suspicion of neoplasm (e.g., lytic or sclerotic lesion on plain radiographs, history of cancer, unexplained weight loss, or systemic symptoms); Clinical or radiological suspicion of infection (e.g., endplate destruction of plain radiographs, history of drug or alcohol abuse, or systemic symptoms); When there are indications for surgical intervention or therapeutic injection in the presence of moderate to severe low back pain or radicular pain that is unresponsive to non-interventional therapy. CT indications: MRI is contraindicated, Primary bone tumors (detect or characterize), Trauma (rule out or characterize fracture, evaluate for healing).	Systematic reviews
	Consider referral for MRI if the patient has radiculopathy (leg-dominant pain) that persists after six weeks of non-interventional treatment. Continue non-interventional treatment when clinical and imaging findings correlate, and monitor for functional improvement as non-surgical recovery is still likely, unless symptoms progress or red flags prompt surgical referral. MRI indications: Major or progressive neurologic deficit (e.g., foot drop or functionally limiting weakness such as hip flexion or knee extension); Cauda Equina Syndrome (sudden or progressive onset of new urinary retention, fecal incontinence, saddle (perineal) anesthesia, radicular (leg) pain often bilateral, loss of voluntary rectal sphincter contraction); Progressively severe pain and	Systematic review & cohort study

	debility despite non-interventional therapy; Severe or incapacitating back or leg pain (e.g., requiring hospitalization, precluding walking, or significantly limiting the activities of daily living); Clinical or radiological suspicion of neoplasm (e.g., lytic or sclerotic lesion on plain radiographs, history of cancer, unexplained weight loss, or systemic symptoms); Clinical or radiological suspicion of infection (e.g., endplate destruction of plain radiographs, history of drug or alcohol abuse, or systemic symptoms); When there are indications for surgical intervention or therapeutic injection in the presence of moderate to severe low back pain or radicular pain that is unresponsive to non-interventional therapy. CT indications: MRI is contraindicated; Primary bone tumors (detect or characterize); Trauma (rule out or characterize fracture, evaluate for healing).	
	Lumbar spine x-rays may be required for correlation prior to more sophisticated diagnostic imaging, for example prior to an MRI scan. In this case, the views should be limited to standing AP and lateral in order to achieve better assessment of stability and stenosis. CT scans are best limited to suspected fractures or contraindication to MRI. X-rays of the lumbar spine are very poor indicators of serious pathology. Hence, in the absence of clinical red flags spinal x-rays are not encouraged. More specific and appropriate diagnostic imaging should be performed on the basis of the pathology being sought (e.g., DEXA scan for bone density and bone scan for tumours and inflammatory diseases). In the absence of red flags, radiculopathy, or neurogenic claudication, MRI scanning is generally of limited value. Oblique view x-rays are not recommended; they add only minimal information in a small percentage of cases and more than double the patient's exposure to radiation.	Expert opinion
	DO NOT recommend lumbar discography in primary care. Discography may be relevant as a diagnostic test before surgery in a patient with degenerative disc disease for diagnosis of discogenic back pain. However, the patient must have the ability to report if the pain produced by the injection is the same as the primary complaint. Discography is a controversial test because it: • Is painful, invasive, and expert-dependent • May induce further disc degeneration • Carries the risk of neurological injury and infection	Systematic review
	DO NOT recommend electrodiagnostic studies in primary care. They should only be used as an adjunct to clinical examination and imaging to rule out conditions that may mimic radiculopathy. When the diagnosis of lumbar disc herniation with radiculopathy is suspected, cross-sectional imaging is the diagnostic test of choice.	Expert opinion
Recommendations for management: non-invasive, non-pharmacological		**Level of evidence**
Self-management	*Acute/subacute* Educate the patient and describe the typically benign, long-term course of low back pain. Provide educational materials that are consistent with your verbal advice to reduce fear and anxiety (see patient information sheets and brochures). Other methods for providing self-care education, such as e-mail discussion groups and videos, are not well studied, but may also be beneficial.	Systematic review

	Chronic Provide brief education to optimize function. Brief education is defined as review of clinical examination results, provision of low back pain information and advice to stay active, and reduction of fear and catastrophizing.	Systematic review
	Chronic Recommend, if available, a structured community-based self-management group program for a patient interested in learning pain coping skills. These programs are offered through chronic disease management and chronic pain programs. Self-management programs focus on teaching core skills, such as self-monitoring of symptoms, to determine likely causal factors in pain exacerbations or ameliorations, activity pacing, relaxation techniques, communication skills, and modification of negative 'self-talk' or catastrophizing. These programs use goal setting and 'homework assignments' to encourage participants' self confidence in their ability to successfully manage their pain and increase their day-to-day functioning. Most community-based programs also include exercise and activity programming, which are also recommended. Where structured group programs are not available, refer to a trained professional for individual self-management counselling.	Guideline
	There is inconclusive evidence to recommend for or against back schools for acute or subacute low back pain.	Systematic review
Exercise	*Acute/subacute* Advise patient to stay active and continue his/her usual activity, including work, within the limits permitted by the pain. Recommend physical exercise. Patients should limit/pace any activity or exercise that causes spread of symptoms (peripheralization). Self-treating with an exercise program not specifically designed for the patient may aggravate symptoms.	Systematic review
	Recommend exercise in the treatment of subacute low back pain. The specific type of exercise may vary. Progressive exercise is based on a number of variables that include but are not limited to increasing physical activity, education regarding pain, and a graded exercise program. Emphasis should be on optimizing function and de-emphasizing pain. Refer patients whose pain is exacerbated by physical activity and exercise to a spinal care specialist such as a physical therapist, chiropractor, osteopathic physician, or physician who specializes in musculoskeletal medicine for individualized advice. Patients should limit/pace any activity or exercise that causes spread of symptoms (peripheralization). Self-treating with an exercise program not specifically designed for the patient may aggravate symptoms.	Systematic review
	There is insufficient evidence (no evidence from SRs) to recommend for or against yoga for acute or subacute low back pain.	Expert opinion
	Chronic Recommend exercise and therapeutic exercise. Encourage patient to initiate gentle exercise and to gradually increase the exercise level within his/her pain tolerance. Sophisticated equipment is not necessary. Other options may include unsupervised walking and group exercise programs, such as those offered by	Systematic review

	chronic disease management programs. The peer support of group exercise is likely to result in better outcomes, giving patients improved confidence and empowering them to manage with less medical intervention. When exercise exacerbates the patient's pain, the exercise program should be assessed by a qualified physical therapist or exercise specialist. If exercise persistently exacerbates their pain, patients should be further assessed by a physician to determine if further investigation, medication, treatment, or consultation is required. Some studies reported mild negative reactions to exercise programs, such as increased low back pain and muscle soreness in some patients.	
	Recommend therapeutic aquatic exercise for chronic low back pain.	Systematic review
	There is some evidence that Viniyoga and Iyengar types of yoga can be helpful in the treatment of chronic low back pain. No evidence was found to recommend other types of yoga. It is important to find an instructor who has experience in working with individuals who have low back pain to avoid further injury.	Systematic review
Orthotics	There is insufficient evidence (no evidence from SRs) to recommend for or against back belts, corsets, non-motorized traction, or over-the-counter TENS for chronic low back pain.	Expert opinion
Manual therapies	*Acute/subacute* DO NOT use traction. Traction has been associated with significant adverse events. Passive treatment modalities such as traction should be avoided as mono-therapy and not routinely be used because they may increase the risk of illness behavior and chronicity. Adverse effects from traction include reduced muscle tone, bone demineralization, and thrombophlebitis.	Systematic review
	DO NOT use motorized traction for chronic low back pain.	Systematic review
	There is inconclusive evidence to recommend for or against gravity tables (inversion/inverted traction, self-traction, gravitational traction) for chronic low back pain.	Systematic review
	Acute/subacute Patients who are not improving may benefit from referral for spinal manipulation provided by a spinal care specialist such as a physical therapist, chiropractor, osteopathic physician, or physician who specializes in musculoskeletal medicine. Risk of serious complication after spinal manipulation is low (estimated risk: Cauda Equina Syndrome less than one in one million). Current guidelines contraindicate manipulation in patients with severe or progressive neurological deficit.	Systematic review
	There is inconclusive evidence to recommend for or against the clinical prediction rule for spinal manipulative therapy for acute or subacute low back pain.	Systematic review
	There is inconclusive evidence to recommend for or against manual therapy – massage therapy for acute or subacute low back pain.	Systematic review

	There is insufficient evidence (no evidence from SRs) to recommend for or against craniosacral massage/therapy for acute or subacute low back pain.	Expert opinion
	There is insufficient evidence (no evidence from SRs) to recommend for or against craniosacral massage/therapy for chronic low back pain.	Expert opinion
	There is insufficient evidence (no evidence from SRs) to recommend for or against manual therapy – spinal mobilization for acute or subacute low back pain.	Expert opinion
	There is insufficient evidence (no evidence from SRs) to recommend for or against touch therapies for acute or subacute low back pain.	Expert opinion
	There is insufficient evidence (no evidence from SRs) to recommend for or against touch therapies for chronic low back pain.	Expert opinion
	Chronic Recommend massage therapy as an adjunct to a broader active rehabilitation program.	Systematic review
	There is inconclusive evidence to recommend for or against spinal manipulative treatment for chronic low back pain.	Systematic review
	There is inconclusive evidence to recommend for or against spinal mobilization for chronic low back pain.	Systematic review
	There is insufficient evidence (no evidence from SRs) to recommend for or against intramuscular stimulation for chronic low back pain.	Expert opinion
Acupuncture	There is inconclusive evidence to recommend for or against acupuncture for acute or subacute low back pain.	Systematic review
	Chronic Recommend acupuncture as a short-term therapy or as an adjunct to a broader active rehabilitation program.	Systematic review
Electrotherapies	DO NOT use therapeutic ultrasound for acute or subacute low back pain.	RCT & systematic review
	There is insufficient evidence to recommend for or against the use of therapeutic ultrasound for chronic low back pain. Based on expert opinion, this modality is overused relative to any potential therapeutic benefit.	Systematic review
	DO NOT use TENS for acute low back pain.	Systematic review
	DO NOT use TENS as a sole treatment for chronic low back pain.	Systematic review
	Chronic TENS may be useful as an adjunct in select patients for pain control to reduce the need for medications. A short trial (two to three treatments) using different stimulation parameters should be sufficient to determine if the patient will respond to this modality.	Expert opinion
	There is inconclusive evidence to recommend for or against low-level laser therapy for acute or subacute low back pain.	RCT & systematic review
	There is inconclusive evidence to recommend for or against low-level laser therapy for chronic low back pain.	Systematic review
	There is inconclusive evidence to recommend for or against short-wave diathermy for acute or subacute low back pain.	RCT & systematic review
	There is insufficient evidence (no evidence from SRs) to recommend for or against interferential current therapy for acute or subacute low back pain.	Expert opinion
	There is insufficient evidence (no evidence from SRs) to recommend for or against interferential current therapy for chronic low back pain.	Expert opinion

	There is insufficient evidence (no evidence from SRs) to recommend for or against shock-wave treatment for acute or subacute low back pain.	Expert opinion
	There is inconclusive evidence to recommend for or against shock-wave treatment for chronic low back pain.	Systematic review
Psychological therapy	There is inconclusive evidence to recommend for or against operant conditioning provided by a physiotherapist for acute or subacute low back pain.	Systematic review
	Chronic Where group chronic pain cognitive behavioural therapy programs are not available, consider referral for individual cognitive behavioural therapy provided by a psychologist or other qualified provider with training and/or experience in cognitive behavioural therapy for chronic pain management.	Systematic review
	Progressive relaxation or electromyographic (EMG) biofeedback can be considered for chronic pain.	Systematic review
Combined physical and psychological	For subacute low back pain (duration four to eight weeks), intensive interdisciplinary rehabilitation (defined as an intervention that includes a physician consultation coordinated with a psychological, physical therapy, social, or vocational intervention) is moderately effective. There is evidence that functional restoration with a cognitive-behavioural component reduces work absenteeism.	Systematic review
	No evidence was found to recommend interdisciplinary rehabilitation for acute low back pain (pain less than four weeks).	Systematic review
Return-to-work	Encourage early return to work. Refer workers with low back pain beyond six weeks to a comprehensive return-to-work rehabilitation program. Effective programs are typically multidisciplinary and involve case management, education about keeping active, psychological or behavioural treatment, and participation in an exercise program. Working despite some residual discomfort poses no threat and will not harm patients.	Systematic review
	There is insufficient evidence (no evidence from SRs) to recommend for or against modified work duties for facilitating return to work for acute or subacute low back pain.	RCT
Other	Recommend superficial heat (application of heating pads or heated blankets) for the short-term relief of acute low back pain.	Systematic review
	Acute/subacute Clinical experience supports a role for superficial cold packs and alternating heat and cold as per patient preference. Heat or cold should not be applied directly to the skin, and not for longer than 15 to 20 minutes. Use with care if lack of protective sensation.	Expert opinion
	Acute/subacute DO NOT prescribe bed rest as a treatment. If the patient must rest, bed rest should be limited to no more than two days. Prolonged bed rest for more than four days is not recommended for acute low back problems. Bed rest for longer than two days increases the amount of sick leave compared with early resumption of normal activity in acute low back pain. There is evidence that prolonged bed rest is harmful.	Systematic review
	There is inconclusive evidence to recommend for or against mindfulness-based meditation for chronic low back pain.	Systematic review

	There is inconclusive evidence to recommend for or against spa therapy for chronic low back pain.	Systematic review
Recommendations for management: non-invasive, pharmacological		**Level of evidence**
NSAIDs	*Acute/subacute* Prescribe medication, if necessary, for pain relief preferably to be taken at regular intervals. First choice acetaminophen; second choice NSAIDs. Serious adverse effects of NSAIDs include gastrointestinal complications (e.g., bleeding, perforation, and increased blood pressure).	Systematic review
	There is inconclusive evidence to recommend for or against topical NSAIDS for acute or subacute low back pain.	Systematic review
	Chronic Recommend acetaminophen and NSAIDs. A proton pump inhibitor (PPI) should be considered for patients over 45 years of age when using an oral NSAID/COX-2 inhibitor. Cardiovascular, renal, gastrointestinal risks, and comorbidities need to be taken into account when prescribing any NSAID. NSAIDs are associated with mild to moderately severe side effects such as: abdominal pain, bleeding, diarrhea, edema, dry mouth, rash, dizziness, headache, and tiredness.	Systematic review & expert opinion
	There is insufficient evidence (no evidence from SRs) to recommend for or against topical NSAIDs for chronic low back pain.	Expert opinion
Opioids	Cautious and responsible use of opioids should only be considered for carefully selected patients with severe acute pain not controlled with acetaminophen and NSAIDs, at a minimum effective dose only for a limited period of time, usually less than one to two weeks. Ongoing need for opioids is an indication for reassessment. In general, opioids and compound analgesics have a substantially increased risk of side effects and risk of dependence compared with acetaminophen alone. Advise patient to avoid driving until cognitive side effects have been ruled out.	Systematic review
	Evidence is lacking for long-term use of opioids for chronic low back pain. However, there is some evidence of the benefit of opioids for short-term pain and function improvements. Long-term use of opioids should only follow an unsuccessful trial of non- opioid analgesics. In severe chronic pain, strong opioids require careful consideration. Long-acting opioids are preferred as they can establish a steady state blood and tissue level that may minimize the patient's experience of unsteady dosing (cyclical improvement and/or withdrawal) from short-acting opioids. Any use of opioids over the long term will lead to physical dependence. Avoid escalating doses above 50 mg/day if initiating, and above 90 mg/day oral morphine equivalent for ongoing use. Careful attention to incremental improvements in pain or function is required to justify ongoing use of opioids. Because little is known about the long-term effects of therapy it should be monitored carefully.	Systematic review & expert opinion

	A history of addiction is a relative contraindication. Consultation with an addictions specialist may be helpful in these cases.	
Paracetamol	*Acute/subacute* Prescribe medication, if necessary, for pain relief preferably to be taken at regular intervals. First choice acetaminophen; second choice NSAIDs.	Systematic review
	Chronic Recommend acetaminophen and NSAIDs.	Systematic review & expert opinion
Other	*Acute/subacute* Prescribe medication, if necessary, for pain relief preferably to be taken at regular intervals. First choice acetaminophen; second choice NSAIDs. Only consider adding a short course of muscle relaxant (benzodiazepines, cyclobenzaprine, or antispasticity drugs) on its own, or added to NSAIDs, if acetaminophen or NSAIDs have failed to reduce pain. Drowsiness, dizziness, and dependency are common adverse effects of muscle relaxants.	Systematic review
	Acute/subacute DO NOT prescribe antibiotic treatment in primary care.	Expert opinion
	Chronic DO NOT prescribe antibiotic treatment for MRI modic changes in primary care.	Expert opinion
	DO NOT use oral steroids for acute low back pain.	Expert opinion
	There is insufficient evidence to recommend for or against analgesic antidepressants such as amitriptyline, other tricyclic antidepressants, or serotonin-norepinephrine reuptake inhibitors (SNRIs) for acute low back pain with or without leg dominant pain.	Expert opinion
	There is insufficient evidence to recommend for or against anticonvulsants (gabapentin, topiramate) for acute low back pain with or without leg dominant pain.	Expert opinion
	There is insufficient evidence to recommend for or against marijuana/dried cannabis for acute or subacute low back pain.	Expert opinion
	There is insufficient evidence to recommend for or against marijuana/dried cannabis for chronic low back pain.	Expert opinion
	There is inconclusive evidence to recommend for or against the clinical prediction rule for herbal medicine for acute or subacute low back pain.	Systematic review
	There is insufficient evidence (no evidence from SRs) to recommend for or against Tapentadol for acute or subacute low back pain.	Expert opinion
	There is insufficient evidence (no evidence from SRs) to recommend for or against Tapentadol (Nucynta) for chronic low back pain.	Expert opinion
	Chronic Muscle relaxants (e.g., cyclobenzaprine) may be appropriate in selected patients for symptomatic relief of pain and muscle spasm. Caution must be exercised with managing side effects, particularly drowsiness, and also with patient selection given the abuse potential for this class of drugs.	Systematic review
	Tricyclic antidepressants amitriptyline and nortriptyline may have a small to moderate effect for chronic low back pain with or without leg dominant pain at much lower doses than might be used for depression. Possible side effects include drowsiness and anticholinergic effects.	Systematic review
	The following herbal medicines can be considered as treatment options for acute exacerbations of chronic low back pain:	Systematic review

	• An aqueous extract of Harpagophytum procumbens (also called devil's claw, grapple plant, wood spider) at a standardized daily dosage of 50 mg harpagoside • A combination of extract of Salix daphnoides and Salix purpurea (also called purple willow, red willow) at a standardized dosage of 240 mg salicin/day • A plaster of Capsicum frutescens (also called bird pepper, hot pepper, red chili, spur pepper, Tabasco pepper)	
	DO NOT offer SSRIs for treating chronic low back pain. They may, however, be indicated for co-morbid depression.	Systematic review
	There is inconclusive evidence to recommend for or against Duloxetine for chronic low back pain.	Systematic review
	There is insufficient evidence (no evidence from SRs) to recommend for or against Buprenorphine transdermal system for chronic low back pain.	Expert opinion
Recommendations for management: invasive, non-surgical		**Level of evidence**
Spinal injections	*Chronic* DO NOT order diagnostic Selective Nerve Root Blocks in primary care. There is evidence to support their use in specialty services to assist in diagnosis when multiple levels may be involved; they require specialist follow-up to interpret.	Systematic review
	Chronic There is inconclusive evidence to recommend for or against diagnostic lumbar facet joint nerve blocks.	Systematic review
	Chronic There is insufficient evidence to recommend for or against diagnostic sacroiliac joint blocks.	Systematic review
	Chronic There is insufficient evidence to recommend for or against intra-articular sacroiliac injections.	Expert opinion
Radiofrequency denervation	There is insufficient evidence to recommend for or against conventional radiofrequency neurotomy with or without appropriate diagnostic evaluation by controlled lumbar facet joint blocks.	Expert opinion
Epidurals	DO NOT use epidural steroid injections for acute low back pain in the absence of radiculopathy.	Systematic review
	There is inconclusive evidence to recommend for or against epidural steroid injections in the presence of radiculopathy. Image-guided epidural steroid injections may be helpful for some patients with lumbar radicular pain for longer than six weeks who have not responded to non-interventional treatments. Clinical experience suggests that patients who have responded favourably (improved function and pain relief) to an epidural steroid injection may benefit from a follow-up injection after three months. Adverse effects are infrequent and include headache, fever, and subdural penetration; rare but catastrophic events, including epidural abscess and paralysis, can occur.	Systematic review & expert opinion
	Chronic There is inconclusive evidence to recommend for or against epidural steroid injections. For patients with leg pain, image-guided epidural steroid injections may be effective in providing short-term and occasional long-term pain relief. Clinical experience suggests that patients who have responded favourably (improved function and pain relief) to an epidural steroid injection may benefit from a follow-up injection after three months.	Systematic review & expert opinion

Other	DO NOT prescribe systemic corticosteroids (intramuscular injection) for treatment of patients with acute low back pain and a negative result on a straight-leg-raise test.	RCT
	DO NOT use prolotherapy as a sole treatment for chronic low back pain.	Systematic review
	Chronic Prolotherapy may be useful for carefully selected and monitored patients who are participating in an appropriate program of therapeutic exercise and/or manipulation or mobilization.	Expert opinion
	There is inconclusive evidence to recommend for or against trigger point injections for chronic low back pain.	Systematic review
Recommendations for management: invasive, surgical		**Level of evidence**
Surgery and prognostic factors	Refer patients who: are engaged in an optimal package of care including a combined physical and psychological treatment program (usually six months of care); and still have severe low back pain for which the patient would consider surgery, particularly if related to spinal stenosis with leg pain or claudication To optimize surgical outcome, anyone with significant psychological distress should be referred for appropriate treatment. Counsel the patient that it may be determined that surgery may not be an option in his/her case.	Expert opinion
Spinal decompression	-	
Spinal fusion	-	
Disc replacement	-	
Other	-	

Quality appraisal (AGREE-II)	**Lin 2020[4]**	**Meroni 2019[5]**	**Doniselli 2019[6]**
1. Scope & purpose	72	94	94
2. Stakeholder involvement	31	87	72
3. Rigour of development	17	94	79
4. Clarity of presentation	74	91	89
5. Applicability	19	68	57
6. Editorial independence	0	97	71
Overall assessment	33	89	79
Overall quality	Low	Excellent	High

Quality appraisal (AGREE-REX)	**Score (1-7)**
1. Evidence	5
2. Applicability to target users	7
3. Applicability to patients/populations	6
4. Values and preferences of target users	7
5. Values and preferences of patients/populations	5
6. Values and preferences of policy/decision-makers	5
7. Values and preferences of guideline developers	7
8. Purpose	7
9. Local application and adoption	7
Recommended in the context for which they were developed?	Yes
Recommended in the Australian context?	Yes

[4] Lin 2020 classified high-quality guidelines as those that scored 50% or higher in stakeholder involvement, rigour of development, and editorial independence.

[5] Meroni 2019 considered guidelines with an average domain score of 75% or higher to be excellent, and those with a score below 60% to be fair/poor.

[6] Doniselli 2019 defined high quality as when 5 or more domains scored >60%, average when 3 or 4 domains scored >60%, and low quality when 2 domains or fewer scored >60%.

Data extraction table: guideline		
Bibliographic reference	Stochkendahl MJ, Kjaer P, Hartvigsen J, Kongsted A, Aaboe J, Andersen M, et al. National Clinical Guidelines for non-surgical treatment of patients with recent onset low back pain or lumbar radiculopathy. Eur Spine J. 2018;27(1):60-75.	
Scope (country)	Denmark	
Institution	Danish Health Authority	
Last search for evidence	March 2016	
Patient population	Patients above the age of 16 years suffering from non-specific low back pain with or without associated leg pain, but no signs of lumbar radiculopathy, and (2) patients with symptoms and clinical signs of lumbar radiculopathy above the age of 18 years	
Diagnostic classification	Recent onset (<12 weeks) non-specific low back pain and lumbar radiculopathy.	
Monitoring indicators	-	
Recommendations for diagnosis		**Level of evidence**
Alternative diagnoses	-	
Risk assessment & stratification tools	It is not good practice to routinely offer targeted treatment in patients with new onset LBP in addition to usual care over usual care, as the effect is unknown.	Consensus recommendation
Imaging	Do not routinely offer imaging (MRI or X-ray) to patients with recent onset LBP, as the evidence does not support a positive effect.	Very low (weak/conditional recommendation)
Recommendations for management: non-invasive, non-pharmacological		**Level of evidence**
Self-management	Consider offering individualised patient education in addition to usual care in patients with recent onset low back pain and the ability to increase self-efficacy	Very low (weak/conditional recommendation)
Exercise	Consider offering patients with recent onset LBP advice about staying active rather than advice about rest.	Low (weak/conditional recommendation)
	Consider offering patients with recent onset LBP supervised exercise in addition to usual care.	Low (weak/conditional recommendation)
Orthotics	-	
Manual therapies	Consider offering patients with recent onset LBP spinal manual therapy in addition to usual care.	Low (weak/conditional recommendation)
Acupuncture	Do only offer patients with recent onset LBP acupuncture in addition to usual care after careful consideration, as the effect is uncertain.	Very low (weak/conditional recommendation)
Electrotherapies	-	
Psychological therapy	-	
Combined physical and psychological	-	
Return-to-work	-	
Other	-	
Recommendations for management: non-invasive, pharmacological		**Level of evidence**
NSAIDs	Do only offer patients with recent onset LBP NSAIDs in addition to usual care after careful consideration, as the evidence points towards no short-term effect.	Low (weak/conditional recommendation)
Opioids	Do only offer patients with recent onset LBP opioids in addition to usual care after careful consideration, as the evidence points towards no short-term effect.	Low (weak/conditional recommendation)

Paracetamol	Do only offer patients with recent onset LBP paracetamol in addition to usual care after careful consideration, as the evidence points towards no short-term effect.	Moderate (weak/conditional recommendation)
Other	-	
Recommendations for management: invasive, non-surgical		**Level of evidence**
Spinal injections	-	
Radiofrequency denervation	-	
Epidurals	-	
Other	-	
Recommendations for management: invasive, surgical		**Level of evidence**
Surgery and prognostic factors	-	
Spinal decompression	-	
Spinal fusion	-	
Disc replacement	-	
Other	-	

Quality appraisal (AGREE-II)	**Lin 2020[7]**	**Doniselli 2018[8]**
1. Scope & purpose	87	89
2. Stakeholder involvement	65	88
3. Rigour of development	77	90
4. Clarity of presentation	80	88
5. Applicability	32	48
6. Editorial independence	64	71
Overall assessment	67	92
Overall quality	High	High

Quality appraisal (AGREE-REX)	**Score (1-7)**
1. Evidence	7
2. Applicability to target users	6
3. Applicability to patients/populations	5
4. Values and preferences of target users	5
5. Values and preferences of patients/populations	5
6. Values and preferences of policy/decision-makers	5
7. Values and preferences of guideline developers	6
8. Purpose	3
9. Local application and adoption	4
Recommended in the context for which they were developed?	Yes
Recommended in the Australian context?	Yes

[7] Lin 2020 classified high-quality guidelines as those that scored 50% or higher in stakeholder involvement, rigour of development, and editorial independence.

[8] Doniselli 2019 defined high quality as when 5 or more domains scored >60%, average when 3 or 4 domains scored >60%, and low quality when 2 domains or fewer scored >60%.

Data extraction table: guideline		
Bibliographic reference	Chenot JF, Greitemann B, Kladny B, Petzke F, Pfingsten M, Schorr SG. Non-Specific Low Back Pain. Dtsch. 2017;114(51-52):883-90.	
Scope (country)	Germany	
Institution	German Disease Management Group	
Last search for evidence	NR (2015?)	
Patient population	-	
Diagnostic classification	Non-specific low back pain.	
Monitoring indicators	-	
Recommendations for diagnosis		**Level of evidence**
Alternative diagnoses	If the initial history and physical examination of a patient with low back pain do not yield any sign of a dangerous course of the disease or other serious conditions, no further diagnostic steps should be undertaken for the time being	Expert consensus (Strong recommendation)
	If any somatic warning signs (“red flags”) are present, then further imaging or laboratory tests and/or referral to a specialist should ensue, depending on the particular diagnosis that is suspected and its degree of urgency.	Expert consensus (Strong recommendation)
Risk assessment & stratification tools	Psychosocial and workplace-related risk factors should be considered from the beginning.	Expert consensus (Strong recommendation)
	After four weeks of persistent pain with an inadequate response to treatment that has been provided in accordance with the guideline, the coordinating physician should assess psychosocial risk factors (“yellow flags”) with a standardized screening instrument (e.g., the STarT Back Tool or the Örebro Short Questionnaire) …	Expert consensus (Weak recommendation)
	…and may also assess workplace-related factors with a standardized screening instrument.	Expert consensus (Open recommendation)
	Patients whose activities in everyday life are still restricted and who still have inadequate relief of pain despite 12 weeks of treatment in accordance with the guideline, as well as patients with an exacerbation of chronic non-specific low back pain, should undergo multidisciplinary assessment.	Expert consensus (Strong recommendation)
Imaging	Patients with acute or recurrent low back pain in whom the history and physical examination yield no evidence of a dangerous course of the disease or other serious condition should not undergo any imaging.	Systematic reviews (Strong recommendation)
	For patients whose low back pain continues to limit their physical activity or has worsened despite treatment in accordance with the guideline, the indication for diagnostic imaging should be reassessed in 4 to 6 weeks	Expert consensus based on systematic review (Strong recommendation)
	Patients with unchanged symptoms should not undergo repeated imaging, as there is no reason to expect any relevant structural changes calling for a change in the treatment strategy.	Expert consensus (Strong recommendation)
Recommendations for management: non-invasive, non-pharmacological		**Level of evidence**
Self-management	Over the course of the disease, the physician should continually explain the condition and the treatment to the patient and should encourage the pursuit of a healthful lifestyle, including regular physical exercise.	Systematic review (Strong recommendation)

	"Back school" can be used to treat chronic low back pain as part of an overall concept in combination with activating therapeutic measures.	Systematic review (Open recommendation)
Exercise	Over the course of the disease, the physician should continually explain the condition and the treatment to the patient and should encourage the pursuit of a healthful lifestyle, including regular physical exercise.	Systematic review (Strong recommendation)
	Patients should be instructed to continue their usual physical activities as much as possible.	Systematic review (Strong recommendation)
	Exercise therapy combined with educative measures based on behavioral-therapeutic principles should be used in the primary treatment of chronic non-specific low back pain. It yields more effective pain reduction and better functional ability than can be achieved with general medical care and passive treatment measures. Programs for strengthening and stabilizing the musculature seem to relieve low back pain better than programs with a cardiopulmonary orientation. Reviews of RCTs have shown that exercise programs based on a behavior-therapeutic approach improve physical functional ability and speed up the return to work. Current evidence does not show which specific type of exercise therapy is best for pain relief and improved functional ability. The choice of exercise therapy is, therefore, based mainly on the patient's preference, everyday life circumstances, and physical fitness and the availability of a qualified therapist to carry it out.	Systematic review (Strong recommendation)
	Weak recommendation for rehabilitative sports and functional training.	Expert consensus (Weak recommendation)
	Ergotherapy can be used to treat chronic low back pain as part of an overall concept in combination with activating therapeutic measures.	Systematic review (Open recommendation)
Orthotics	Medical aids are discouraged. They may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that it causes harm.	Systematic review (Strong recommendation)
Manual therapies	Traction devices are discouraged. They may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that they cause harm.	Systematic review (Strong recommendation)
	Manual therapies such as manipulation and mobilization can be used to treat chronic low back pain as part of an overall concept in combination with activating therapeutic measures.	Systematic review (Open recommendation)
	Massage can be used to treat chronic low back pain as part of an overall concept in combination with activating therapeutic measures.	Systematic review (Open recommendation)
Acupuncture	Acupuncture can be used to treat chronic low back pain as part of an overall concept in combination with activating therapeutic measures.	Systematic review (Open recommendation)
Electrotherapies	Interference-current therapy is discouraged. It may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that it causes harm.	RCTs (Strong recommendation)
	Short-wave diathermy is discouraged. It may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that it causes harm.	RCTs (Strong recommendation)
	Laser therapy is discouraged. It may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that it causes harm.	Systematic review (Strong recommendation)

	Magnetic field therapy is discouraged. It may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that it causes harm.	Systematic review (Strong recommendation)
	Percutaneous electrical nerve stimulation (PENS) is discouraged. It may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that it causes harm.	Systematic review (Strong recommendation)
	Transcutaneous electrical nerve stimulation (TENS) is discouraged. It may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that it causes harm.	Systematic review (Strong recommendation)
	Therapeutic ultrasound is discouraged. It may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that it causes harm.	Systematic review (Strong recommendation)
Psychological therapy	-	
Combined physical and psychological	Patients with subacute and chronic non-specific low back pain should be treated in multimodal programs if less intensive evidence-based treatments have yielded an insufficient benefit.	Systematic review (Strong recommendation)
Return-to-work	-	
Other	Bed rest should not be a part of the treatment of non-specific low back pain, and patients should be advised against it.	Systematic review (Strong recommendation)
	Weak recommendation for progressive muscle relaxation.	Systematic review (Weak recommendation)
	Self-administered heat therapy can be used to treat chronic low back pain as part of an overall concept in combination with activating therapeutic measures.	Systematic review (Open recommendation)
	Kinesiotaping is discouraged. It may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that it causes harm.	Systematic review (Strong recommendation)
	Cryotherapy is discouraged. It may still be used in individual cases, in combination with physical exercise, as long as there is no evidence that it causes harm.	Systematic review (Strong recommendation)
Recommendations for management: non-invasive, pharmacological		**Level of evidence**
NSAIDs	Nonsteroidal anti-inflammatory drugs (NSAID) are the pain-relieving drugs most likely recommended. To minimize side effects NSAIDs should be given in the lowest effective dose and for the shortest possible time.	Systematic review (Weak recommendation)
	Considering the contraindications, COX-2-inhibitors can be used if NSAIDs are contraindicated or poorly tolerated (off-label-use)	Systematic review (Open recommendation)
Opioids	Opioid drugs can be a treatment option for acute non-specific low back pain if non-opioid analgesics are contraindicated or have been found to be ineffective in the individual patient.	RCTs (Open recommendation)
	The indication for opioid drugs should be regularly reassessed at intervals of no longer than 4 weeks.	Guideline (Strong recommendation)
	They can be used to treat chronic non-specific low back pain for 4 to 12 weeks initially.	Systematic review (Open recommendation)
	If this brief period of treatment brings about a relevant improvement in the patient's pain and/or subjective physical impairment, while causing only minor or no side effects, then opioid drugs can also be a long-term therapeutic option.	Systematic review (Open recommendation)

Paracetamol	In the light of new evidence, paracetamol (= acetaminophen) should no longer be used.	Systematic review (Weak recommendation)
Other	In individual cases, metamizole can be considered as an treatment option if non-opioid analgesics are contraindicated or poorly tolerated.	Expert consensus (Open recommendation)
	Nor should flupirtine be used to treat non-specific low back pain: its inadequately documented benefit is outweighed by its risks—mainly hepatotoxicity, ranging from elevated liver function parameters to organ failure, and potential dependence.	Systematic review (Strong recommendation)
Recommendations for management: invasive, non-surgical		**Level of evidence**
Spinal injections	-	
Radiofrequency denervation	-	
Epidurals	-	
Other	Non-specific low back pain should not be treated with percutaneous procedures.	Systematic review (Strong recommendation)
	Nor should intravenously, intra-muscularly, or subcutaneously administered analgesic drugs, local anesthetics, glucocorticoids, or mixed infusions be used.	Systematic review (Strong recommendation)
Recommendations for management: invasive, surgical		**Level of evidence**
Surgery and prognostic factors	Non-specific low back pain should not be treated with surgery.	Systematic review (Strong recommendation)
Spinal decompression	-	
Spinal fusion	-	
Disc replacement	-	
Other	-	

Quality appraisal (AGREE-II)	**Ng 2020**	**Meroni 2019[9]**
1. Scope & purpose	83.3	93
2. Stakeholder involvement	47.2	87
3. Rigour of development	33.3	73
4. Clarity of presentation	80.6	94
5. Applicability	22.9	57
6. Editorial independence	33.3	75
Overall assessment	-	80
Overall quality	-	Excellent

Quality appraisal (AGREE-REX)	**Score (1-7)**
1. Evidence	6
2. Applicability to target users	6
3. Applicability to patients/populations	4
4. Values and preferences of target users	6
5. Values and preferences of patients/populations	4
6. Values and preferences of policy/decision-makers	6
7. Values and preferences of guideline developers	6
8. Purpose	6
9. Local application and adoption	5
Recommended in the context for which they were developed?	Yes
Recommended in the Australian context?	Yes

Data extraction table: guideline

[9] Meroni 2019 considered guidelines with an average domain score of 75% or higher to be excellent, and those with a score below 60% to be fair/poor.

Bibliographic reference	National Institute for Health and Care Excellence. Low back pain and sciatica in over 16s: assessment and management (NICE guideline NG59). London: NICE; 2016.	
Scope (country)	UK	
Institution	National Institute for Health and Care Excellence	
Last search for evidence	15 December 2015 (Surveillance conducted Oct 2018 re spinal fusion, no changes made to guidance)	
Patient population	People aged 16 years or above with low back pain with or without sciatica.	
Diagnostic classification	Low back pain with or without sciatica	
Monitoring indicators	*Baseline audit tool provided, which services can use to track implementation of the guidance. The tool lists each recommendation, and provides fields for each for services to note their current activity, and actions needed to implement recommendations that have not yet been met.*	
Recommendations for diagnosis		**Level of evidence**
Alternative diagnoses	Think about alternative diagnoses when examining or reviewing people with low back pain, particularly if they develop new or changed symptoms. Exclude specific causes of low back pain, for example, cancer, infection, trauma or inflammatory disease such as spondyloarthritis.	
Risk assessment & stratification tools	Consider using risk stratification (for example, the STarT Back risk assessment tool) at first point of contact with a healthcare professional for each new episode of low back pain with or without sciatica to inform shared decision-making about stratified management.	Low-very low
	Based on risk stratification, consider: simpler and less intensive support for people with low back pain with or without sciatica likely to improve quickly and have a good outcome (for example, reassurance, advice to keep active and guidance on self-management) more complex and intensive support for people with low back pain with or without sciatica at higher risk of a poor outcome (for example, exercise programmes with or without manual therapy or using a psychological approach).	Low-very low
Imaging	Do not routinely offer imaging in a non-specialist setting for people with low back pain with or without sciatica.	Low-very low
	Explain to people with low back pain with or without sciatica that if they are being referred for specialist opinion, they may not need imaging.	Low-very low
	Consider imaging in specialist settings of care (for example, a musculoskeletal interface clinic or hospital) for people with low back pain with or without sciatica only if the result is likely to change management.	Low-very low
Recommendations for management: non-invasive, non-pharmacological		**Level of evidence**
Self-management	Provide people with advice and information, tailored to their needs and capabilities, to help them self-manage their low back pain with or without sciatica, at all steps of the treatment pathway. Include: information on the nature of low back pain and sciatica encouragement to continue with normal activities.	Moderate-very low
Exercise	Consider a group exercise programme (biomechanical, aerobic, mind–body or a combination of approaches) within the NHS for people with a specific episode or flare-up of low back pain with or without sciatica. Take people's specific needs, preferences and capabilities into account when choosing the type of exercise.	Moderate-very low
Orthotics	Do not offer belts or corsets for managing low back pain with or without sciatica.	Moderate-very low

	Do not offer foot orthotics for managing low back pain with or without sciatica.	Moderate-very low
	Do not offer rocker sole shoes for managing low back pain with or without sciatica.	Moderate-very low
Manual therapies	Do not offer traction for managing low back pain with or without sciatica.	Low-very low
	Consider manual therapy (spinal manipulation, mobilisation or soft tissue techniques such as massage) for managing low back pain with or without sciatica, but only as part of a treatment package including exercise, with or without psychological therapy.	Low-very low
Acupuncture	Do not offer acupuncture for managing low back pain with or without sciatica.	High-very low
Electrotherapies	Do not offer ultrasound for managing low back pain with or without sciatica.	Low-very low
	Do not offer percutaneous electrical nerve simulation (PENS) for managing low back pain with or without sciatica.	Moderate-very low
	Do not offer transcutaneous electrical nerve simulation (TENS) for managing low back pain with or without sciatica.	Low-very low
	Do not offer interferential therapy for managing low back pain with or without sciatica.	High-low
Psychological therapy	Consider psychological therapies using a cognitive behavioural approach for managing low back pain with or without sciatica but only as part of a treatment package including exercise, with or without manual therapy (spinal manipulation, mobilisation or soft tissue techniques such as massage).	Moderate-low
Combined physical and psychological	Consider a combined physical and psychological programme, incorporating a cognitive behavioural approach (preferably in a group context that takes into account a person's specific needs and capabilities), for people with persistent low back pain or sciatica: when they have significant psychosocial obstacles to recovery (for example, avoiding normal activities based on inappropriate beliefs about their condition) **or** when previous treatments have not been effective.	Moderate-very low
Return-to-work	Promote and facilitate return to work or normal activities of daily living for people with low back pain with or without sciatica.	High-very low
Other	-	
Recommendations for management: non-invasive, pharmacological		**Level of evidence**
NSAIDs	Consider oral non-steroidal anti-inflammatory drugs (NSAIDs) for managing low back pain, taking into account potential differences in gastrointestinal, liver and cardio-renal toxicity, and the person's risk factors, including age.	Moderate-very low
	When prescribing oral NSAIDs for low back pain, think about appropriate clinical assessment, ongoing monitoring of risk factors, and the use of gastroprotective treatment.	
	Prescribe oral NSAIDs for low back pain at the lowest effective dose for the shortest possible period of time.	
Opioids	Consider weak opioids (with or without paracetamol) for managing acute low back pain only if an NSAID is contraindicated, not tolerated or has been ineffective.	
	Do not routinely offer opioids for managing acute low back pain.	

	Do not offer opioids for managing chronic low back pain.	
Paracetamol	Do not offer paracetamol alone for managing low back pain.	
Other	Do not offer selective serotonin reuptake inhibitors, serotonin–norepinephrine reuptake inhibitors or tricyclic antidepressants for managing low back pain.	
	Do not offer anticonvulsants for managing low back pain.	
Recommendations for management: invasive, non-surgical		**Level of evidence**
Spinal injections	Do not offer spinal injections for managing low back pain.	Low-very low
Radiofrequency denervation	Consider referral for assessment for radiofrequency denervation for people with chronic low back pain when: non-surgical treatment has not worked for them **and** the main source of pain is thought to come from structures supplied by the medial branch nerve **and** they have moderate or severe levels of localised back pain (rated as 5 or more on a visual analogue scale, or equivalent) at the time of referral.	Moderate-low
	Only perform radiofrequency denervation in people with chronic low back pain after a positive response to a diagnostic medial branch block.	
	Do not offer imaging for people with low back pain with specific facet join pain as a prerequisite for radiofrequency denervation.	
Epidurals	Consider epidural injections of local anaesthetic and steroid in people with acute and severe sciatica.	Moderate-low
	Do not use epidural injections for neurogenic claudication in people who have central spinal canal stenosis.	
Other	-	
Recommendations for management: invasive, surgical		**Level of evidence**
Surgery and prognostic factors	Do not allow a person's BMI, smoking status or psychological distress to influence the decision to refer them for a surgical opinion for sciatica.	Low-very low
Spinal decompression	Consider spinal decompression for people with sciatica when non-surgical treatment has not improved pain or function and their radiological findings are consistent with sciatic symptoms.	Low-very low
Spinal fusion	Do not offer spinal fusion for people with low back pain unless as part of a randomised controlled trial.	Low-very low
Disc replacement	Do not offer disc replacement in people with low back pain.	Low-very low
Other	-	

Quality appraisal (AGREE-II)	**Ng 2020**	**Lin 2020[10]**	**Meroni 2019[11]**	**Doniselli 2018[12]**
1. Scope & purpose	100.0	89	96	92
2. Stakeholder involvement	50.0	78	83	96
3. Rigour of development	82.3	85	82	71
4. Clarity of presentation	94.4	93	94	86
5. Applicability	45.8	83	72	70
6. Editorial independence	54.2	72	97	77
Overall assessment	-	89	88	83
Overall quality	-	High	Excellent	High

[10] Lin 2020 classified high-quality guidelines as those that scored 50% or higher in stakeholder involvement, rigour of development, and editorial independence.

[11] Meroni 2019 considered guidelines with an average domain score of 75% or higher to be excellent, and those with a score below 60% to be fair/poor.

[12] Doniselli 2019 defined high quality as when 5 or more domains scored >60%, average when 3 or 4 domains scored >60%, and low quality when 2 domains or fewer scored >60%.

Quality appraisal (AGREE-REX)	Score (1-7)
1. Evidence	7
2. Applicability to target users	7
3. Applicability to patients/populations	7
4. Values and preferences of target users	7
5. Values and preferences of patients/populations	7
6. Values and preferences of policy/decision-makers	7
7. Values and preferences of guideline developers	7
8. Purpose	7
9. Local application and adoption	7
Recommended in the context for which they were developed?	Yes
Recommended in the Australian context?	Yes

Data extraction table: guideline		
Bibliographic reference	Scottish Intercollegiate Guidelines Network (SIGN). Management of chronic pain (SIGN publication no.136). Edinburgh: SIGN; 2019.	
Scope (country)	UK	
Institution	Scottish Intercollegiate Guidelines	
Last search for evidence	2012 (2018 for opioids)	
Patient population	Adults with chronic non-malignant pain in non-specialist settings.	
Diagnostic classification	Chronic non-malignant pain: pain that has been present for more than 12 weeks.	
Monitoring indicators	The number of patients presenting with chronic pain The number of patients using analgesics to manage chronic pain who receive an annual review The number of patients on opioids and gabapentinoids who receive an annual review of their medications The number of patients on >180 mg/day morphine or equivalent referred for specialist assessment The number of patients referred for self management.	
Recommendations for diagnosis		**Level of evidence**
Alternative diagnoses	-	
Risk assessment & stratification tools	A concise history, examination and biopsychosocial assessment, identifying pain type (neuropathic/ nociceptive/mixed), severity, functional impact and context should be conducted in all patients with chronic pain. This will inform the selection of treatment options most likely to be effective.	Good practice point
Imaging	-	
Recommendations for management: non-invasive, non-pharmacological		**Level of evidence**
Self-management	Self-management resources should be considered to complement other therapies in the treatment of patients with chronic pain.	Strength of evidence: Grade C
	Healthcare professionals should signpost patients to self-help resources, identified and recommended by local pain services, as a useful aide at any point throughout the patient journey. Self management may be used from an early stage of a pain condition through to use as part of a long-term management strategy.	Good practice point
Exercise	Exercise and exercise therapies, regardless of their form, are recommended in the management of patients with chronic pain.	Strength of evidence: Grade B
	Advice to stay active should be given in addition to exercise therapy for patients with chronic low back pain to improve disability in the long term. Advice alone is insufficient.	Strength of evidence: Grade A
Orthotics	-	
Manual therapies	Manual therapy should be considered for short-term relief of pain for patients with chronic low back pain.	Strength of evidence: Grade B
Acupuncture	Acupuncture should be considered for short-term relief of pain in patients with chronic low back pain	Strength of evidence: Grade A
Electrotherapies	Transcutaneous electrical nerve stimulation should be considered for the relief of chronic pain. Either low or high frequency TENS can be used.	Strength of evidence: Grade B
	Low-level laser therapy should be considered as a treatment option for patients with chronic low back pain.	Strength of evidence: Grade B
Psychological therapy	Referral to a pain management programme should be considered for patients with chronic pain.	Strength of evidence: Grade C
	Healthcare professionals referring patients for psychological assessment should attempt to assess and	Good practice point

	address any concerns the patient may have about such a referral. It may be helpful to explicitly state that the aims of psychological interventions are to increase coping skills and improve quality of life when faced with the challenges of living with pain.	
	Cognitive behavioural therapy should be considered for the treatment of patients with chronic pain.	Strength of evidence: Grade C
Combined physical and psychological	-	
Return-to-work	Brief education should be given to patients with chronic pain to help patients continue to work.	Strength of evidence: Grade C
Other	Clinicians should be aware of the possibility that their own behaviour, and the clinical environment, can impact on reinforcement of unhelpful responses.	Good practice point
	Progressive relaxation or EMG biofeedback should be considered for the treatment of patients with chronic pain.	Strength of evidence: Grade C
Recommendations for management: non-invasive, pharmacological		**Level of evidence**
NSAIDs	NSAIDs should be considered in the treatment of patients with chronic non-specific low back pain.	Strength of evidence: Grade B
	Cardiovascular and gastrointestinal risk needs to be taken into account when prescribing any non-steroidal anti-inflammatory drug.	Strength of evidence: Grade B
	Topical NSAIDs should be considered in the treatment of patients with chronic pain from musculoskeletal conditions, particularly in patients who cannot tolerate oral NSAIDs.	Strength of evidence: Grade A
Opioids	Opioids should be considered for short- to medium-term treatment of carefully selected patients with chronic non-malignant pain, for whom other therapies have been insufficient, and the benefits may outweigh the risks of serious harms such as addiction, overdose and death.	Strength of evidence: Grade B
	At initiation of treatment, ensure there is agreement between prescriber and patient about expected outcomes. If these are not attained, then there should be a plan agreed in advance to reduce and stop opioids.	Good practice point
	All patients on opioids should be assessed early after initiation, with planned reviews thereafter. These should be reviewed annually, at a minimum, but more frequently if required. The aim is to achieve the minimum effective dose and avoid harm. Treatment goals may include improvements in pain relief, function and quality of life. Consideration should be given to a gradual early reduction to the lowest effective dose or complete cessation.	Good practice point
	Currently available screening tools should not be relied upon to obtain an accurate prediction of patients at risk of developing problem opioid use, but may have some utility as part of careful assessment either before or during treatment.	Strength of evidence: Grade B
	Signs of abuse, addiction and/or other harms should be sought at reassessment of patients using strong opioids.	Strength of evidence: Grade C
	All patients receiving opioid doses of >50 mg/day morphine equivalent should be reviewed regularly (at least annually) to detect emerging harms and consider ongoing effectiveness. Pain specialist advice or review should be sought at doses >90 mg/day morphine equivalent.	Strength of evidence: Grade D
Paracetamol	-	

Other	Tricyclic antidepressants should not be used for the management of pain in patients with chronic low back pain.	Strength of evidence: Grade A
	Patients using analgesics to manage chronic pain should be reviewed at least annually, and more frequently if medication is being changed, or the pain syndrome and/or underlying comorbidities alter.	Good practice point
	Topical rubifacients should be considered for the treatment of pain in patients with musculoskeletal conditions if other pharmacological therapies have been ineffective.	Strength of evidence: Grade B
Recommendations for management: invasive, non-surgical		**Level of evidence**
Spinal injections	-	
Radiofrequency denervation	-	
Epidurals	-	
Other	-	
Recommendations for management: invasive, surgical		**Level of evidence**
Surgery and prognostic factors	-	
Spinal decompression	-	
Spinal fusion	-	
Disc replacement	-	
Other	-	
Quality appraisal (AGREE-II)		**Meroni 2019[13]**
1. Scope & purpose		85
2. Stakeholder involvement		89
3. Rigour of development		75
4. Clarity of presentation		80
5. Applicability		61
6. Editorial independence		94
Overall assessment		81
Overall quality		Excellent
Quality appraisal (AGREE-REX)		**Score (1-7)**
1. Evidence		6
2. Applicability to target users		5
3. Applicability to patients/populations		5
4. Values and preferences of target users		6
5. Values and preferences of patients/populations		5
6. Values and preferences of policy/decision-makers		5
7. Values and preferences of guideline developers		5
8. Purpose		5
9. Local application and adoption		5
Recommended in the context for which they were developed?		No (out of date search)
Recommended in the Australian context?		No

[13] Meroni 2019 considered guidelines with an average domain score of 75% or higher to be excellent, and those with a score below 60% to be fair/poor.

Data extraction table: guideline		
Bibliographic reference	Qaseem A, Wilt TJ, McLean RM, Forciea MA. Noninvasive treatments for acute, subacute, and chronic low back pain: A clinical practice guideline from the American College of Physicians. Ann Intern Med. 2017;166(7):514-30.	
Scope (country)	USA	
Institution	American College of Physicians	
Last search for evidence	November 2016	
Patient population	Adults with acute, subacute, or chronic low back pain in primary care.	
Diagnostic classification	Acute (<4 weeks), subacute (4 to 12 weeks), and chronic (>12 weeks) low back pain	
Monitoring indicators	-	
Recommendations for diagnosis		**Level of evidence**
Alternative diagnoses	-	
Risk assessment & stratification tools	-	
Imaging	-	
Recommendations for management: non-invasive, non-pharmacological		**Level of evidence**
Self-management	-	
Exercise	*Chronic* Clinicians and patients should initially select nonpharmacologic treatment with ***exercise***, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation.	Moderate (Strong recommendation)
	Chronic Clinicians and patients should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, ***tai chi***, ***yoga***, ***motor control exercise***, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation.	Low (Strong recommendation)
Orthotics	-	
Manual therapies	*Acute/subacute* Clinicians and patients should select nonpharmacologic treatment with superficial heat, ***massage***, acupuncture, or ***spinal manipulation***.	Low (Strong recommendation)
	Chronic Clinicians and patients should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or ***spinal manipulation***.	Low (Strong recommendation)
Acupuncture	*Acute/subacute* Clinicians and patients should select nonpharmacologic treatment with superficial heat, massage, ***acupuncture***, or spinal manipulation.	Low (Strong recommendation)
	Chronic Clinicians and patients should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, ***acupuncture***, mindfulness-based stress reduction, tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation.	Low (Strong recommendation)
Electrotherapies	*Chronic* Clinicians and patients should initially select nonpharmacologic treatment with exercise,	Low (Strong recommendation)

	multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, ***low-level laser therapy***, operant therapy, cognitive behavioral therapy, or spinal manipulation.	
	Chronic Ultrasound had no effect on pain or function compared with control treatments.	Low
	Chronic TENS had no effect on pain or function compared with control treatments.	Low
Psychological therapy	*Chronic* Clinicians and patients should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, ***operant therapy***, ***cognitive behavioral therapy***, or spinal manipulation.	Moderate (Strong recommendation)
Combined physical and psychological	*Chronic* Clinicians and patients should initially select nonpharmacologic treatment with exercise, ***multidisciplinary rehabilitation***, acupuncture, mindfulness-based stress reduction, tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation.	Moderate (Strong recommendation)
Return-to-work	-	
Other	*Acute/subacute* Clinicians and patients should select nonpharmacologic treatment with ***superficial heat***, massage, acupuncture, or spinal manipulation.	Moderate (Strong recommendation)
	Chronic Clinicians and patients should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, ***mindfulness-based stress reduction***, tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation.	Moderate (Strong recommendation)
	Chronic Clinicians and patients should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, tai chi, yoga, motor control exercise, ***progressive relaxation***, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation.	Low (Strong recommendation)
	Chronic Clinicians and patients should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, tai chi, yoga, motor control exercise, progressive relaxation, ***electromyography biofeedback***, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation.	Low (Strong recommendation)
	Chronic Kinesio taping had no effect on pain or function compared with control treatments.	Low
Recommendations for management: non-invasive, pharmacological		**Level of evidence**
NSAIDs	*Acute/subacute* If pharmacologic treatment is desired, clinicians and patients should select nonsteroidal anti-inflammatory drugs or skeletal muscle relaxants.	Moderate (Strong recommendation)
	Chronic In patients who have had an inadequate response to nonpharmacologic therapy, clinicians and patients should consider pharmacologic treatment with	Moderate (Weak recommendation

	non-steroidal anti-inflammatory drugs as first-line therapy.	
Opioids	*Chronic* In patients who have had an inadequate response to nonpharmacologic therapy, clinicians and patients should consider pharmacologic treatment with tramadol or duloxetine as second-line therapy.	Moderate (Weak recommendation
	Chronic Clinicians should only consider opioids as an option in patients who have failed the aforementioned treatments and only if the potential benefits outweigh the risks for individual patients and after a discussion of known risks and realistic benefits with patients.	Moderate (Weak recommendation
Paracetamol	*Acute/subacute* Not effective	-
Other	*Acute/subacute* If pharmacologic treatment is desired, clinicians and patients should select nonsteroidal anti-inflammatory drugs or skeletal muscle relaxants.	Moderate (Strong recommendation)
	Acute/subacute Systemic steroids: not effective	Low
	Chronic In patients who have had an inadequate response to nonpharmacologic therapy, clinicians and patients should consider pharmacologic treatment with tramadol or duloxetine as second-line therapy.	Moderate (Weak recommendation
Recommendations for management: invasive, non-surgical		**Level of evidence**
Spinal injections	-	
Radiofrequency denervation	-	
Epidurals	-	
Other	-	
Recommendations for management: invasive, surgical		**Level of evidence**
Surgery and prognostic factors	-	
Spinal decompression	-	
Spinal fusion	-	
Disc replacement	-	
Other	-	

Quality appraisal (AGREE-II)	**Ng 2020**	**Lin 2020[14]**	**Meroni 2019[15]**	**Doniselli 2018[16]**
1. Scope & purpose	100.0	91	93	94
2. Stakeholder involvement	75.0	46	61	57
3. Rigour of development	77.1	78	69	83
4. Clarity of presentation	91.7	80	85	85
5. Applicability	20.8	18	11	42
6. Editorial independence	70.8	58	75	85
Overall assessment	-	83	66	79
Overall quality	-	Low	Good	Average

Quality appraisal (AGREE-REX)	**Score (1-7)**
1. Evidence	6
2. Applicability to target users	7
3. Applicability to patients/populations	5
4. Values and preferences of target users	5
5. Values and preferences of patients/populations	4
6. Values and preferences of policy/decision-makers	4

[14] Lin 2020 classified high-quality guidelines as those that scored 50% or higher in stakeholder involvement, rigour of development, and editorial independence.

[15] Meroni 2019 considered guidelines with an average domain score of 75% or higher to be excellent, and those with a score below 60% to be fair/poor.

[16] Doniselli 2019 defined high quality as when 5 or more domains scored >60%, average when 3 or 4 domains scored >60%, and low quality when 2 domains or fewer scored >60%.

7. Values and preferences of guideline developers	7
8. Purpose	7
9. Local application and adoption	4
Recommended in the context for which they were developed?	Yes
Recommended in the Australian context?	Yes

Data extraction table: guideline		
Bibliographic reference	Hegmann KT, Travis R, Andersson GBJ, Belcourt RM, Carragee EJ, Donelson R, et al. Non-invasive and Minimally Invasive Management of Low Back Disorders. J Occup Environ Med. 2020;17. Hegmann KT, Travis R, Belcourt RM, Donelson R, Eskay-Auerbach M, Galper J, et al. Diagnostic Tests for Low Back Disorders. J Occup Environ Med. 2019;61(4):e155-e68.	
Scope (country)	USA	
Institution	American College of Occupational and Environmental Medicine	
Last search for evidence	January 2018	
Patient population	Working-age adults	
Diagnostic classification	Low back disorders	
Monitoring indicators	-	
Recommendations for diagnosis		**Level of evidence**
Alternative diagnoses	-	
Risk assessment & stratification tools	Functional capacity evaluations (FCEs) are a recommended option for evaluation of disabling chronic LBP where the information may be helpful to attempt to objectify worker capability, function, motivation, and effort vis-à-vis either a specific job or general job requirements.	Expert consensus (Moderate Confidence)
	There is no recommendation for or against the use of FCEs for chronic stable LBP or after completion of postoperative recovery among those able to return to work.	Expert consensus (Low Confidence)
	Functional capacity evaluations are not recommended for evaluation of acute LBP, acute or subacute radicular syndromes, or postsurgical back pain problems within the first 12 weeks of the postoperative period.	Expert consensus (High Confidence)
Imaging	X-ray is not recommended for acute non-specific LBP	Moderate (High Confidence)
	X-ray is recommended in the setting of red flags where the acute LBP could be due to fracture, neoplasia, infection, or systemic illness, where subacute or chronic LBP is not improved as a means of ruling out other conditions.	Expert consensus (High Confidence)
	Flexion and extension views are recommended for evaluating symptomatic spondylolisthesis (chronic, severe mechanical pain suspected as an instability), in which there is consideration for surgery or other invasive treatment or occasionally in the setting of trauma.	Expert consensus (Moderate Confidence)
	Standing or weight-bearing MRI is not recommended for back or radicular pain syndrome conditions.	Expert consensus (Moderate Confidence)
	MRI is recommended for patients with acute LBP during the first 6 weeks for evaluating progressive neurologic deficit, cauda equina syndrome, history of neoplasia (cancer), persistent fever plus elevated erythrocyte sedimentation rate without other infectious source, or atypical presentation, for example, clinical picture suggests multiple nerve root involvement.	Insufficient (High Confidence)
	MRI is moderately not recommended for acute radicular pain syndromes in the first 6 weeks unless the problems are severe and not trending towards improvement assuming the MRI confirms ongoing nerve root compression consistent with clinical examination and surgery is being considered. Repeat MRI imaging without	Moderate (Moderate Confidence)

	significant clinical change in symptoms and/or signs, such as development of neurological deficit, is also not recommended.	
	MRI is moderately recommended for patients with subacute or chronic radicular pain syndromes lasting at least 4 to 6 weeks in whom the symptoms are not trending towards improvement and prompt surgery is being considered, assuming the MRI confirms a nerve root compression consistent with clinical examination. In cases where an epidural glucocorticosteroid injection is being considered for temporary relief of acute or subacute radiculopathy, MRI at 3 to 4 weeks (before the epidural steroid injection) may be reasonable	Moderate (Moderate Confidence)
	MRI is recommended for selecting chronic LBP patients to rule out concurrent pathology unrelated to injury. This is not recommended before 3 months and only after other treatment modalities (including NSAIDs, aerobic exercise, and directional preference exercises) have failed.	Expert consensus (Moderate Confidence)
	Routine CT is not recommended for acute, subacute, or chronic nonspecific LBP, or for radicular pain syndromes	Low (High Confidence)
	CT is, however, recommended for patients with acute or subacute radicular pain syndrome who failed to improve within 4 to 6 weeks and if there is consideration for an epidural glucocorticoid injection or surgical discectomy (see Epidural Steroid Injection). If there is strong consideration for surgery, then CT myelography should be considered instead of CT alone.	Low (Moderate Confidence)
	Myelography is recommended in uncommon situations, such as contraindications for MRI such as implanted metal that preclude MRI, equivocal findings of disc herniation on MRI suspected of being false positives, spinal stenosis, and/or a postsurgical situation that requires myelography.	Expert consensus (High Confidence)
	Aside from specific indications which involve a minority of LBP patients, the routine use of bone scanning is not recommended in diagnosing LBP.	Expert consensus (High Confidence)
	Single proton emission computed tomography (SPECT) is not currently recommended for LBP and/or related disorders.	Expert consensus (Low Confidence)
	Electrodiagnostic studies, which must include needle electromyography, are recommended where a CT or MRI is equivocal and there is ongoing pain that raises questions about whether there may be a neurological compromise that may be identifiable (ie, leg symptoms consistent with radiculopathy, spinal stenosis, peripheral neuropathy, etc.). may be helpful for evaluation of chronicity and/or aggravation of a preexisting problem.	Moderate (High Confidence)
	Electrodiagnostic studies are not recommended for patients with acute, subacute, or chronic LBP who do not have significant leg pain or numbness.	Low (Moderate Confidence)
	Electrodiagnostic studies are recommended for patients with subacute or chronic LBP highly suspicious for lumbar spinal stenosis when MRI findings may be negative.	Moderate (High Confidence)
	Surface electromyography (sEMG) is not recom- mended to diagnose LBP.	Expert consensus (High Confidence)
	Ultrasound is not recommended for diagnosing LBP.	Expert consensus (High Confidence)

	Thermography is not recommended for diagnosing acute, subacute or chronic LBP or radicular pain.	Expert consensus (Moderate Confidence)
	Fluoroscopy is not recommended for evaluating acute, subacute or chronic LBP.	Expert consensus (Moderate Confidence)
	Videofluoroscopy or the assessment of acute, subacute, or chronic LBP is not recommended.	Expert consensus (Moderate Confidence)
	Lumbar discography is moderately not recommended for acute, subacute, or chronic LBP or radicular pain syndromes.	Strong (High Confidence)
	MRI discography is not recommended for evaluating herniated discs.	Low (Moderate Confidence)
	Myeloscopy is not recommended for diagnosing acute, sub-acute, or chronic LBP, spinal stenosis, radicular pain syndromes, or postsurgical back pain.	Expert consensus (Low Confidence)
Recommendations for management: non-invasive, non-pharmacological		**Level of evidence**
Self-management	Fear Avoidance Belief Training (FABT) is recommended for acute, subacute, or chronic LBP patients with elevated fear avoidance beliefs at baseline with or without referred pain.	Expert consensus (Moderate Confidence)
Exercise	An exercise prescription is moderately recommended for acute, subacute, chronic, and radicular LBP patients. This may be self-administered or enacted through formal therapy appointments.	Moderate (High Confidence)
	Aerobic exercises, most commonly a progressive walking program targeting either time or distance, are recommended for all patients from the initial appointment.	Moderate for acute and subacute LBP, Strong for chronic LBP, Expert Consensus for radicular pain. (High Confidence)
	Directional exercises which centralize or abolish the pain are recommended.	Low for acute LBP, Expert consensus for subacute, chronic, and radicular pain (Moderate Confidence)
	Slump stretching exercises three to five times a day are an option and are Recommended.	Low for acute LBP, Expert consensus for subacute, chronic. (Moderate Confidence)
	Stretching exercises for treatment of chronic LBP in the absence of significant range of motion deficits may result in lack of adherence to functional goals including aerobic and strengthening exercises and thus, are not recommended.	Expert consensus (Low Confidence)
	Strengthening exercises are recommended (C), High Confidence for nearly all LBP patients other than those with acute LBP that resolves rapidly or acute LBP in the early acute treatment phase when strengthening could aggravate the pain.	Low (High Confidence)
	Specific strengthening exercises, such as stabilization exercises, are also helpful for the treatment of LBP and thus are recommended.	Low (High Confidence)

	Abdominal strengthening exercises as a sole or central goal of a strengthening program for treatment of LBP are not recommended.	Expert consensus (Low Confidence)
	Aquatic therapy has indications to make it a select recommendation (eg, extreme obesity, significant degenerative joint disease, etc), as a progressive walking program is generally preferable for longer term exercise program maintenance in the vast majority of patients. Yet, those select indications are where aquatic therapy may be successful. Aquatic therapy is recommended for select chronic LBP and for subacute LBP patients. Aquatic therapy is not recommended for all other subacute and chronic LBP patients.	Low for select chronic LBP; Expert consensus for subacute LBP and all other subacute and chronic LBP (Moderate Confidence)
	Lumbar extension machines are not recommended.	Expert consensus (Low Confidence)
	Exercise aspects of yoga and tai chi for select, motivated patients with chronic LBP are recommended and for acute and subacute LBP patients, there is no recommendation.	Low for chronic; Expert consensus for acute and subacute. (Low Confidence)
	No recommendation for treatment of LBP with pilates as quality evidence is lacking.	Expert consensus (Low Confidence)
Orthotics	Shoe lifts are recommended for treatment of chronic or recurrent LBP among individuals with significant leg length discrepancy of more than 2 cm	Expert consensus (Low Confidence)
	Shoe lifts are not recommended for treatment of other spine disorders.	Expert consensus (Moderate Confidence)
	Lumbar supports are not recommended for treatment of LBP.	Low (Moderate Confidence)
Manual therapies	Traction is strongly not recommended for treatment of subacute or chronic LBP.	Strong (Moderate Confidence)
	Decompression through traction and spinal decompressive devices is not recommended for treatment of acute, sub-acute, chronic, or radicular pain syndromes.	Expert consensus (Moderate Confidence)
	Massage is recommended for select use in sub- acute or chronic LBP as an adjunct to more efficacious treatments consisting primarily of a graded aerobic and strengthening exercise program.	Low (Low Confidence)
	Massage is recommended for select use in acute LBP or chronic radicular pain syndromes in which LBP is a substantial symptom component.	Expert consensus (Low Confidence)
	Mechanical devices for administering massage are not recommended.	Low (Moderate Confidence)
	Reflexology is not recommended.	Low for chronic LBP, expert consensus for other LBP disorders (Moderate Confidence)
	There is no recommendation for treatment of any of the LBP disorders with myofascial release	Expert consensus (Low Confidence)
	Manipulation or mobilization of the lumbar spine is recommended for select treatment of acute or subacute LBP, or radicular pain syndromes without neurological deficit, generally if needed after treatment with NSAIDs, directional and aerobic exercise.	Expert consensus (Low Confidence)

	Manipulation or mobilization for short-term relief of chronic pain while used as a component of an active exercise program is recommended.	Low (Low Confidence)
	Manipulation under anesthesia (MUA) and medication-assisted spinal manipulation (MASM) are not recommended for treatment of acute, subacute, or chronic LBP.	Expert consensus (Moderate Confidence)
Acupuncture	Acupuncture is recommended for selective use to treat chronic moderate to severe LBP as an adjunct to more efficacious treatments as there is no quality evidence of lasting effects.	Low (Low Confidence)
	For treatment of acute, subacute, or radicular LBP, there are no quality studies, there are other effective treatments for those patients, and thus, acupuncture is not recommended.	Expert consensus (Moderate Confidence)
Electrotherapies	No recommendation for or against the use of ultrasound for treatment of acute, subacute, chronic, or radicular LBP.	Expert consensus (Low Confidence)
	Low-level laser therapy is not recommended for treatment of LBP.	Low (Moderate Confidence)
	TENS is not recommended for treatment of acute or sub-acute LBP or acute radicular pain syndromes.	Expert consensus (Moderate Confidence)
	TENS is recommended for select use in treatment of chronic LBP or chronic radicular pain syndrome as an adjunct to more efficacious treatments. Chronic LBP should be insufficiently managed with prior NSAIDs, aerobic exercise, and strengthening exercise with which compliance is documented.	Expert consensus (Low Confidence)
	All of the following are not recommended: microcurrent electrical stimulation, neuromuscular electrical stimulation (non-chronic pain), and PENS.	Expert consensus (Low Confidence)
	There is no recommendation for or against all of: H-Wave Device stimulation therapy, high-voltage galvanic therapy, interferential therapy, and neuromuscular electrical stimulation (chronic LBP, chronic radicular pain).	Expert consensus (Low Confidence)
Psychological therapy	-	
Combined physical and psychological	-	
Return-to-work	-	
Other	Bed rest is not recommended for the management of acute, subacute, chronic, or radicular LBP.	Strong (Acute); Moderate (Subacute, Chronic); Low (Radicular). (High Confidence)
	Specific beds or other commercial sleep products are not recommended for treatment of acute, subacute, or chronic LBP.	Expert consensus (Moderate Confidence)
	Lordotic sitting posture is recommended for treatment of acute, subacute, or chronic LBP, and radicular pain.	Expert consensus (Low Confidence)
	Sleep posture(s) that are most comfortable for the patient are instead recommended.	Expert consensus (Low Confidence)
	There is no recommendation for or against specific mattresses, bedding, and water beds.	Expert consensus (Low Confidence)
	Kinesiotaping is not recommended for treatment of spine conditions.	Low (Moderate Confidence)

	Magnets are moderately not recommended for treatment of any LBP disorder.	Moderate (High Confidence)
	There is no recommendation regarding inversion therapy.	Expert consensus (Low Confidence)
	Self-applications of low-tech heat therapies are recommended.	Low (Low Confidence)
	Self-applications of cryotherapies are recommended.	Expert consensus (Low Confidence)
	High-tech devices or provider-based applications of heat and/or cryotherapy are costly, have no quality evidence of efficacy for treatment of LBP and thus are not recommended.	Expert consensus (Low Confidence)
	Diathermy is not recommended for treatment of any type of LBP.	Low (Moderate Confidence)
	No recommendation for or against the use of infrared therapy for treatment of acute, subacute, chronic, or radicular LBP.	Expert consensus (Low Confidence)
Recommendations for management: non-invasive, pharmacological		**Level of evidence**
NSAIDs	NSAIDs are strongly recommended.	Strong for acute, chronic and radicular syndromes; Moderate for subacute. (High Confidence)
	Gastrointestinal bleeding is rarely problematic in employed populations, when there is increased risk and as NSAIDs are superior, concomitant prescription of proton pump inhibitors are strongly recommended, sucralfate is moderately recommended, and H2 blockers are recommended.	Strong for PPI, Moderate for sucralfate, Low for H2 blockers (High Confidence)
Opioids	Opioids are strongly not recommended for treatment of non-severe pain.	Strong (High Confidence)
Paracetamol	Acetaminophen is an acceptable alternative with some evidence of efficacy, but is inferior to NSAIDs and thus is recommended.	Low (High Confidence)
Other	There is no recommendation for use of antibiotics in LBP patients other than proven infection.	Expert consensus (Low Confidence)
	Selective serotonin reuptake inhibitors, bupropion, and trazodone are ineffective and strongly not recommended for chronic LBP and not recommended for other LBP syndromes.	Strong for chronic LBP; Expert consensus for other LBP syndromes. (Moderate Confidence)
	Norepinephrine reuptake inhibitor antidepressants (eg, tricyclic anti-depressants—amitriptyline, imipramine, nortriptyline, desipramine, maprotiline, doxepin) and mixed serotonin norepinephrine reuptake inhibitors (eg, duloxetine) are strongly recommended for chronic LBP and recommended for acute and subacute pain.	Strong for chronic LBP; Low for acute and subacute pain (Moderate Confidence)
	Anti-convulsants including gabapentin have evidence showing a lack of efficacy and thus they are not recommended for acute, subacute, and chronic LBP.	Low (Low Confidence)
	Topiramate is recommended for chronic LBP patients with depression or anxiety, although it is generally recommended after exercises and trials of NSAIDs and anti-depressants.	Low (Low Confidence)

	Bisphosphonates and calcitonin are not recommended for chronic LBP management.	Expert consensus (Moderate Confidence)
	Oral and intravenous colchicine are not recommended for treatment of acute, subacute, or chronic LBP.	Expert consensus (Moderate Confidence)
	No recommendation for or against use of thiocolchicoside for treatment of acute, subacute, or chronic LBP.	Expert consensus (Low Confidence)
	Lidocaine patches are not recommended for treatment of chronic LBP.	Low (Moderate Confidence)
	N-methyl-D- aspartate (NMDA) receptor/antagonists including dextromethorphan are not recommended.	Expert consensus (Moderate Confidence)
	Muscle relaxants (not including carisoprodol) are moderately recommended as a second-line treatment in moderate to severe acute LBP that has not been adequately controlled by NSAIDs.	Moderate (Moderate Confidence)
	Muscle relaxants are not recommended for treatment of acute mild to moderate LBP.	Expert consensus (Moderate Confidence)
	Muscle relaxants are selectively recommended for acute exacerbations of chronic LBP but otherwise are not recommended for treatment of chronic LBP.	Expert consensus (Low Confidence)
	Carisoprodol and diazepam are not recommended due to their abuse potential and lack of superiority to other muscle relaxants.	Expert consensus (Low Confidence)
	Systemic glucocorticosteroids are recommended for treatment of acute and subacute radicular pain.	Low (Moderate Confidence)
	Glucocorticosteroids are not recommended for acute, subacute or chronic LBP.	Moderate for acute LBP, Expert consensus for subacute/chronic. (High Confidence)
	Herbal treatments have been utilized to threat LBP, including Camphora molmol, Salix alba, Melaleuca alternifolia, Angelica sinensis, Aloe vera, Thymus officinalis, Menthe piperita, Arnica montana, Curcuma longa, Tanacetum parthenium, Harpagophytum procumbens, and Zingiber officinale. There is no recommendation for all of these with the exception that willow bark (salix) is not recommended. If salicylates are used as treatment, generic aspirin is preferable to willow bark or salicin.	Expert consensus (Low Confidence)
	While other treatments appear likely to have greater efficacy (eg, NSAIDs, progressive exercise program, etc), capsaicin may be a useful adjunct and is moderately recommended for short-term but not long-term treatment of acute or subacute LBP or temporary flare-ups of chronic LBP.	Moderate (Moderate Confidence)
	Spiroflor is not recommended for treatment of acute, subacute, or chronic LBP as it appears less efficacious than capsaicin and there are other treatments that are efficacious.	Expert consensus (Low Confidence)
	The use of topical NSAIDs or other creams and ointments for treatment of acute, subacute, or chronic LBP have no recommendation.	Expert consensus (Low Confidence)
	For treatment of chronic LBP, DMSO, N-acetylcysteine, EMLA, and wheatgrass cream are not recommended.	Expert consensus (Low Confidence)
	In the absence of documented deficiencies, vitamin supplementation is not recommended	Expert consensus (Low Confidence)

	There is no recommendation regarding iontophoresis.	Expert consensus (Low Confidence)
Recommendations for management: invasive, non-surgical		**Level of evidence**
Spinal injections	-	
Radiofrequency denervation	-	
Epidurals	-	
Other	-	
Recommendations for management: invasive, surgical		**Level of evidence**
Surgery and prognostic factors	--	
Spinal decompression	-	
Spinal fusion	-	
Disc replacement	-	
Other	-	
Quality appraisal (AGREE-II)		**Ng 2020**
1. Scope & purpose		100.0
2. Stakeholder involvement		55.6
3. Rigour of development		61.5
4. Clarity of presentation		83.3
5. Applicability		22.9
6. Editorial independence		50.0
Overall assessment		-
Overall quality		
Quality appraisal (AGREE-REX)		**Score (1-7)**
1. Evidence		6
2. Applicability to target users		6
3. Applicability to patients/populations		5
4. Values and preferences of target users		6
5. Values and preferences of patients/populations		5
6. Values and preferences of policy/decision-makers		5
7. Values and preferences of guideline developers		6
8. Purpose		6
9. Local application and adoption		4
Recommended in the context for which they were developed?		Yes
Recommended in the Australian context?		Yes

Data extraction table: guideline		
Bibliographic reference	Veterans Affairs/Department of Defense. Clinical practice guideline for diagnosis and treatment of low back pain. Version 2.0. VA/DoD; 2017.	
Scope (country)	USA	
Institution	Veterans Affairs/Department of Defense	
Last search for evidence	October 2016	
Patient population	Adult patients with LBP	
Diagnostic classification	Lower back pain	
Monitoring indicators	-	
Recommendations for diagnosis		**Level of evidence**
Alternative diagnoses	For patients with low back pain, we recommend that clinicians conduct a history and physical examination, that should include identifying and evaluating neurologic deficits (e.g., radiculopathy, neurogenic claudication), red flag symptoms associated with serious underlying pathology (e.g., malignancy, fracture, infection), and psychosocial factors.	Strong
Risk assessment & stratification tools	For patients with low back pain, we suggest performing a mental health screening as part of the low back pain evaluation and taking results into consideration during selection of treatment.	Weak
Imaging	For patients with acute axial low back pain (i.e., localized, non-radiating), we recommend against routinely obtaining imaging studies or invasive diagnostic tests.	Strong
	For patients with low back pain, we recommend diagnostic imaging and appropriate laboratory testing when neurologic deficits are serious or progressive or when red flag symptoms are present.	Strong
	For patients with low back pain greater than one month who have not improved or responded to initial treatments, there is inconclusive evidence to recommend for or against any diagnostic imaging.	NA
Recommendations for management: non-invasive, non-pharmacological		**Level of evidence**
Self-management	For patients with chronic low back pain, we recommend providing evidence- based information with regard to their expected course, advising patients to remain active, and providing information about self-care options.	Strong
	For patients with chronic low back pain, we suggest adding a structured education component, including pain neurophysiology, as part of a multicomponent self-management intervention.	Weak
Exercise	For patients with acute low back pain, there is insufficient evidence to support the use of specific clinician-directed exercise.	NA
	For patients with chronic low back pain, we suggest offering clinician-directed exercises.	Weak
	For patients with chronic low back pain, we suggest offering an exercise program, which may include Pilates, yoga, and tai chi.	Weak
Orthotics	For acute or chronic low back pain, there is insufficient evidence for or against the use of lumbar supports.	NA
Manual therapies	For patients with low back pain, there is insufficient evidence to support the use of lumbar traction.	NA
	For patients with acute or chronic low back pain, we suggest offering spinal mobilization/manipulation as part of a multimodal program.	Weak

Acupuncture	For patients with acute low back pain, there is insufficient evidence to support the use of acupuncture.	NA
	For patients with chronic low back pain, we suggest offering acupuncture.	Weak
Electrotherapies	For patients with low back pain, there is insufficient evidence to support the use of ultrasound.	NA
	For patients with low back pain, there is inconclusive evidence to support the use of transcutaneous electrical nerve stimulation (TENS).	NA
	For patients with low back pain, there is insufficient evidence to support the use of electrical muscle stimulation.	NA
Psychological therapy	For patients with chronic low back pain, we recommend cognitive behavioral therapy.	Strong
Combined physical and psychological	For selected patients with chronic low back pain not satisfactorily responding to more limited approaches, we suggest offering a multidisciplinary or interdisciplinary rehabilitation program which should include at least one physical component and at least one other component of the biopsychosocial model (psychological, social, occupational) used in an explicitly coordinated manner.	Weak
Return-to-work	-	
Other	For patients with chronic low back pain, we suggest mindfulness-based stress reduction.	Weak
Recommendations for management: non-invasive, pharmacological		**Level of evidence**
NSAIDs	For patients with acute or chronic low back pain, we recommend treating with nonsteroidal anti-inflammatory drugs, with consideration of patient-specific risks.	Strong
Opioids	For patients with low back pain, we recommend against initiating long-term opioid therapy.	Strong
	For patients with acute low back pain or acute exacerbations of chronic low back pain, there is insufficient evidence to recommend for or against the use of time- limited opioid therapy. Given the significant risks and potential benefits of opioid therapy, patients should be evaluated individually, including consideration of psychosocial risks and alternative non-opioid treatments. Any opioid therapy should be kept to the shortest duration and lowest dose possible.	NA
Paracetamol	For patients with acute or chronic low back pain, there is insufficient evidence to recommend for or against the use of time-limited (less than seven days) acetaminophen therapy.	NA
	For patients with chronic low back pain, we recommend against the chronic use of oral acetaminophen.	Strong
Other	For patients with chronic low back pain, we suggest offering treatment with duloxetine, with consideration of patient-specific risks.	Weak
	For patients with acute low back pain or acute exacerbations of chronic low back pain, we suggest offering a non-benzodiazepine muscle relaxant for short-term use.	Weak
	For patients with chronic low back pain, we suggest against offering a non- benzodiazepine muscle relaxant.	Weak
	For patients with low back pain, we recommend against benzodiazepines.	Strong
	For patients with acute or chronic low back pain with or without radiculopathy, we recommend against the use of systemic corticosteroids (oral).	Strong

	For the treatment of acute or chronic low back pain, including patients with both radicular and non-radicular low back pain, there is insufficient evidence to recommend for or against the use of antiepileptics including gabapentin and pregabalin.	NA
	For the treatment of low back pain, there is insufficient evidence to recommend for or against the use of topical preparations.	NA
	For the treatment of low back pain, there is insufficient evidence to recommend for or against nutritional, herbal, and homeopathic supplements.	NA
Recommendations for management: invasive, non-surgical		**Level of evidence**
Spinal injections	For patients with acute or chronic low back pain with or without radiculopathy, we recommend against the use of systemic corticosteroids (oral or intramuscular injection).	Strong
	For the treatment of low back pain, we suggest against offering intra-articular facet joint steroid injections.	Weak
Radiofrequency denervation	For patients with low back pain, there is inconclusive evidence to recommend for or against medial branch blocks and radiofrequency ablative denervation.	NA
Epidurals	For the long-term reduction of radicular low back pain, non-radicular low back pain, or spinal stenosis, we recommend against offering spinal epidural steroid injections.	Strong
	For the very short-term effect (less than or equal to two weeks) of reduction of radicular low back pain, we suggest offering epidural steroid injection.	Weak
Other	-	
Recommendations for management: invasive, surgical		**Level of evidence**
Surgery and prognostic factors	-	
Spinal decompression	-	
Spinal fusion	-	
Disc replacement	-	
Other	-	
Quality appraisal (AGREE-II)		**Meroni 2019[17]**
1. Scope & purpose		76
2. Stakeholder involvement		67
3. Rigour of development		64
4. Clarity of presentation		94
5. Applicability		15
6. Editorial independence		83
Overall assessment		67
Overall quality		Good
Quality appraisal (AGREE-REX)		**Score (1-7)**
1. Evidence		7
2. Applicability to target users		7
3. Applicability to patients/populations		6
4. Values and preferences of target users		7
5. Values and preferences of patients/populations		6
6. Values and preferences of policy/decision-makers		6
7. Values and preferences of guideline developers		7
8. Purpose		6
9. Local application and adoption		6

[17] Meroni 2019 considered guidelines with an average domain score of 75% or higher to be excellent, and those with a score below 60% to be fair/poor.

Recommended in the context for which they were developed?	Yes
Recommended in the Australian context?	Yes

Appendix D: Evidence tables – systematic reviews

Eligible reviews (*included in best evidence synthesis)

Diagnosis

Imaging/testing

Stolz M, von Piekartz H, Hall T, Schindler A, Ballenberger N. Evidence and recommendations for the use of segmental motion testing for patients with LBP - A systematic review. Musculoskelet Sci Pract. 2019;45:102076.
*Lemmers GPG, van Lankveld W, Westert GP, van der Wees PJ, Staal JB. Imaging versus no imaging for low back pain: a systematic review, measuring costs, healthcare utilization and absence from work. Eur Spine J. 2019;28(5):937-50.
Teraguchi M, Yim R, Cheung JP, Samartzis D. The association of high-intensity zones on MRI and low back pain: a systematic review. Scoliosis Spinal Disord. 2018;13:22.
Kim JH, van Rijn RM, van Tulder MW, Koes BW, de Boer MR, Ginai AZ, et al. Diagnostic accuracy of diagnostic imaging for lumbar disc herniation in adults with low back pain or sciatica is unknown; a systematic review. Chiropr Man Therap. 2018;26:37.
*Steffens D, Hancock MJ, Pereira LS, Kent PM, Latimer J, Maher CG. Do MRI findings identify patients with low back pain or sciatica who respond better to particular interventions? A systematic review. Eur Spine J. 2016;25(4):1170-87.
Raastad J, Reiman M, Coeytaux R, Ledbetter L, Goode AP. The association between lumbar spine radiographic features and low back pain: a systematic review and meta-analysis. Semin Arthritis Rheum. 2015;44(5):571-85.
Ferrari S, Manni T, Bonetti F, Villafane JH, Vanti C. A literature review of clinical tests for lumbar instability in low back pain: validity and applicability in clinical practice. Chiropr Man Therap. 2015;23:14.
Brinjikji W, Luetmer PH, Comstock B, Bresnahan BW, Chen LE, Deyo RA, et al. Systematic literature review of imaging features of spinal degeneration in asymptomatic populations. AJNR Am J Neuroradiol. 2015;36(4):811-6.
Brinjikji W, Diehn FE, Jarvik JG, Carr CM, Kallmes DF, Murad MH, et al. MRI Findings of Disc Degeneration are More Prevalent in Adults with Low Back Pain than in Asymptomatic Controls: A Systematic Review and Meta-Analysis. AJNR Am J Neuroradiol. 2015;36(12):2394-9.
Boswell MV, Manchikanti L, Kaye AD, Bakshi S, Gharibo CG, Gupta S, et al. A Best-Evidence Systematic Appraisal of the Diagnostic Accuracy and Utility of Facet (Zygapophysial) Joint Injections in Chronic Spinal Pain. Pain physician. 2015;18(4):E497-533.

Screening/stratification

Riley SP, Swanson BT, Dyer E. Are movement-based classification systems more effective than therapeutic exercise or guideline based care in improving outcomes for patients with chronic low back pain? A systematic review. J Manual Manipulative Ther. 2019;27(1):5-14.
*Lheureux A, Berquin A. Comparison between the STarT Back Screening Tool and the Orebro Musculoskeletal Pain Screening Questionnaire: Which tool for what purpose? A semi-systematic review. Ann Phys Rehabil Med. 2019;62(3):178-88.
Barrey CY, Le Huec JC. Chronic low back pain: Relevance of a new classification based on the injury pattern. Orthopaedics and Traumatology: Surgery and Research. 2019;105(2):339-46.
*Verhagen AP, Downie A, Maher CG, Koes BW. Most red flags for malignancy in low back pain guidelines lack empirical support: a systematic review. Pain. 2017;158(10):1860-8.
Khan Y. The STarT back tool in chiropractic practice: a narrative review. Chiropr Man Therap. 2017;25:11.
*Karran EL, McAuley JH, Traeger AC, Hillier SL, Grabherr L, Russek LN, et al. Can screening instruments accurately determine poor outcome risk in adults with recent onset low back pain? A systematic review and meta-analysis. BMC Med. 2017;15(1):13.
*Haskins R, Osmotherly PG, Rivett DA. Diagnostic clinical prediction rules for specific subtypes of low back pain: a systematic review. J Orthop Sports Phys Ther. 2015;45(2):61-76, A1-4.
*Hartvigsen L, Kongsted A, Hestbaek L. Clinical examination findings as prognostic factors in low back pain: a systematic review of the literature. Chiropr Man Therap. 2015;23:13.

Non-invasive, non-pharmacological

Multiple interventions

Nascimento PRCD, Costa LOP, Araujo AC, Poitras S, Bilodeau M. Effectiveness of interventions for non-specific low back pain in older adults. A systematic review and meta-analysis. Physiotherapy (United Kingdom). 2019;105(2):147-62.
Lee JH, Choi KH, Kang S, Kim DH, Kim DH, Kim BR, et al. Nonsurgical treatments for patients with radicular pain from lumbosacral disc herniation. Spine Journal. 2019;19(9):1478-89.
Skelly AC, Chou R, Dettori JR, Turner JA, Friedly JL, Rundell SD, et al. Noninvasive Nonpharmacological Treatment for Chronic Pain: A Systematic Review. Agency for Healthcare Research and Quality (US). 2018:06.
Hong JY, Song KS, Cho JH, Lee JH. An Updated Overview of Low Back Pain Management in Primary Care. Asian spine j. 2017;11(4):653-60.
*Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, et al. Nonpharmacologic Therapies for Low Back Pain: A Systematic Review for an American College of Physicians Clinical Practice Guideline. Ann Intern Med. 2017;166(7):493-505.
*O'Keeffe M, Purtill H, Kennedy N, Conneely M, Hurley J, O'Sullivan P, et al. Comparative Effectiveness of Conservative Interventions for Nonspecific Chronic Spinal Pain: Physical, Behavioral/Psychologically Informed, or Combined? A Systematic Review and Meta-Analysis. J Pain. 2016;17(7):755-74.
Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, et al. Noninvasive Treatments for Low Back Pain. Agency for Healthcare Research and Quality (US). 2016:02.

Self-management/education

Zahari Z, Ishak A, Justine M. The effectiveness of patient education in improving pain, disability and quality of life among older people with low back pain: A systematic review. Journal of Back and Musculoskeletal Rehabilitation. 2020;33(2):245-54.
Wood L, Hendrick PA. A systematic review and meta-analysis of pain neuroscience education for chronic low back pain: Short-and long-term outcomes of pain and disability. Eur J Pain. 2019;23(2):234-49.
Tegner H, Frederiksen P, Esbensen BA, Juhl C. Neurophysiological Pain Education for Patients With Chronic Low Back Pain: A Systematic Review and Meta-Analysis. Clin J Pain. 2018;34(8):778-86.
*Du S, Hu L, Dong J, Xu G, Chen X, Jin S, et al. Self-management program for chronic low back pain: A systematic review and meta-analysis. Patient Educ Couns. 2017;100(1):37-49.
Ainpradub K, Sitthipornvorakul E, Janwantanakul P, van der Beek AJ. Effect of education on non-specific neck and low back pain: A meta-analysis of randomized controlled trials. Manual Ther. 2016;22:31-41.
*Traeger AC, Hubscher M, Henschke N, Moseley GL, Lee H, McAuley JH. Effect of Primary Care-Based Education on Reassurance in Patients With Acute Low Back Pain: Systematic Review and Meta-analysis. JAMA Intern Med. 2015;175(5):733-43.
Ramond-Roquin A, Bouton C, Begue C, Petit A, Roquelaure Y, Huez JF. Psychosocial Risk Factors, Interventions, and Comorbidity in Patients with Non-Specific Low Back Pain in Primary Care: Need for Comprehensive and Patient-Centered Care. Front Med (Lausanne). 2015;2:73.

Telephone-based interventions

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Manual therapy

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Electrotherapy

TENS

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Psychological

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Other

Ozone therapy

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Cupping

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Biofeedback

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Mindfulness

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Virtual reality

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Visual feedback

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Spa therapy

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Non-invasive, pharmacological

General (inc. anti-depressants)

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NSAIDs

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Paracetamol

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Opioids

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Anticonvulsants

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Muscle relaxants

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Other pharmacological

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Complementary medicines

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Invasive, non-surgical

Spinal injections

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Minimally invasive – adhesiolysis

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Regenerative medicine

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Invasive, surgical

Surgical – general

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Surgical – discectomy

Xu J, Li Y, Wang B, Lv G, Li L, Dai Y, et al. Minimum 2-Year Efficacy of Percutaneous Endoscopic Lumbar Discectomy versus Microendoscopic Discectomy: A Meta-Analysis. World Neurosurg. 2020;138:19-26.
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Surgical – fusion

Wang W, Sun X, Zhang T, Sun S, Kong C, Ding J, et al. Comparison between topping-off technology and posterior lumbar interbody fusion in the treatment of chronic low back pain: A meta-analysis. Medicine (Baltimore). 2020;99(5):e18885.
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Lingutla KK, Pollock R, Ahuja S. Sacroiliac joint fusion for low back pain: a systematic review and meta-analysis. Eur Spine J. 2016;25(6):1924-31.
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Surgical – other

Helm S, Simopoulos TT, Stojanovic M, Abdi S, El Terany MA. Effectiveness of thermal annular procedures in treating discogenic low back pain. Pain physician. 2017;20(6):447-70.
Odonkor CA, Orman S, Orhurhu V, Stone ME, Ahmed S. Spinal Cord Stimulation vs Conventional Therapies for the Treatment of Chronic Low Back and Leg Pain: A Systematic Review of Health Care Resource Utilization and Outcomes in the Last Decade. Pain Med. 2019;20(12):2479-94.
Head J, Mazza J, Sabourin V, Turpin J, Hoelscher C, Wu C, et al. Waves of Pain Relief: A Systematic Review of Clinical Trials in Spinal Cord Stimulation Waveforms for the Treatment of Chronic Neuropathic Low Back and Leg Pain. World Neurosurg. 2019;131:264-74.e3.
Bicket MC, Dunn RY, Ahmed SU. High-Frequency Spinal Cord Stimulation for Chronic Pain: Pre-Clinical Overview and Systematic Review of Controlled Trials. Pain Med. 2016;17(12):2326-36.

Data extraction table: systematic review	
Bibliographic reference	Abdel Shaheed C, Maher CG, Williams KA, Day R, McLachlan AJ. Efficacy, tolerability, and dose-dependent effects of opioid analgesics for low back pain a systematic review and meta-analysis. JAMA Intern Med. 2016;176(7):958-68.
Source of funding	Dr Maher: NHMRC research fellowship. Dr McLachlan: Program Director on the NHMRC Centre for Research Excellence on Medicines and Ageing.
Meta-analysis?	Yes
Number of included studies	N=20
Study designs	RCTs
Search strategy	MEDLINE, EMBASE, Cochrane Database of Systematic Reviews, CENTRAL, CINAHL, and PsycINFO (inception to end September 2015) were searched. In addition we screened reference lists of included RCTs and relevant systematic reviews to identify additional RCTs.
Number of participants	N=7,925
Population	Nonspecific low back pain
Intervention	Opioid analgesic medicines
Comparison	Placebo-controlled RCTs and RCTs comparing 2 drugs from the same class or different doses of the same drug were eligible for inclusion.
Relevant outcome measures	The primary outcome measure was pain. Pain and disability outcomes were converted to a common 0 to 100 scale, with effects greater than 20 points considered clinically important.
Outcomes	Of 20 included RCTs of opioid analgesics (with a total of 7925 participants), 13 trials (3419 participants) evaluated short-term effects on chronic low back pain, and no placebo-controlled trials enrolled patients with acute low back pain. In half of these 13 trials, at least 50% of participants withdrew owing to adverse events or lack of efficacy. There was moderate-quality evidence that opioid analgesics reduce pain in the short term; mean difference (MD), −10.1 (95% CI, −12.8 to −7.4). Meta-regression revealed a 12.0 point greater pain relief for every 1 log unit increase in morphine equivalent dose (P = .046). Clinically important pain relief was not observed within the dose range evaluated (40.0-240.0-mg morphine equivalents per day). There was no significant effect of enrichment study design.
Authors' conclusions	For people with chronic low back pain who tolerate the medicine, opioid analgesics provide modest short-term pain relief but the effect is not likely to be clinically important within guideline recommended doses. Evidence on long-term efficacy is lacking. The efficacy of opioid analgesics in acute low back pain is unknown.

Quality appraisal (AMSTAR 2: https://amstar.ca/)		Schreijenberg 2019[26]
1. PICO	Yes	
***2. 'A priori' design**	No	
3. Selection of study designs explained	Yes	
***4. Comprehensive literature search**	Partial	
5. Duplicate study selection	Yes	
6. Duplicate data extraction	Yes	
***7. List of excluded studies with reasons**	No	
8. Description of the included studies	Yes	
***9. Satisfactory RoB technique used**	Yes	
10. Sources of funding reported	Yes	
***11. Appropriate methods for statistical combination of results**	Yes	
12. Potential impact of RoB assessed	Yes	
***13. RoB accounted for in interpretation/discussion**	Yes	
14. Satisfactory explanation for heterogeneity	Yes	
***15. Adequate investigation of publication bias**	Yes	
16. Conflict of interest reported	Yes	Adequate: at least 8/16
Overall confidence in results of the review	Critically low	

Data extraction table: systematic review	
Bibliographic reference	Abdel Shaheed C, Maher CG, Williams KA, McLachlan AJ. Efficacy and tolerability of muscle relaxants for low back pain: Systematic review and meta-analysis. Eur J Pain. 2017;21(2):228-37.
Source of funding	CGM: NHMRC research fellowship. AJM: is the Program Director for the NHMRC Centre for Research Excellence on Medicines and Ageing.
Meta-analysis?	Yes
Number of included studies	N=15
Study designs	RCTs
Search strategy	MEDLINE, EMBASE, Cochrane, CENTRAL and PsycINFO (inception to October 2015). Additionally, we screened studies and reference lists from systematic reviews evaluating these medicines for patients with LBP to identify eligible RCTs
Number of participants	3362
Population	Non-specific LBP
Intervention	Single ingredient or combination medicines containing a muscle relaxant or benzodiazepine for non-specific LBP
Comparison	Placebo-controlled, comparing two drugs from the same class, different doses of drug.
Relevant outcome measures	Pain, disability or adverse events.
Outcomes	A total of five trials (496 participants) provide high quality evidence that muscle relaxants provide clinically significant pain relief in the short term for acute LBP; MD 21.3, [29.0, 13.5]. There was no information on long-term outcomes. The median adverse event rate in clinical trials for muscle relaxants was similar to placebo 14.1% IQR (7.0–28.7%) and 16.0% (4.1–31.2%); p = 0.5, respectively. There is no evidence for the efficacy of benzodiazepines in LBP. For people with acute LBP, muscle relaxants provide clinically significant short-term pain relief. For chronic LBP, the efficacy of muscle relaxants is largely unknown. There was no eligible RCT evidence to support the efficacy of benzodiazepines in LBP. Prolonged use of these medicines in LBP cannot be guided by trial evidence.
Authors' conclusions	Muscle relaxants provide clinically significant pain relief for acute low back pain. Caution must be taken with the interpretation of the findings as the evidence comes from specific muscle relaxant medicines.

Quality appraisal (AMSTAR 2: https://amstar.ca/)		Braun 2020[77]	Schreijenberg 2019[26]
1. PICO	Yes		
***2. 'A priori' design**	No	No	
3. Selection of study designs explained	Yes		
***4. Comprehensive literature search**	Partial	?	
5. Duplicate study selection	Yes		
6. Duplicate data extraction	Yes		
***7. List of excluded studies with reasons**	No	No	
8. Description of the included studies	Yes		
***9. Satisfactory RoB technique used**	Yes	?	
10. Sources of funding reported	No		
***11. Appropriate methods for statistical combination of results**	Yes	Yes	
12. Potential impact of RoB assessed	Yes		
***13. RoB accounted for in interpretation/discussion**	Yes	No	
14. Satisfactory explanation for heterogeneity	Yes		
***15. Adequate investigation of publication bias**	Yes	Yes	
16. Conflict of interest reported	Yes		
Overall confidence in results of the review	Critically Low	Critically Low	Adequate: at least 8/16

Data extraction table: systematic review	
Bibliographic reference	Akindele-Agbeja O, Mbada CE, Egwu MO. Does the inclusion of spinal manipulative therapy in multimodal treatment regimens result in better outcomes in chronic low back pain? A systematic review. Proceedings of Singapore Healthcare. 2017;26(2):114-20.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Alzahrani H, Mackey M, Stamatakis E, Pinheiro MB, Wicks M, Shirley D. The effectiveness of incidental physical activity interventions compared to other interventions in the management of people with low back pain: A systematic review and meta-analysis of randomised controlled trials. Phys Ther Sport. 2019;36:34-42.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	?
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Arnold E, La Barrie J, DaSilva L, Patti M, Goode A, Clewley D. The Effect of Timing of Physical Therapy for Acute Low Back Pain on Health Services Utilization: A Systematic Review. Arch Phys Med Rehabil. 2019;100(7):1324-38.
Source of funding	NR
Meta-analysis?	Yes
Number of included studies	N=11
Study designs	Studies were peer-reviewed randomized control trials (RCTs), prospective cohort, or retrospective cohort designs.
Search strategy	A medical librarian conducted the literature search from inception to May 2018 in MEDLINE, CINAHL, and Embase databases. The search included articles in English with no additional limits from the inception of each respective database.
Number of participants	The RCTs had sample sizes ranging from 60 to 220 individuals, the prospective cohort study had a sample of 4723 individuals, and the retrospective cohort studies had sample sizes ranging from 454 to 753,450 individuals.
Population	At least 18 years old and had a new episode of LBP within 6 months prior to the primary index date (entry into health system)
Intervention	Early PT is within 30 days of the index visit for acute LBP.
Comparison	Delayed PT or usual care (defined as no PT or additional intervention beyond education)
Relevant outcome measures	Future HSU, such as cost, health care visits, imaging, medications, injections, and surgery.
Outcomes	Five out of 6 studies that compared early PT to delayed PT found that early PT reduces future HSU. Random effects meta-analysis indicated a significant reduction in opioid use, spine injection, and spine surgery. Five studies compared early PT to usual care and reported mixed results.
Authors' conclusions	Early PT for acute LBP may reduce HSU, cost, and opioid use, and improve health care efficiency. This review may assist patients, health care providers, health care systems, and third-party payers in making decisions for the treatment of acute LBP.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Bai R, Li C, Xiao Y, Sharma M, Zhang F, Zhao Y. Effectiveness of spa therapy for patients with chronic low back pain: An updated systematic review and meta-analysis. Medicine (Baltimore). 2019;98(37):e17092.
Source of funding	2012 Chinese Nutrition Society (CNS) Nutrition Research Foundation—DSM Research Fund.
Meta-analysis?	Yes
Number of included studies	N=12
Study designs	RCTs
Search strategy	PubMed (1966 to June 2019), EMBASE (1974 to June 2019), Science Citation Index (1974 to June 2019), and Cochrane (to June 2019). All reference sections of eligible studies were manually reviewed for potential inclusion, no limits on language.
Number of participants	966, 808, and 468 patients with data on VAS, Schober tests, and ODI respectively were included in data synthesis
Population	Patients who were diagnosed with CLBP
Intervention	Spa therapy (combination of balneotherapy with physiotherapy, mud-pack), Exclusion: mineral water not natural spring, spa therapy intervention > 3 months.
Comparison	NR
Relevant outcome measures	VAS, Schober test, and ODI evaluate the intensity of pain, lumbar spine mobility, and lumbar spine function respectively, and they were chosen as main outcome measures for meta-analysis.
Outcomes	There was a significant decrease in pain based on visual analogue scale (VAS) (mean difference [MD] 16.07, 95% confidence interval [CI] [9.57, 22.57], P < .00001, I^2 = 88%, n = 966), and lumbar spine function in Oswestry disability index (ODI) (MD 7.12, 95% CI [3.77, 10.47], P<.00001, I^2=87%, n=468) comparing spa therapy group to control group. Methodological assessment for included studies showed that the study's quality is associated with lacking blinding.
Authors' conclusions	This updated meta-analysis confirmed that spa therapy can benefit pain reliving and improve lumbar spine function among patients with CLBP. Physiotherapy of subgroup analysis indicated that it can improve lumbar spine function. However, these conclusions should be treated with caution due to limited studies. More high-quality RCTs with double-blind design, larger sample size, and longer follow-up should be employed to improve the validity of study results.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	No
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Bai DY, Yuan ZG, Shao JJ, Zhu T, Zhang HJ. Unstable shoes for the treatment of lower back pain: a meta-analysis of randomized controlled trials. Clin Rehabil. 2019;33(11):1713-21.
Source of funding	The author(s) received no financial support for the research, authorship, and/or publication of this article.
Meta-analysis?	Yes
Number of included studies	N=5
Study designs	RCTs
Search strategy	PubMed (1966 to June 2019), EMBASE (1974 to June 2019), Science Citation Index (1974 to June 2019), and Cochrane (to June 2019). All reference sections of eligible studies were manually reviewed for potential inclusion, no limits on language.
Number of participants	N=251
Population	Patients with chronic lower back pain.
Intervention	Wore unstable shoes.
Comparison	Wore flat shoes.
Relevant outcome measures	Function, pain, and quality of life.
Outcomes	The meta-analysis results showed that there was a tendency toward a reduction in the Roland–Morris disability questionnaire score (mean difference (MD) –2.16, 95% confidence interval (CI) –4.28 to −0.03, I2=53%) and pain score (MD −0.84, 95% CI −1.66 to −0.02, I2 = 84%) in patients wearing unstable shoes compared to those wearing flat shoes. There was no significant difference in the life quality scores between the unstable shoe and flat shoe groups (MD −0.59, 95% CI −6.18 to 5.01, I2 = 0%). Functional disability and pain scores were determined to have very low-quality evidence, and life quality scores were determined to have low-quality evidence according to the Grading of Recommendations Assessment, Development and Evaluation analysis.
Authors' conclusions	Unstable shoes may be effective in treating lower back pain in the clinic, but the conclusion was limited by the current low-quality studies.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	No
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Binny J, Joshua Wong NL, Garga S, Lin CC, Maher CG, McLachlan AJ, et al. Transcutaneous electric nerve stimulation (TENS) for acute low back pain: systematic review. Scand J Pain. 2019;19(2):225-33.
Source of funding	This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. Chris Maher, Chris Lin, Adrian Traeger and Gustavo Machado hold research fellowships funded by NHMRC.
Meta-analysis?	No
Number of included studies	N=3
Study designs	RCT
Search strategy	MEDLINE, EMBASE, CENTRAL, CINAHL, PsycINFO and Cochrane Database of Systematic Reviews (inception to May 2018) were searched for reports of placebo-controlled randomised controlled trials (RCTs) evaluating TENS for acute LBP. Additionally, we screened reference lists of included RCTs and relevant systematic reviews to identify any other relevant studies.
Number of participants	N=192
Population	Acute, non-specific LBP
Intervention	TENS
Comparison	Placebo
Relevant outcome measures	Pain, disability or adverse events
Outcomes	One low quality trial (n = 63) provides low quality evidence that ~30 min treatment with TENS in an emergency-care setting provides clinically worthwhile pain relief for moderate to severe acute LBP in the immediate term compared with sham TENS [Mean Difference (MD) – 28.0 (95% CI – 32.7, −23.3)]. Two other studies which administered a course of TENS over 4–5 weeks, in more usual settings provide inconclusive evidence; MD −2.75 (95% CI −11.63, 6.13). There was limited data on adverse events or long-term follow-up.
Authors' conclusions	The current evidence is insufficient to support or dismiss the use of TENS for acute LBP. There is insufficient evidence to guide the use of TENS for acute LBP. There is low quality evidence of moderate improvements in pain with a short course of TENS (~30 min) during emergency transport of patients to the hospital. Future research should evaluate whether TENS has an opioid sparing role in the management of acute LBP.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review		
Bibliographic reference	Blanchette MA, Stochkendahl MJ, Borges Da Silva R, Boruff J, Harrison P, Bussieres A. Effectiveness and Economic Evaluation of Chiropractic Care for the Treatment of Low Back Pain: A Systematic Review of Pragmatic Studies. PLoS ONE. 2016;11(8):e0160037.	
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Braun 2020[77]
1. PICO		
***2. 'A priori' design**		?
3. Selection of study designs explained		
***4. Comprehensive literature search**		?
5. Duplicate study selection		
6. Duplicate data extraction		
***7. List of excluded studies with reasons**		No
8. Description of the included studies		
***9. Satisfactory RoB technique used**		Yes
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**		Yes
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**		Yes
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**		No
16. Conflict of interest reported		
Overall confidence in results of the review		Critically low

Data extraction table: systematic review	
Bibliographic reference	Chang WD, Lin HY, Lai PT. Core strength training for patients with chronic low back pain. J Phys Ther Sci. 2015;27(3):619-22.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Almeida 2020[75]
1. PICO	No
***2. 'A priori' design**	No
3. Selection of study designs explained	No
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	No
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	No
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Chen CH, Weng PW, Wu LC, Chiang YF, Chiang CJ. Radiofrequency neurotomy in chronic lumbar and sacroiliac joint pain: A meta-analysis. Medicine (Baltimore). 2019;98(26):e16230.
Source of funding	None
Meta-analysis?	Yes
Number of included studies	N=15
Study designs	RCTs
Search strategy	Searched articles listed in the Medline, Cochrane, EMBASE, and ISI Web of Knowledge databases published through March 2019. The reference lists of relevant studies were also reviewed. Keywords used for the search included: RF neurotomy, denervation, lumbar pain, and sacroiliac joint pain.
Number of participants	N=528 intervention, n=457 control
Population	Patients with a history of chronic function-limiting lumbar and sacroiliac joint pain lasting at least 6 months.
Intervention	Radiofrequency neurotomy
Comparison	Other nonsurgical treatments
Relevant outcome measures	The Oswestry Disability Index (ODI), measurement for pain, and a quality of life (QoL) questionnaire.
Outcomes	Patients treated with RF neurotomy (n = 528) had significantly greater improvement in ODI scores, pain scores and QoL measured by EQ-5D compared with controls (n = 457); however, significant heterogeneity was observed when data were pooled from eligible studies. In subgroup analyses, patients who received RF neurotomy had a significantly greater improvement in ODI scores compared with those with sham treatment. Patients treated with RF achieved significantly greater improvement in pain scores compared with controls who received sham treatment or medical treatment. In a subgroup analysis of pain in the sacroiliac joint and in lumbar facet joints, the RF neurotomy group achieved a significantly greater improvement in ODI score and pain scores compared with the control group. The ODI score and pain score were improved after 2 months of follow up in the analyses stratified by follow-up duration.
Authors' conclusions	Use of RF neurotomy as an intervention for chronic lumbar and sacroiliac joint pain led to improved function; however, larger, more directly comparable studies are needed to confirm this study's findings.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Chou R, Hashimoto R, Friedly J, Fu R, Dana T, Sullivan S, et al. Pain Management Injection Therapies for Low Back Pain. Agency for Healthcare Research and Quality (US). 2015.
Source of funding	AHRQ Technology Assessment Program
Meta-analysis?	Yes
Number of included studies	N=92. Seventy-eight randomized trials of epidural injections, 13 trials of facet joint injections, and one trial of sacroiliac injections were included.
Study designs	RCTs; large (>1000) observational studies of back injections that reported harms.
Search strategy	Searches in Ovid MEDLINE, the Cochrane Central Register of Controlled Trials, the Cochrane Database of Systematic Reviews, and the National Guideline Clearinghouse from 2008 through October, 2014. We restricted search start dates to January 2008, as there are multiple recent systematic evidence reviews directly addressing the Key Questions in the current review, including a good-quality review conducted by the same investigators of the current review that was commissioned by the American Pain Society (APS) and conducted searches through July 2008. The APS review included all of the interventions addressed in the current review. We used the APS review and other systematic reviews to identify studies published prior to 2008. We also hand searched the reference lists of relevant studies and searched for unpublished studies in ClinicalTrials.gov. We did not solicit Scientific Information Packets for published and unpublished studies because the corticosteroid and local anesthetic drugs examined in this review are generic and the injections do not involve use of proprietary devices. Literature searches will be updated while the draft report is posted for public comment and undergoing peer review to identify any new publications. Literature identified during the update search will be assessed by following the same process of dual review as all other studies considered for inclusion in the report. If any pertinent new literature is identified for inclusion in the report, it will be incorporated before the final submission of the report.
Number of participants	Overall not reported.
Population	Patients with lumbosacral radiculopathy, spinal stenosis, nonradicular back pain, or chronic postsurgical back pain
Intervention	Epidural, facet joint, and sacroiliac corticosteroid injections
Comparison	Placebo or other interventions
Relevant outcome measures	Pain, function, quality of life, opioid use, subsequent surgery, health care utilization, and harms, including bleeding, infection, neurological events, and systemic complications, such as weight gain, diabetes, osteoporosis, and other endocrinological effects, measured 1 week or later after the injection.
Outcomes	For epidural corticosteroid injections versus placebo interventions for radiculopathy, the only statistically significant effects were on mean improvement in pain at immediate-term follow up (weighted mean difference [WMD] –7.55 on a 0 to 100 scale, 95% CI –11.4 to –3.74) (strength of evidence [SOE]: moderate), mean improvement in function at immediate-term follow up when an outlier trial was excluded (standardized mean difference [SMD] –0.33, 95% CI –0.56 to –0.09) (SOE: low), and risk of surgery at short-term follow up (relative risk [RR] 0.62, 95% CI 0.41 to 0.92) (SOE: low). The magnitude of effects on pain and function was small, did not meet predefined thresholds for minimum clinically important differences, and there were no differences on outcomes at longer- term follow up. Evidence on effects of different injection techniques, patient characteristics, or comparator interventions estimates was limited and did not show clear effects. Trials of epidural corticosteroid injections for radiculopathy versus non placebo interventions did not clearly demonstrate effectiveness (SOE: insufficient to low). Evidence was limited for epidural corticosteroid injections versus placebo interventions for spinal stenosis (SOE: low to moderate) or nonradicular back pain (SOE: low), but showed no differences in pain, function, or likelihood of surgery.

	Studies found no clear differences between various facet joint corticosteroid injections (intra-articular, extra-articular [peri-capsular], or medial branch) and placebo interventions (SOE: low to moderate). There was insufficient evidence from one very small trial to determine effects of peri-articular sacroiliac joint corticosteroid injections injection (SOE: insufficient). Serious harms from injections were rare in randomized trials and observational studies, but harms reporting was suboptimal (SOE: low).
Authors' conclusions	Epidural corticosteroid injections for radiculopathy were associated with immediate improvements in pain and might be associated with immediate improvements in function, but benefits were small and not sustained, and there was no effect on long-term risk of surgery. Evidence did not suggest that effectiveness varies based on injection technique, corticosteroid, dose, or comparator. Limited evidence suggested that epidural corticosteroid injections are not effective for spinal stenosis or nonradicular back pain and that facet joint corticosteroid injections are not effective for presumed facet joint pain. There was insufficient evidence to evaluate effectiveness of sacroiliac joint corticosteroid injections.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	High

Data extraction table: systematic review	
Bibliographic reference	Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, et al. Nonpharmacologic Therapies for Low Back Pain: A Systematic Review for an American College of Physicians Clinical Practice Guideline. Annals of Internal Medicine. 2017;166(7):493-505.
Source of funding	Agency for Healthcare Research and Quality.
Meta-analysis?	Yes
Number of included studies	N=114: n=11 systematic reviews (including Kamper 2014), n=99 RCTs. The number of trials evaluating nonpharmacologic therapies ranged from 2 (tai chi) to 121 (exercise).
Study designs	RCTs
Search strategy	Ovid MEDLINE (January 2008 through February 2016), Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, and reference lists.
Number of participants	Variable
Population	Adults with acute (<4 weeks), subacute (4 to 12 weeks), or chronic (≥12 weeks) nonradicular or radicular low back pain. Excluded conditions were low back pain due to cancer, infection, inflammatory arthropathy, high-velocity trauma, or fracture; low back pain during pregnancy; and the presence of severe or progressive neurologic deficits.
Intervention	9 nonpharmacologic options: exercise, spinal manipulation, acupuncture, massage, mind–body interventions (yoga, tai chi, mindfulness-based stress reduction), psychological therapies, or multidisciplinary rehabilitation.
Comparison	Sham treatment, wait list, usual care, another nonpharmacologic option.
Relevant outcome measures	Long-term (≥1 year) or short-term (≤6 months) pain, function, return to work, and harms.
Outcomes	Chronic LBP Exercise (vs. usual care): Pain: Small effect, moderate strength of evidence (1 SR (19 RCTs) + 1 SR) Function: Small effect, moderate strength of evidence (1 SR (17 RCTs) + 1 SR) Motor control exercise (vs. minimal intervention): Pain: Moderate effect, low strength of evidence (1 SR (2 RCTs)) Function: Small effect, low strength of evidence (1 SR (3 RCTs)) Tai chi vs. wait list or no tai chi: Pain: Moderate effect, low strength of evidence (2 RCTs) Function: Small effect, low strength of evidence (1 RCT) Yoga vs. usual care: Pain: Moderate effect, low strength of evidence (1 RCT) Function: Moderate effect, low strength of evidence (1 RCT) Yoga vs. education: Pain: Small/no effect, low strength of evidence (9 RCTs) Function: Small/no effect, low strength of evidence (9 RCTs) Mindfulness vs. usual care or education: Pain: Small effect, moderate strength of evidence (3 RCTs) Function: Small effect, moderate strength of evidence (3 RCTs) Progressive relaxation vs. wait-list control: Pain: Moderate effect, low strength of evidence (1 SR (3 RCTs)) Function: Moderate effect, low strength of evidence (1 SR (3 RCTs)) Electromyography biofeedback vs. wait list or placebo: Pain: Moderate effect, low strength of evidence (1 SR (3 RCTs)) Function: No effect, low strength of evidence (1 SR (3 RCTs)) Operant therapy vs. wait list control: Pain: Small effect, low strength of evidence (1 SR (3 RCTs)) Function: No effect, low strength of evidence (1 SR (2 RCTs)) Cognitive-behavioral therapy vs. wait list control: Pain: Moderate effect, low strength of evidence (1 SR (5 RCTs)) Function: No effect, low strength of evidence (1 SR (4 RCTs))

	Multidisciplinary rehabilitation vs. no multidisciplinary rehabilitation" Pain: Moderate effect, low strength of evidence (1 SR (3 RCTs)) Function: Small effect, low strength of evidence (1 SR (3 RCTs)) Multidisciplinary rehabilitation vs. usual care: Pain: Moderate/small effect, moderate strength of evidence (1 SR (9 RCTs/7 RCTs)) Function: Small effect, moderate strength of evidence (1 SR (9 RCTs/7 RCTs)) Acupuncture vs. sham acupuncture: Pain: Moderate effect, low strength of evidence (1 SR (4 RCTs) + 5 RCTs) Function: No effect, low strength of evidence (1 SR (4 RCTs) + 5 RCTs) Acupuncture vs. no acupuncture: Pain: Moderate effect, moderate strength of evidence (1 SR (4 RCTs)) Function: Moderate effect, moderate strength of evidence (1 SR (3 RCTs)) Spinal manipulation vs. sham manipulation: Pain: No effect, low strength of evidence (1 SR (3 RCTs) + 1 RCT) Function: Unable to estimate (1 RCT) Spinal manipulation vs. inert treatment: Pain: Small effect, low strength of evidence (7 RCTs) Massage vs. usual care: Pain: No effect, low strength of evidence (1 RCT) Function: Unable to estimate (2 RCTs) Acute LBP Exercise (vs. usual care): Pain: No effect, low strength of evidence (1 SR (3 RCTs) + 3 RCTs) Function: No effect, low strength of evidence (1 SR (3 RCTs) + 3 RCTs) Acupuncture vs. sham acupuncture: Pain: Small effect, low strength of evidence (2 RCTs) Function: No effect, low strength of evidence (5 RCTs) Spinal manipulation vs. sham manipulation: Pain: Unable to estimate (1 RCT) Function: Small effect, low strength of evidence (1 SR (2 RCTs)) Spinal manipulation vs. inert treatment: Pain: No effect, low strength of evidence (1 SR (3 RCTs)) Function: No effect, low strength of evidence (1 SR (2 RCTs))
Authors' conclusions	Several nonpharmacologic therapies for primarily chronic low back pain are associated with small to moderate, usually short-term effects on pain; findings include new evidence on mind–body interventions.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall	High

Data extraction table: systematic review	
Bibliographic reference	Chou R, Deyo R, Friedly J, Skelly A, Weimer M, Fu R, et al. Systemic Pharmacologic Therapies for Low Back Pain: A Systematic Review for an American College of Physicians Clinical Practice Guideline. Ann Intern Med. 2017;166(7):480-92.
Source of funding	Contract HHSA290201200014I from AHRQ, U.S. Department of Health and Human Services.
Meta-analysis?	No
Number of included studies	N=46. The number of trials ranged from 9 (benzodiazepines) to 70 (nonsteroidal anti-inflammatory drugs).
Study designs	RCTs
Search strategy	Ovid MEDLINE, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews. Prior ACP/APS review to identify earlier studies. Jan 2007- Nov 2016. Reviewed reference lists and searched ClinicalTrials.gov.
Number of participants	Not reported overall
Population	Acute or chronic nonradicular or radicular low back pain.
Intervention	Acetaminophen, NSAIDs, opioids, tramadol and tapentadol, antidepressants, skeletal muscle relaxants, benzodiazepines, corticosteroids, and antiseizure medications
Comparison	Placebo or another intervention.
Relevant outcome measures	Pain, function, or harms.
Outcomes	New evidence found that acetaminophen was ineffective for acute low back pain, nonsteroidal anti-inflammatory drugs had smaller benefits for chronic low back pain than previously observed, duloxetine was effective for chronic low back pain, and benzodiazepines were ineffective for radiculopathy. For opioids, evidence remains limited to short-term trials showing modest effects for chronic low back pain; trials were not designed to assess serious harms. Skeletal muscle relaxants are effective for short-term pain relief in acute low back pain but caused sedation. Systemic corticosteroids do not seem to be effective. For effective interventions, pain relief was small to moderate and generally short-term; improvements in function were generally smaller. Evidence is insufficient to determine the effects of antiseizure medications.
Authors' conclusions	Several systemic medications for low back pain are associated with small to moderate, primarily short-term effects on pain. New evidence suggests that acetaminophen is ineffective for acute low back pain, and duloxetine is associated with modest effects for chronic low back pain.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Panahi 2020[89]	Schreijenberg 2019[26]
1. PICO	Yes	
***2. 'A priori' design**	Yes	
3. Selection of study designs explained	Yes	
***4. Comprehensive literature search**	Yes	
5. Duplicate study selection	Yes	
6. Duplicate data extraction	Yes	
***7. List of excluded studies with reasons**	Yes	
8. Description of the included studies	Yes	
***9. Satisfactory RoB technique used**	Yes	
10. Sources of funding reported	Yes	
***11. Appropriate methods for statistical combination of results**	No meta-analysis	
12. Potential impact of RoB assessed	No meta-analysis	
***13. RoB accounted for in interpretation/discussion**	Yes	
14. Satisfactory explanation for heterogeneity	Yes	
***15. Adequate investigation of publication bias**	No meta-analysis	
16. Conflict of interest reported	Yes	Adequate: at least 8/16
Overall confidence in results of the review	High	

Data extraction table: systematic review			
Bibliographic reference	Chou R, Deyo R, Friedly J, Skelly A, Hashimoto R, Weimer M, et al. Noninvasive Treatments for Low Back Pain. Agency for Healthcare Research and Quality (US). 2016:02		
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Panahi 2020[89]	Miake-Lye 2019[79] (AMSTAR)
1. PICO		Yes	
***2. 'A priori' design**		Yes	Yes
3. Selection of study designs explained		Yes	
***4. Comprehensive literature search**		Yes	Yes
5. Duplicate study selection		Yes	Yes
6. Duplicate data extraction		Yes	Yes
***7. List of excluded studies with reasons**		Yes	Yes
8. Description of the included studies		Yes	Yes
***9. Satisfactory RoB technique used**		Yes	Yes
10. Sources of funding reported		Yes	
***11. Appropriate methods for statistical combination of results**		No meta-analysis	Yes
12. Potential impact of RoB assessed		No meta-analysis	
***13. RoB accounted for in interpretation/discussion**		Yes	Yes
14. Satisfactory explanation for heterogeneity		Yes	
***15. Adequate investigation of publication bias**		No meta-analysis	Yes
16. Conflict of interest reported		Yes	Yes
Overall confidence in results of the review		High	11/11

Data extraction table: systematic review		
Bibliographic reference	Coulter ID, Crawford C, Hurwitz EL, Vernon H, Khorsan R, Suttorp Booth M, et al. Manipulation and mobilization for treating chronic low back pain: a systematic review and meta-analysis. Spine J. 2018;18(5):866-79.	
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Braun 2020[77]
1. PICO		
***2. 'A priori' design**		No
3. Selection of study designs explained		
***4. Comprehensive literature search**		?
5. Duplicate study selection		
6. Duplicate data extraction		
***7. List of excluded studies with reasons**		No
8. Description of the included studies		
***9. Satisfactory RoB technique used**		Yes
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**		Yes
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**		Yes
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**		Yes
16. Conflict of interest reported		
Overall confidence in results of the review		Critically low

Data extraction table: systematic review	
Bibliographic reference	Cuenca-Martinez F, Cortes-Amador S, Espi-Lopez GV. Effectiveness of classic physical therapy proposals for chronic non-specific low back pain: a literature review. Phys. 2018;21(1):16-22.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Dario AB, Moreti Cabral A, Almeida L, Ferreira ML, Refshauge K, Simic M, et al. Effectiveness of telehealth-based interventions in the management of non-specific low back pain: a systematic review with meta-analysis. Spine J. 2017;17(9):1342-51.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	?
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Dissanguan D, Sitilertpisan P, Joseph LH, Paungmali A. Effectiveness of Lumbar Support in Management of Low Back Pain: A Systematic Review. Online Journal of Health & Allied Sciences. 2018;17(4):1-6.
Source of funding	Thailand Research Fund (TRF)
Meta-analysis?	No
Number of included studies	N=8 (n=6 RCTs)
Study designs	Randomized controlled and quasi-experimental trials
Search strategy	Related studies were searched through electronic databases, including PubMed, Science Direct and Scopus, from January 1995 to December 2017. The keywords used were “lumbar support, lumbar belt, back support, back belt” and “back pain, lumbar pain and backache”. The search was carried out by using individual keywords with a combination of Boolean Logics (AND). In addition, studies that were published in English only were considered for inclusion in this study.
Number of participants	Not reported overall
Population	Non-specific LBP
Intervention	Any type of lumbar support for treating LBP
Comparison	NR
Relevant outcome measures	Outcome measures for determining progression of LBP symptoms, such as pain intensity (Visual Analog Scale, Numerical Rating Scale), overall improvement (Numerical Rating Scale), quality of life (SF-36, SF-12), specific functional status of back pain (Oswestry disability questionnaire, Roland-Morris disability score, Quebec disability score), etc.
Outcomes	Five of the six randomized controlled trials were of good quality, with all of them showing the use of lumbar support usually reducing discomfort and improving quality of life in individuals with low back pain. The prescription for wearing lumbar support for 6-8 hours per day for at least one month showed positive results.
Authors’ conclusions	The support belt appeared to be as effective as additional intervention together with usual care in the management of non-specific low back pain.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. ‘A priori’ design**	No
3. Selection of study designs explained	No
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	No
6. Duplicate data extraction	No
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	No
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	No
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Du S, Hu L, Dong J, Xu G, Chen X, Jin S, et al. Self-management program for chronic low back pain: A systematic review and meta-analysis. Patient Educ Couns. 2017;100(1):37-49.
Source of funding	This work was supported by grants from Youth Fund of Humanities and Social Science Research Foundation, Ministry of Education, China, 2014 (Grant Name: Study on the self-management model in patients with chronic low back pain based on Self- Efficacy Model; Grant No.14YJCZH024), Directing Program of Philosophy and Social Science Research Projects in Institutions of Higher Education, Jiangsu Province, 2014 (Grant Name: Study on the influencing factors of quality of life of patients with chronic low back pain: an analysis based on self-efficacy as the mediator variable; Grant No. 2014SJD140). The research was also sponsored by Qing Lan Project of Jiangsu Province.
Meta-analysis?	Yes
Number of included studies	N=13
Study designs	RCTs
Search strategy	A search was performed in five English databases: Pubmed, Cochrane Library, Web of Science, Elsevier (ScienceDirect), and CINAHL (Cumulative Index to Nursing and Allied Health Literature), which have been checked from their inception up to June, 2015. We used following MeSH (medical subject heading) terms and text words: ("back pain" OR "chronic back pain" OR "low back pain" OR "lower back pain" OR "chronic low back pain") AND ("self- management" OR "self-care" OR "patient education") AND ("randomized controlled trial" OR "random*"), which was the summary of search strategy. Meanwhile, cited reference retrievals were also performed.
Number of participants	Overall not reported
Population	Adults (>18years old) with CLBP were included. LBP is defined as "pain occurring in the lumbosacral region with radiation limited to above the knee, without signs of nerve root compromise". Patients' pain intensity should be 3 or above of a 0–10 pain scale (Visual Analogue Scale (VAS), or Visual Numeric Scale (VNS)). Further, CLBP is defined as the symptom of LBP which persists for more than three months (12 weeks).
Intervention	Self-management programs
Comparison	Waiting-list/usual care/active controls
Relevant outcome measures	Pain intensity, disability
Outcomes	The effect sizes (ESs) of SMP on pain intensity were 0.29, 0.20, 0.23, and 0.25 at immediate post-intervention, short-term, intermediate-term, and long-term follow-ups, respectively. The ESs on disability were 0.28, 0.23, 0.19, and 0.19 at immediate post-intervention, short-term, intermediate-term, and long-term follow-ups, respectively.
Authors' conclusions	For CLBP patients, there is moderate-quality evidence that SMP has a moderate effect on pain intensity, and small to moderate effect on disability. SMP can be regarded as an effective approach for CLBP management. In addition to face-to-face mode, internet-based strategy can also be considered as a useful option to deliver SMP. Theoretically driven programs are preferred.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes

10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Enke O, New HA, New CH, Mathieson S, McLachlan AJ, Latimer J, et al. Anticonvulsants in the treatment of low back pain and lumbar radicular pain: A systematic review and meta-analysis. Cmaj. 2018;190(26):E786-E93.
Source of funding	No external funding. Two authors (Christopher Maher, C.-W. Christine Lin) are funded by NHMRC fellowships. Andrew McLachlan is the Program Director of the NHMRC Centre for Research Excellence on Medicines and Ageing.
Meta-analysis?	Yes
Number of included studies	N=9
Study designs	RCTs
Search strategy	MEDLINE, Embase, CINAHL, PsycINFO, the Cochrane Central Register for Controlled Trials (CENTRAL) and WHO International Clinical Trials Registry Platform, inception to Dec2017. Search strategy using keywords for randomized controlled trials (RCTs) and low back pain or sciatica published by the Cochrane Back and Neck Group, plus keywords to identify anticonvulsants based on a recent Cochrane review and the WHO Collaborating Centre for Drug Statistics Methodology Anatomical Therapeutic Chemical (ATC) classification of antiepileptics. No language or publication restriction. We contacted the principal authors of unpublished studies for more information if eligibility was unclear, and searched reference lists of included trials and related systematic reviews to identify potentially relevant studies.
Number of participants	N=859
Population	Nonspecific low back pain, sciatica or neurogenic claudication of any duration
Intervention	Anticonvulsants (topiramate, gabapentin or pregabalin)
Comparison	Placebo
Relevant outcome measures	Any outcome of pain intensity (e.g., numerical rating scale), disability (e.g., Roland–Morris Disability Questionnaire) or adverse events.
Outcomes	Nine trials compared topiramate, gabapentin or pregabalin to placebo in 859 unique participants. Fourteen of 15 comparisons found anti-convulsants were not effective to reduce pain or disability in low back pain or lumbar radicular pain; for example, there was high-quality evidence of no effect of gabapentinoids versus placebo on chronic low back pain in the short term (pooled mean difference [MD] –0.0, 95% confidence interval [CI] –0.8 to 0.7) or for lumbar radicular pain in the immediate term (pooled MD –0.1, 95% CI –0.7 to 0.5). The lack of efficacy is accompanied by increased risk of adverse events from use of gabapentinoids, for which the level of evidence is high.
Authors' conclusions	There is moderate- to high-quality evidence that anticonvulsants are ineffective for treatment of low back pain or lumbar radicular pain. There is high-quality evidence that gabapentinoids have a higher risk for adverse events.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes

***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Low

Data extraction table: systematic review	
Bibliographic reference	Enthoven WT, Roelofs PD, Deyo RA, van Tulder MW, Koes BW. Non-steroidal anti-inflammatory drugs for chronic low back pain. Cochrane Database Syst Rev. 2016;2:CD012087.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	Yes
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	
Overall confidence in results of the review	High

Data extraction table: systematic review	
Bibliographic reference	Fernandez M, Ferreira ML, Refshauge KM, Hartvigsen J, Silva IR, Maher CG, et al. Surgery or physical activity in the management of sciatica: a systematic review and meta-analysis. Eur Spine J. 2016;25(11):3495-512.
Source of funding	MF is a PhD student supported by the Chiropractic and Osteopathic College of Australasia (COCA) Research Limited. CGM is supported by an ARC fellowship.
Meta-analysis?	Yes
Number of included studies	N=12
Study designs	RCTs
Search strategy	MEDLINE, CINAHL, Embase and PEDro from inception to 15 May 2013. Search terms included sciatica, synonyms of sciatica, randomised controlled trials and surgery. Reference lists of included studies, conference proceedings, unpublished reports and clinical trials registries also searched, no language or geographic restrictions.
Number of participants	Overall not reported
Population	Patients were experiencing the three most common causes of sciatica—disc herniation, spondylolisthesis and spinal stenosis
Intervention	All types of surgical procedures conducted in patients with sciatica, irrespective of diagnosis, were eligible to be included. Included microdiscectomy, open discectomy and fluoroscopic-guided percutaneous disc decompression for disc herniation. Decompressive laminectomy and posterior-lateral fusion were used for spondylolisthesis, while partial or total laminectomy, medial facetectomy, discectomy, osteophyte removal, hypertrophic ligament removal or fusion were employed for spinal stenosis.
Comparison	Physical activity: any form of planned, structured and repetitive exercise supervised by a health professional, as well as advice to stay active/engage in physical activity.
Relevant outcome measures	Pain and/or disability outcomes.
Outcomes	In the short term, surgery provided better outcomes than physical activity for disc herniation: disability [WMD -9.00 (95 % CI -13.73, -4.27)], leg pain [WMD -16.01 (95 % CI -23.00, -9.02)] and back pain [WMD -12.44 (95 % CI -17.76, -7.09)]; for spondylolisthesis: disability [WMD -14.60 (95 % CI -17.12, -12.08)], leg pain [WMD -35.00 (95 % CI -39.66, -30.34)] and back pain [WMD -20.00 (95 % CI -24.66, -15.34)] and spinal stenosis: disability [WMD -11.39 (95 % CI -17.31, -5.46)], leg pain [WMD, -27.17 (95 % CI -35.87, -18.46)] and back pain [WMD -20.80 (95 % CI -25.15, -16.44)]. Long-term and greater than 2-year post-randomisation results favoured surgery for spondylolisthesis and stenosis, although the size of the effects reduced with time. For disc herniation, no significant effect was shown for leg and back pain comparing surgery to physical activity.
Authors' conclusions	There are indications that surgery is superior to physical activity-based interventions in reducing pain and disability for disc herniation at short-term follow-up only; but high-quality evidence in this field is lacking (GRADE). For spondylolisthesis and spinal stenosis, surgery is superior to physical activity up to greater than 2 years follow-up.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	No
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No

***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Low

Data extraction table: systematic review	
Bibliographic reference	Franke H, Fryer G, Ostelo R, Kamper SJ. Muscle energy technique for non-specific low-back pain. Cochrane Database of Systematic Reviews. 2015(2).
Source of funding	No internal or external sources of support given.
Meta-analysis?	Yes
Number of included studies	N=12 (Bindra 2012, Dhinkaran 2011, Mesquita 2012, Naik 2010, Patil 2010, Rana 2009a, 2009b, Geisser 2006a, 2006b, Selkow 2009, Ellythy 2012a, 2012b, Salvador 2005, Pillay 2005).
Search strategy	Cochrane Central Register of Controlled Trials (CENTRAL, which includes the Back Review Group Trials Registry; Cochrane Library) up to May 2014; MEDLINE (OvidSP) up to May 2014; EMBASE (OvidSP) (1947 to 2014 week 21) up to May 2014; Cumulative Index to Nursing and Allied Health Literature (CINAHL, EBSCO) up to June 2014; Physiotherapy Evidence Database (PEDro), Osteopathic Medicine Digital Repository (OSTMED-DR), OSTEOPATHIC RESEARCHWEB, GOOGLE SCHOLAR up to June 2014. ClinicalTrials.gov and The World Health Organization International Clinical Trials Registry Platform (WHO ICTRP) for ongoing trials from inception to June 2014. Supplemented by citation tracking of identified trials and a manual search of reference lists of all relevant papers not listed in the electronic database.
Study designs	RCTs
Number of participants	N=500
Population	Adults (older than 18 years) with nonspecific LBP (that is, pain between the lumbo-pelvic region and the 12th rib). We excluded studies which included participants with specific LBP (back pain with a specific cause, such as compression fracture, a tumour or metastasis, ankylosing spondylitis, infection) and studies involving pregnant participants.
Intervention	'Muscle energy technique' (MET) as a treatment for non-specific low-back pain (low-back pain that cannot be linked to a specific cause). MET is a form of manual or 'hands-on' therapy used by osteopathic physicians, chiropractors, and physical therapists. In this type of therapy, a patient contracts muscles by pushing against resistance provided by the therapist. The therapist then assists the patient in stretching, strengthening and relaxing those muscles. The goal is to help restore normal muscle and joint mobility.
Comparison	Any intervention (without MET), no treatment, sham MET, all other therapies.
Relevant outcome measures	Pain, functional disability, QoL
Outcomes	The meta-analyses provided low-quality evidence that MET provided no additional benefit when added to other therapies on the outcomes of chronic pain and disability in the short-term (weighted mean difference (WMD) for pain 0.00, 95% CI -2.97 to 2.98 on a 100-point scale; standardised mean difference (SMD) for disability -0.18, 95% CI -0.43 to 0.08, 7 studies, 232 participants). There was low-quality evidence that MET produced no clinically relevant differences in pain compared to sham MET (mean difference (MD) 14.20, 95% CI -10.14 to 38.54, 1 study, 20 participants). For the comparison of MET to other conservative therapies for acute non-specific LBP, there was very low-quality evidence of no clinically relevant difference for the outcomes of pain (MD -10.72, 95% CI -32.57 to 11.13, 2 studies, 88 participants) and functional status (MD 0.87, 95% CI -6.31 to 8.05, 1 study, 60 participants). For the comparison of MET to other conservative therapies for chronic non-specific LBP, there was low-quality evidence of no clinically relevant difference for the outcomes of pain (MD -9.70, 95% CI -20.20 to 0.80, 1 study, 30 participants) and functional status (MD -4.10, 95% CI -9.53 to 1.33, 1 study, 30 participants). There was low-quality evidence of no clinically relevant difference for the addition of MET to other interventions for acute non-specific LBP for the outcome of pain (MD -3, 95% CI -11.37 to 5.37, 1 study, 40 participants) and low-quality evidence of an effect in

	favour of MET for functional status (MD -17.6, 95% CI -27.05 to -8.15, 1 study, 40 participants). For chronic non-specific LBP, there was low-quality evidence of an effect in favour of MET for the addition of MET to other interventions for the outcomes of pain (MD -34.1, 95% CI -38.43 to -29.77, 1 study, 30 participants) and functional status (MD -22, 95% CI -27.41 to -16.59, 1 study, 30 participants). Lastly, there was low-quality evidence of no difference for the addition of MET to another manual intervention compared to the same intervention with other conservative therapies for the outcomes of pain (MD 5.20, 95% CI -3.03 to 13.43, 1 study, 20 participants) and functional status (MD 6.0, 95% CI -0.49 to 12.49, 1 study, 20 participants).
Authors' conclusions	The quality of research related to testing the effectiveness of MET is poor. Studies are generally small and at high risk of bias due to methodological deficiencies. Studies conducted to date generally provide low-quality evidence that MET is not effective for patients with LBP. There is not sufficient evidence to reliably determine whether MET is likely to be effective in practice. Large, methodologically sound studies are necessary to investigate this question.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	**Lorenc 2018[78] (AMSTAR)**
1. PICO	
***2. 'A priori' design**	
3. Selection of study designs explained	
***4. Comprehensive literature search**	
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	
8. Description of the included studies	
***9. Satisfactory RoB technique used**	
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	
16. Conflict of interest reported	
Overall confidence in results of the review	High

Data extraction table: systematic review	
Bibliographic reference	Furlan AD, Giraldo M, Baskwill A, Irvin E, Imamura M. Massage for low-back pain. Cochrane Database Syst Rev. 2015(9):CD001929.
Source of funding	Internal sources: Institute for Work & Health, Canada. External sources: Canadian Institutes for Health Research (CIHR), Canada. Andrea Furlan received a CIHR New Investigator Award (2012-2017)
Meta-analysis?	Yes
Number of included studies	N=25 qualitative synthesis, n=19 meta-analysis
Study designs	RCTs
Search strategy	Cochrane Central Register of Controlled Trials, MEDLINE, MEDLINE In-Process and Other Non-Indexed Citations, EMBASE, CINAHL, LILACS, Index to Chiropractic Literature (21 Jul 2014), Proquest Dissertation Abstracts, PubMed (7 Aug 2014). All from inception to 17 Jul 2014 unless specified. We did not impose any language restrictions. We searched the reference lists of all included studies and other systematic reviews.
Number of participants	N=3,096
Population	Adults (people older than 18 years) with non-specific LBP (pain localized from the costal margin or 12th rib to the inferior gluteal fold.)
Intervention	Massage as soft-tissue manipulation using hands or a mechanical device. Massage can be applied to any body part, to the lumbar region only or to the whole body
Comparison	Active controls and inactive controls.
Relevant outcome measures	Primary outcomes were pain and back-specific functional status. 1. Short-term: outcome assessment ≤ six months after randomization. 2. Long-term: outcome assessment > six months after randomization. Data regarding adverse effects and complications related to massage. Secondary outcomes: overall improvement, patient satisfaction, quality of life and work-related status.
Outcomes	We judged the quality of the evidence to be "low" to "very low", and the main reasons for downgrading the evidence were risk of bias and imprecision. There was no suggestion of publication bias. For acute LBP, massage was found to be better than inactive controls for pain ((SMD -1.24, 95% CI -1.85 to -0.64; participants = 51; studies = 1)) in the short-term, but not for function ((SMD -0.50, 95% CI -1.06 to 0.06; participants = 51; studies = 1)). For sub-acute and chronic LBP, massage was better than inactive controls for pain ((SMD -0.75, 95% CI -0.90 to -0.60; participants = 761; studies = 7)) and function (SMD -0.72, 95% CI -1.05 to -0.39; 725 participants; 6 studies;) in the short-term, but not in the long-term; however, when compared to active controls, massage was better for pain, both in the short ((SMD -0.37, 95% CI -0.62 to -0.13; participants = 964; studies = 12)) and long-term follow-up ((SMD -0.40, 95% CI -0.80 to -0.01; participants = 757; studies = 5)), but no differences were found for function (both in the short and long-term). There were no reports of serious adverse events in any of these trials. Increased pain intensity was the most common adverse event reported in 1.5% to 25% of the participants.
Authors' conclusions	We have very little confidence that massage is an effective treatment for LBP. Acute, sub-acute and chronic LBP had improvements in pain outcomes with massage only in the short-term follow-up. Functional improvement was observed in participants with sub-acute and chronic LBP when compared with inactive controls, but only for the short-term follow-up. There were only minor adverse effects with massage.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	**Miyake-Lye 2019[79] (AMSTAR)**	**Lorenc 2018[78] (AMSTAR)**
1. PICO		
***2. 'A priori' design**	Yes	
3. Selection of study designs explained		
***4. Comprehensive literature search**	Yes	

5. Duplicate study selection	Yes	
6. Duplicate data extraction	Yes	
***7. List of excluded studies with reasons**		
8. Description of the included studies	Yes	
***9. Satisfactory RoB technique used**	Yes	
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**	Yes	
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**	Yes	
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**	Yes	
16. Conflict of interest reported	Yes	
Overall confidence in results of the review	11/11	High

Data extraction table: systematic review	
Bibliographic reference	Glazov G, Yelland M, Emery J. Low-level laser therapy for chronic non-specific low back pain: a meta-analysis of randomised controlled trials. Acupunct Med. 2016;34(5):328-41.
Source of funding	NR
Meta-analysis?	Yes
Number of included studies	N=15
Study designs	RCTs
Search strategy	MEDLINE, PubMed, EMBASE, CINAHL, Cochrane CENTRAL, AMED, and PEDro. Publication reference lists were additionally examined to identify any missed studies. We used the Updated Search Strategies for CBRG, which included a generic search for RCTs and controlled clinical trials, combined with a specific search for 'back' conditions. We completed the search by adding terms related to the laser intervention.
Number of participants	N=1,039
Population	Non-pregnant adults with CNLBP
Intervention	Low intensity laser applied to classical acupuncture points, tender points and/or trigger points, and where acupuncture intent was explicitly stated in the report
Comparison	Sham laser therapy with similar appearance to the active treatment but without laser irradiation.
Relevant outcome measures	Primary outcomes: (1) LBP visual analogue scale (VAS) or numerical pain rating scale (NPRS); and (2) 'global assessment': dichotomous categorical outcomes of overall improvement or satisfaction with the received intervention. Measured immediately (<1 week post-treatment) and at short-term (1–12 weeks) follow-up. Secondary outcomes: disability (Oswestry Disability Index, Roland-Morris Disability Questionnaire), adverse effects, range of movement (ROM) of the back, and pain or global assessment at intermediate (~6 months) and long-term (~1 year) follow-up.
Outcomes	Immediate and short-term follow-up: significant pain reduction of up to WMD (weighted mean difference) −1.40 cm (95% CI −1.91 to −0.88 cm) in favour of laser treatment, occurring in trials using at least 3 Joules (J) per point, with baseline pain <30 months and in non-acupuncture LLLT trials. Global assessment: RR 2.16 (95% CI 1.61 to 2.90) in favour of laser treatment in the same groups only at immediate follow-up.
Authors' conclusions	We demonstrated moderate quality of evidence (GRADE) to support a clinically important benefit in LLLT for CNLBP in the short term, which was only seen following higher laser dose interventions and in participants with a shorter duration of back pain.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	
Overall confidence in results of the review	Low

Data extraction table: systematic review			
Bibliographic reference	Gomes-Neto M, Lopes JM, Conceicao CS, Araujo A, Brasileiro A, Sousa C, et al. Stabilization exercise compared to general exercises or manual therapy for the management of low back pain: A systematic review and meta-analysis. Phys Ther Sport. 2017;23:136-42		
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Almeida 2020[75]	Braun 2020[77]
1. PICO		Yes	
***2. 'A priori' design**		No	No
3. Selection of study designs explained		No	
***4. Comprehensive literature search**		Yes	?
5. Duplicate study selection		Yes	
6. Duplicate data extraction		Yes	
***7. List of excluded studies with reasons**		Partial	No
8. Description of the included studies		No	
***9. Satisfactory RoB technique used**		Yes	?
10. Sources of funding reported		No	
***11. Appropriate methods for statistical combination of results**		Yes	Yes
12. Potential impact of RoB assessed		No	
***13. RoB accounted for in interpretation/discussion**		No	Yes
14. Satisfactory explanation for heterogeneity		Yes	
***15. Adequate investigation of publication bias**		No	No
16. Conflict of interest reported		No	
Overall confidence in results of the review		Critically low	Critically low

Data extraction table: systematic review	
Bibliographic reference	Hajihasani A, Rouhani M, Salavati M, Hedayati R, Kahlaee AH. The Influence of Cognitive Behavioral Therapy on Pain, Quality of Life, and Depression in Patients Receiving Physical Therapy for Chronic Low Back Pain: A Systematic Review. Pm R. 2019;11(2):167-76.
Source of funding	Support: Clinical Research Development Center of Rofeideh Rehabilitation Hospital, Neuromuscular Rehabilitation Research Center of Semnan University of Medical Sciences.
Meta-analysis?	No
Number of included studies	N=10
Study designs	RCTs
Search strategy	Key terms: “behavioral (or behavioural) treatment” OR “behavior (behaviour) treatment” OR “behavior (behaviour) therapy” OR “cognitive behavior (or behavior) treatment” OR “cognitive treatment” OR “cognitive therapy” OR “operant behavior (or behaviour) treatment” OR “respondent behavior (or behaviour) treatment” AND “physical therapy” OR “physiotherapy” OR “exercise therapy” OR “electrotherapy” OR “electrical therapy” OR “manual therapy” OR “myofascial therapy” OR “rehabilitation” AND “low back pain” OR “lower back pain” OR “back pain” OR “chronic back pain” OR “chronic lower back pain” in Google Scholar, PubMed, Ovid, ScienceDirect, ProQuest, Scopus, Embase, and Cochrane Library, no limitation on time and language (inception to Jan 2018). Reference lists of all relevant previous systematic reviews also screened.
Number of participants	Not reported overall.
Population	Patients experiencing nonspecific CLBP for at least 3 months
Intervention	CBT
Comparison	Routine PT
Relevant outcome measures	Pain, disability, quality of life, depression, functional capacity
Outcomes	Although CBT + PT was found to be superior to PT for pain, disability, quality of life, and functional capacity variables in some of the included studies, no extra benefit from CBT was documented in other investigations. The included studies also failed to show any advantage of CBT + PT over PT in reducing depression, and PT was even found to be superior to CBT + PT in one high-quality study.
Authors’ conclusions	Although appearing to be advantageous by reducing pain and disability and enhancing functional capacity and quality of life, CBT effects on depression cannot be teased out from the effects of PT.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. ‘A priori’ design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	
Overall confidence in results of the review	Low

Data extraction table: systematic review	
Bibliographic reference	Hall A, Richmond H, Copsey B, Hansen Z, Williamson E, Jones G, et al. Physiotherapist-delivered cognitive-behavioural interventions are effective for low back pain, but can they be replicated in clinical practice? A systematic review. Disabil Rehabil. 2018;40(1):1-9.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Halliday MH, Garcia AN, Amorim AB, Machado GC, Hayden JA, Pappas E, et al. Treatment Effect Sizes of Mechanical Diagnosis and Therapy for Pain and Disability in Patients With Low Back Pain: A Systematic Review. J Orthop Sports Phys Ther. 2019;49(4):219-29.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	Yes
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Hartvigsen L, Kongsted A, Hestbaek L. Clinical examination findings as prognostic factors in low back pain: a systematic review of the literature. Chiropr Man Therap. 2015;23:13.
Source of funding	LHa is the owner of a chiropractic clinic and has received funding from The Danish Chiropractors' Foundation. The Nordic Institute of Chiropractic and Clinical Biomechanics and AK's position at the University of Southern Denmark are financially supported by the Danish Chiropractors' Foundation.
Meta-analysis?	No
Number of included studies	N=49
Study designs	-
Search strategy	MEDLINE (from 1966), Embase (from 1974) and MANTIS (from 1888) from inception to June 26th, 2012. Screening of the reference lists of relevant reviews and retrieved papers, bibliography screening and citation tracking of authors of relevant studies.
Number of participants	Not reported overall
Population	Adult patients with LBP with or without leg pain and/or signs of nerve root involvement or spinal stenosis, receiving no or non-surgical treatment.
Intervention	Low-tech clinical tests (tests performed without the use of equipment other than simple inexpensive devices like a handheld goniometer, a reflex hammer, a pinwheel or a tape measure).
Comparison	NR
Relevant outcome measures	Statistical association between clinical examination findings at baseline and at least one of the outcomes of pain, disability, return to work, use of health care services or medication, and global improvement.
Outcomes	Associations between clinical tests and outcomes were often inconsistent between studies. In more than one third of the tests, there was no evidence of the tests being associated with outcome. Only two clinical tests demonstrated a consistent association with at least one of the outcomes: centralization and non-organic signs.
Authors' conclusions	For most clinical tests in LBP there is not consistent evidence for an association with outcome. Centralization and non-organic signs are exceptions from that. None of the other clinical tests have been investigated in confirmatory studies and study quality is generally low. There is a need for hypothesis testing studies designed specifically to investigate the prognostic value of the clinical tests, and a need for standardization of the performance and interpretation of tests.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Haskins R, Osmotherly PG, Rivett DA. Diagnostic clinical prediction rules for specific subtypes of low back pain: a systematic review. J Orthop Sports Phys Ther. 2015;45(2):61-76, A1-4.
Source of funding	NR
Meta-analysis?	No
Number of included studies	N=15
Study designs	Derivation, validation, and impact analysis studies
Search strategy	Search strings identified to have high sensitivity for prediction-model studies in combination with disease-specific filters for back-related disorders. Components of this search strategy have been used in previous systematic reviews for prognostic CPRs. MEDLINE, Embase, the Cochrane Central Register of Controlled Trials, PyscINFO, CINAHL, AMED, and the Index to Chiropractic Literature were searched from their inception to July 2013. Hand searching and citation tracking were used as supplementary search strategies.
Number of participants	Not reported overall
Population	Adults with LBP
Intervention	Diagnostic forms of CPRs: “a clinical tool that quantifies the individual contributions that various components of the history, physical examination, and ba- sic laboratory results make towards the diagnosis, prognosis, or likely response to treatment in an individual patient.”
Comparison	NR
Relevant outcome measures	Diagnostic CPRs were operationally defined as relating to the present status or classification of an individual, which included, but was not limited to, pathoanatomic diagnoses.
Outcomes	Of 10 014 studies screened for eligibility, the search identified that 13 diagnostic CPRs for LBP have been derived. Among those, 1 tool for identifying lumbar spinal stenosis and 2 tools for identifying inflammatory back pain have undergone validation. No impact analysis studies were identified.
Authors’ conclusions	Most diagnostic CPRs for LBP are in their initial development phase and cannot be recommended for use in clinical practice at this time. Validation and impact analysis of the diagnostic CPRs identified in this review are warranted, particularly for those tools that meet an identified unmet need of clinicians who manage patients with LBP.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. ‘A priori’ design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	No
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Helm S, Racz GB, Gerdesmeyer L, Justiz R, Hayek S, Kaplan ED, et al. Percutaneous and endoscopic adhesiolysis in managing low back and lower extremity pain: A systematic review and meta-analysis. Pain physician. 2016;19(2):E245-E81.
Source of funding	No external funding
Meta-analysis?	Yes
Number of included studies	N=7 RCTs and 3 observational studies for percutaneous adhesiolysis. N=1 RCT and 3 observational studies for spinal endoscopy.
Study designs	RCTs and observational studies
Search strategy	PubMed, Cochrane, U.S. National Guideline Clearinghouse, Google Scholar, Previous systematic reviews, Clinical Trials, Communication with investigators active in the field, Bibliographies of reviewed papers were also examined. Search period 1966-Sep 2015. Search terms included epidural adhesiolysis, epidural fibrosis, epidural lysis of adhesions, epidural neurolysis, epidural neuroplasty, percutaneous adhesiolysis, percutaneous neuroplasty, Racz procedure, endoscopic adhesiolysis, epidural endoscopy, epiduroscopy, spinal endoscopy.
Number of participants	No overall reported
Population	Patients with chronic refractory low back pain with or without lower extremity pain of at least 4 months' duration and not responsive to conservative care, including medications, physical or chiropractic therapy or epidural injections.
Intervention	Caudal lumbar percutaneous adhesiolysis and endoscopic adhesiolysis.
Comparison	Not specified
Relevant outcome measures	Pain relief of at least 50% and functional improvement of at least 40% were the primary outcome measures. Short-term efficacy was defined as improvement of 6 months or less; whereas, long-term efficacy was defined more than 6 months. The secondary outcome measures were functional status improvement, change in psychological status, or a reduction in either opioid use or reliance on health care interventions.
Outcomes	Based upon 7 randomized controlled trials showing efficacy, with no negative trials, there is Level I or strong evidence of the efficacy of percutaneous adhesiolysis in the treatment of chronic refractory low back and lower extremity pain. Based upon one high-quality randomized controlled trial, there is Level II to III evidence supporting the use of spinal endoscopy in treating chronic refractory low back and lower extremity pain.
Authors' conclusions	The evidence is Level I or strong that percutaneous adhesiolysis is efficacious in the treatment of chronic refractory low back and lower extremity pain. Percutaneous adhesiolysis may be considered as a first-line treatment for chronic refractory low back and lower extremity pain. The evidence is Level II to III that spinal endoscopy is effective in the treatment of chronic refractory low back and lower extremity pain.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Partial
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes

14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Low

Data extraction table: systematic review	
Bibliographic reference	Hogan KK, Perkins WO, Powden CJ, Hoch MC. The Effectiveness of Custom Foot Orthotics in Treating Chronic Low Back Pain: A Critically Appraised Topic. International Journal of Athletic Therapy & Training. 2016;21(1):14-23.
Source of funding	NR
Meta-analysis?	No
Number of included studies	N=3 (n=1 RCT, 2 prospective cohort)
Study designs	RCTs, prospective cohort studies
Search strategy	EBSCOhost, CINAHL, SPORTDiscus, PubMed, additional resources obtained via review of reference lists and hand search. Published since 2005 – Nov 2014.
Number of participants	Not reported overall
Population	Adults with chronic LBP
Intervention	Custom foot orthotics
Comparison	Control group (no foot orthotics)
Relevant outcome measures	Self-reported measures
Outcomes	Custom foot orthotic groups demonstrated significant reductions in patient-reported pain and disability (moderate quality evidence).
Authors' conclusions	There is moderate evidence to support the use of custom foot orthotics to improve self-reported measures in adults with chronic low back pain after seven weeks of use.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	No
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	No
6. Duplicate data extraction	No
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	No
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	No
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Hu HT, Gao H, Ma RJ, Zhao XF, Tian HF, Li L. Is dry needling effective for low back pain?: A systematic review and PRISMA-compliant meta-analysis. Medicine (Baltimore). 2018;97(26):e11225.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review		
Bibliographic reference	Hu XY, Chen NN, Chai QY, Yang GY, Trevelyan E, Lorenc A, et al. Integrative treatment for low back pain: An exploratory systematic review and meta-analysis of randomized controlled trials. Chin J Integr Med. 2015;26:26.	
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Lorenc 2018[78] (AMSTAR)
1. PICO		
***2. 'A priori' design**		
3. Selection of study designs explained		
***4. Comprehensive literature search**		
5. Duplicate study selection		
6. Duplicate data extraction		
***7. List of excluded studies with reasons**		
8. Description of the included studies		
***9. Satisfactory RoB technique used**		
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**		
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**		
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**		
16. Conflict of interest reported		
Overall confidence in results of the review		High

Data extraction table: systematic review	
Bibliographic reference	Huang Z, Ma J, Chen J, Shen B, Pei F, Kraus VB. The effectiveness of low-level laser therapy for nonspecific chronic low back pain: a systematic review and meta-analysis. Arthritis Res Ther. 2015;17:360.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Jonas WB, Crawford C, Colloca L, Kriston L, Linde K, Moseley B, et al. Are Invasive Procedures Effective for Chronic Pain? A Systematic Review. Pain Med. 2019;20(7):1281-93.
Source of funding	Samueli Institute. Karin Meissner received support from the Theophrastus Foundation and the Schweizer-Arau Foundation, Germany.
Meta-analysis?	Yes
Number of included studies	N=7 LBP (n=25 total on chronic pain conditions). 2 vertebroplasty, 4 neurotomy, 1 intradisc delivery of electrothermal energy
Study designs	RCTs
Search strategy	- Jan 2018, PubMed, EMBASE, CINAHL, Central (Cochrane Library), PILOTS, PsycInfo, DoD Biomedical Research, and clinicaltrials. gov. Search terms included ("Diagnostic Techniques, Surgical" OR "Orthopedic Procedures" OR "Specialties, Surgical" OR "Surgical Procedures, Operative" OR "surgery" [Subheading] or surgery) AND ("Placebos" OR "Placebo Effect" or sham surg* or placebo surg* or mock surg* or simulated surg* or placebo proc* or sham proc* or mock proc* or simulated proc*). Reference lists were examined, and experts in the field were contacted.
Number of participants	N=445
Population	Patients with chronic pain conditions, defined as those conditions where pain lasted more than three months.
Intervention	Any invasive procedure, including classical surgery. Invasive procedures were defined as when an instrument was inserted into the body (either endoscopically or percutaneously) for the purposes of manipulating tissue or changing anatomy.
Comparison	Parallel sham procedure that used the same invasive approach, instruments, and ritual but eliminated the hypothesized active component of tissue manipulation.
Relevant outcome measures	Pain reduction
Outcomes	The standardized mean difference for reduction of low back pain in seven studies (N = 445) was 0.18 (95% CI = –0.14 to 0.51, P = 0.26, I2 = 62%)
Authors' conclusions	There is little evidence for the specific efficacy beyond sham for invasive procedures in chronic pain.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review			
Bibliographic reference	Kalin S, Rausch-Osthoff AK, Bauer CM. What is the effect of sensory discrimination training on chronic low back pain? A systematic review. BMC Musculoskelet Disord. 2016;17:143.		
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Almeida 2020[75]	Braun 2020[77]
1. PICO		Yes	
***2. 'A priori' design**		No	No
3. Selection of study designs explained		No	
***4. Comprehensive literature search**		Yes	?
5. Duplicate study selection		Yes	
6. Duplicate data extraction		Yes	
***7. List of excluded studies with reasons**		Yes	No
8. Description of the included studies		Yes	
***9. Satisfactory RoB technique used**		Yes	?
10. Sources of funding reported		Yes	
***11. Appropriate methods for statistical combination of results**		No meta-analysis	No meta-analysis
12. Potential impact of RoB assessed		No meta-analysis	
***13. RoB accounted for in interpretation/discussion**		No	Yes
14. Satisfactory explanation for heterogeneity		Yes	
***15. Adequate investigation of publication bias**		No meta-analysis	No meta-analysis
16. Conflict of interest reported		Yes	
Overall confidence in results of the review		Critically low	Critically low

Data extraction table: systematic review	
Bibliographic reference	Kamper SJ, Apeldoorn AT, Chiarotto A, Smeets RJ, Ostelo RW, Guzman J, et al. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain: Cochrane systematic review and meta-analysis. Bmj. 2015;350:h444. AND Gianola S, Andreano A, Castellini G, Moja L, Valsecchi MG. Multidisciplinary biopsychosocial rehabilitation for chronic low back pain: the need to present minimal important differences units in meta-analyses. Health Qual Life Outcomes. 2018;16(1):91.
Source of funding	No external funding.
Meta-analysis?	Yes
Number of included studies	N=41 (Abbassi 2012, Alaranta 1994, Bendix 1996/1998, Henchoz 2010, Kaapa 2006, Kool 2007, Lambeek 2010, Linton 2005, Lukinmaa 1989, Mangels 2009, Mitchell 1994, Monticone 2013, Nicholas 1991, Roche 2007/11, Skouen 2002, Smeets 2006/08, Strand 2001, Streibelt 2009, Turner 1990, von Korff 2005)
Study designs	RCTs
Search strategy	Electronic searches of Cochrane Back Review Group Trials Register, CENTRAL, Medline, Embase, PsycINFO, and CINAHL databases up to February 2014, supplemented by hand searching of reference lists and forward citation tracking of included trials.
Number of participants	N=6,858
Population	Participants with low back pain (defined as pain between the 12th rib and buttock crease) for more than three months. We excluded trials if they recruited patients with specific low back pain caused by infection, neoplasm, metastasis, rheumatoid arthritis or other inflammatory articular conditions (such as ankylosing spondylitis), spinal stenosis, or fractures. We included trials that reported on patients with diagnoses such as disc degeneration or bulging discs, facet joint dysfunction, or sacroiliac joint pain.
Intervention	Multidisciplinary rehabilitation involved a physical component and one or both of a psychological component or a social or work targeted component; multidisciplinary rehabilitation was delivered by healthcare professionals from at least two different professional backgrounds.
Comparison	Non-multidisciplinary intervention.
Relevant outcome measures	The primary outcomes were pain, disability, and work absenteeism. Secondary outcomes were psychological functioning, quality of life, adverse events, and health service utilisation.
Outcomes	Kamper: Sixteen trials provided moderate quality evidence that multidisciplinary rehabilitation decreased pain (standardised mean difference 0.21, 95% confidence interval 0.04 to 0.37; equivalent to 0.5 points in a 10 point pain scale) and disability (0.23, 0.06 to 0.40; equivalent to 1.5 points in a 24 point Roland-Morris index) compared with usual care. Nineteen trials provided low quality evidence that multidisciplinary rehabilitation decreased pain (standardised mean difference 0.51, −0.01 to 1.04) and disability (0.68, 0.16 to 1.19) compared with physical treatments, but significant statistical heterogeneity across trials was present. Eight trials provided moderate quality evidence that multidisciplinary rehabilitation improves the odds of being at work one year after intervention (odds ratio 1.87, 95% confidence interval 1.39 to 2.53) compared with physical treatments. Seven trials provided moderate quality evidence that multidisciplinary rehabilitation does not improve the odds of being at work (odds ratio 1.04, 0.73 to 1.47) compared with usual care. Two trials that compared multidisciplinary rehabilitation with surgery found little difference in outcomes and an increased risk of adverse events with surgery. Gianola: Improvement in back pain was observed in an appreciable number of patients in the short- and medium-term after MBR: the minimal important difference (MID) was lower but still close to 1 (0.75 and 0.86 MID units, respectively). MBR probably had little or no benefit for the majority of patients in the long-term, where the MID approached 0 (0.27 MID units, confidence interval 0.07–0.48).

Authors' conclusions	Kamper: Multidisciplinary biopsychosocial rehabilitation interventions were more effective than usual care (moderate quality evidence) and physical treatments (low quality evidence) in decreasing pain and disability in people with chronic low back pain. For work outcomes, multidisciplinary rehabilitation seems to be more effective than physical treatment but not more effective than usual care. Gianola: Meta-analyses expressed in MID units may offer better insight into the clinical relevance of MBR: the intervention is highly recommended for reducing pain in the short- and medium-term but cannot be recommended for long-term pain reduction since the benefit decays rapidly.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	High

Data extraction table: systematic review	
Bibliographic reference	Karran EL, McAuley JH, Traeger AC, Hillier SL, Grabherr L, Russek LN, et al. Can screening instruments accurately determine poor outcome risk in adults with recent onset low back pain? A systematic review and meta-analysis. BMC Med. 2017;15(1):13.
Source of funding	LR and SH did not receive funding support from any organisation for the submitted work. EK received Royal Adelaide Hospital Allied Health Research Grant funding (2014 and 2015) and the 2015 Dawes Scholarship. JM is supported by a NHMRC project grant ID 1047827. AT is supported by a NHMRC PhD Scholarship APP1075670. LG is supported by the Swiss National Science Foundation. GLM is supported by a NHMRC research fellowship NHMRC ID 106279. AW received financial compensation for her contribution to screening of the search results (research assistant employed by SH).
Meta-analysis?	Yes
Number of included studies	N=18
Study designs	Prospective cohort studies meeting a Level I or Level II quality standard according to the NHMRC evidence hierarchy for prognostic studies
Search strategy	Medline, CINAHL, EMBASE, PsycINFO, PEDro, Cochrane Central Register of Controlled Trials (CENTRAL), Web of Science (ISI) and SciVerse SCOPUS searched between June 23 and July 7, 2014. No time limits were applied, but studies were limited to English language publications and those involving human participants. Search terms included the following keywords and their variations: low back pain, sciatica, radiculopathy, risk, screening, questionnaire, instrument, prediction, prognosis, validity. The reference lists of all included articles and relevant review articles were later searched to identify any additional studies. Searching of all databases was updated on June 29 and December 22, 2015, and June 30, 2016.
Number of participants	Not reported overall.
Population	Adults (aged 18 or over) with 'recent onset' LBP (i.e. acute LBP (0–6 weeks) or subacute LBP (6 weeks to 3 months)), with or without leg pain.
Intervention	Included studies involved the application of a previously developed PSI within the first 3 months of an episode of LBP and reported follow-up outcomes at a minimum of 12 weeks from initial screening. We defined a PSI as an instrument that met all of the following criteria: (1) a self-report questionnaire; (2) assesses multiple factors or constructs that have predictive validity for patients with musculoskeletal pain; and (3) was developed to provide prognostic information for musculoskeletal conditions.
Comparison	Included studies were required to report associations between the PSI scores and participant outcomes, and aimed, a priori, to evaluate the instrument for its predictive validity.
Relevant outcome measures	1. Pain intensity as measured using a visual analogue scale, numeric rating scale (NRS), verbal rating scale or Likert scale 2. Disability as measured by validated self-report questionnaires 3. Sick leave or days absent from work or return to work status 4. Self-reported recovery using a global perceived effect scale or a Likert (recovery) scale
Outcomes	We identified 18 eligible studies investigating seven instruments. Five studies investigated the STarT Back Tool: performance for discriminating pain outcomes at follow-up was 'non-informative' (pooled AUC = 0.59 (0.55–0.63), n = 1153) and 'acceptable' for discriminating disability outcomes (pooled AUC = 0.74 (0.66–0.82), n = 821). Seven studies investigated the Orebro Musculoskeletal Pain Screening Questionnaire: performance was 'poor' for discriminating pain outcomes (pooled AUC = 0.69 (0.62–0.76), n = 360), 'acceptable' for disability outcomes (pooled AUC = 0.75 (0.69–0.82), n = 512), and 'excellent' for absenteeism outcomes (pooled AUC = 0.83 (0.75–0.90), n = 243). Two studies investigated the Vermont Disability Prediction Questionnaire and four further instruments were investigated in single studies only.

Authors' conclusions	LBP screening instruments administered in primary care perform poorly at assigning higher risk scores to individuals who develop chronic pain than to those who do not. Risks of a poor disability outcome and prolonged absenteeism are likely to be estimated with greater accuracy. It is important that clinicians who use screening tools to obtain prognostic information consider the potential for misclassification of patient risk and its consequences for care decisions based on screening. However, it needs to be acknowledged that the outcomes on which we evaluated these screening instruments in some cases had a different threshold, outcome, and time period than those they were designed to predict.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Kuss K, Becker A, Quint S, Leonhardt C. Activating therapy modalities in older individuals with chronic non-specific low back pain: a systematic review. Physiotherapy. 2015;101(4):310-8.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review			
Bibliographic reference	Lawford BJ, Walters J, Ferrar K. Does walking improve disability status, function, or quality of life in adults with chronic low back pain? A systematic review. Clin Rehabil. 2016;30(6):523-36.		
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Almeida 2020[75]	Braun 2020[77]
1. PICO		Yes	
***2. 'A priori' design**		Yes	?
3. Selection of study designs explained		No	
***4. Comprehensive literature search**		Yes	?
5. Duplicate study selection		Yes	
6. Duplicate data extraction		Yes	
***7. List of excluded studies with reasons**		No	No
8. Description of the included studies		Partial	
***9. Satisfactory RoB technique used**		Yes	?
10. Sources of funding reported		No	
***11. Appropriate methods for statistical combination of results**		No meta-analysis	No meta-analysis
12. Potential impact of RoB assessed		No meta-analysis	No meta-analysis
***13. RoB accounted for in interpretation/discussion**		No	
14. Satisfactory explanation for heterogeneity		Yes	
***15. Adequate investigation of publication bias**		No meta-analysis	No meta-analysis
16. Conflict of interest reported		Yes	
Overall confidence in results of the review		Critically low	Critically low

Data extraction table: systematic review	
Bibliographic reference	Lemmers GPG, van Lankveld W, Westert GP, van der Wees PJ, Staal JB. Imaging versus no imaging for low back pain: a systematic review, measuring costs, healthcare utilization and absence from work. Eur Spine J. 2019;28(5):937-50.
Source of funding	NR
Meta-analysis?	No
Number of included studies	N=14 (n=6 RCTs, n=8 observational studies)
Study designs	RCTs and observational studies
Search strategy	PubMed, CINAHL, EMBASE, Cochrane Library and Web of Science up to October 2017. “Appendix” shows the complete search strategy with the keywords used (MeSH, EMTREE and text words). All articles published in English were eligible.
Number of participants	Not reported overall
Population	Patients older than 18 years of age with LBP with or without sciatica.
Intervention	Imaging (X-ray, CT and MRI).
Comparison	No imaging.
Relevant outcome measures	Costs, healthcare utilization or absence from work.
Outcomes	Moderate-quality evidence (1 RCT; n = 421) supports that direct costs increase for patients undergoing X-ray. Low-quality evidence (3 OSs; n = 9535) supports that early MRI may lead to an increase in costs. There is moderate-quality evidence (1 RCT, 2 OSs; n = 3897) that performing MRI or imaging (MRI or CT) is associated with an increase in healthcare utilization (e.g., future injections, surgery, medication, etc.). There is low-quality evidence (5 OSs; n = 15,493) that performing X-ray or MRI is associated with an increase in healthcare utilization. Moderate-quality evidence (2 RCTs; n = 667) showed no significant differences between X-ray or MRI groups compared with non-imaging groups on absence from work. However, low-quality evidence (2 Oss; n = 7765) did show significantly greater mean absence from work in the MRI groups in comparison with the non-imaging groups.
Authors’ conclusions	Imaging in LBP may be associated with higher medical costs, increased healthcare utilization and more absence from work.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. ‘A priori’ design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Lheureux A, Berquin A. Comparison between the STarT Back Screening Tool and the Orebro Musculoskeletal Pain Screening Questionnaire: Which tool for what purpose? A semi-systematic review. Ann Phys Rehabil Med. 2019;62(3):178-88.
Source of funding	No specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The authors are both supported by the University of Louvain, Belgium.
Meta-analysis?	No
Number of included studies	N=28
Study designs	NR
Search strategy	PubMed/MEDLINE between 1997 (creation of the OMPSQ) and October 2017 and were written in English or French. Several combinations of keywords were used: ‘‘start back screening tool’’, ‘‘start back’’, ‘‘Örebro musculoskeletal pain screening questionnaire’’, ‘‘Örebro musculoskeletal pain’’, ‘‘OMPSQ’’, ‘‘OMSQ’’, ‘‘acute low back pain screening questionnaire’’, ‘‘ALBPSQ’’.
Number of participants	Not reported overall
Population	Adults over 18 years of age, of both sexes, with acute or subacute non-specific spinal pain (lumbar/cervical), without a red flag classification and without surgical intervention on the spine.
Intervention	SBST and/or OMPSQ original/short form.
Comparison	NR
Relevant outcome measures	Data on sensitivity, specificity and/or AUC relating to ‘‘pain’’, ‘‘function’’, ‘‘work’’ or ‘‘global recovery’’
Outcomes	The OMPSQ best predicted a Pain NRS >= 3 at 3 months (AUC = 0.64 (0.50–0.78)) and at 6 months (AUC between 0.70 (no confidence interval provided) and 0.84 (0.71–0.97)). The SBST and the OMPSQ are comparable to predict an Oswestry Disability Index >= 30% at 6 months. A single study showed no difference between the SBST and the OMPSQ to predict absenteeism >= 30 days at 6 months. The two questionnaires cannot be compared for ‘‘global recovery’’ outcomes.
Authors’ conclusions	The OMPSQ seems better than the SBST for predicting ‘‘pain’’ and ‘‘work’’ outcomes, the SBST may be better for ‘‘function’’ outcomes. These results should be taken with caution because of the high heterogeneity between studies. It should be noted that the OMPSQ was elaborated with the aim of creating a prognostic tool while the SBST was devised as a treatment-allocating tool and is easier to use in clinical practice. This should guide the choice of using one questionnaire rather than the other.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. ‘A priori’ design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	No
5. Duplicate study selection	No
6. Duplicate data extraction	No
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review			
Bibliographic reference	Lin HT, Hung WC, Hung JL, Wu PS, Liaw LJ, Chang JH. Effects of pilates on patients with chronic non-specific low back pain: a systematic review. J Phys Ther Sci. 2016;28(10):2961-9.		
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Almeida 2020[75]	Braun 2020[77]
1. PICO		No	
***2. 'A priori' design**		No	No
3. Selection of study designs explained		No	
***4. Comprehensive literature search**		Partial	?
5. Duplicate study selection		Yes	
6. Duplicate data extraction		Yes	
***7. List of excluded studies with reasons**		Partial	No
8. Description of the included studies		Partial	
***9. Satisfactory RoB technique used**		Yes	?
10. Sources of funding reported		No	
***11. Appropriate methods for statistical combination of results**		No meta-analysis	No meta-analysis
12. Potential impact of RoB assessed		No meta-analysis	No meta-analysis
***13. RoB accounted for in interpretation/discussion**		No	
14. Satisfactory explanation for heterogeneity		No	
***15. Adequate investigation of publication bias**		No meta-analysis	No meta-analysis
16. Conflict of interest reported		No	
Overall confidence in results of the review		Critically low	Critically low

Data extraction table: systematic review		
Bibliographic reference	Lopez-de-Uralde-Villanueva I, Munoz-Garcia D, Gil-Martinez A, Pardo-Montero J, Munoz-Plata R, Angulo-Diaz-Parreno S, et al. A Systematic Review and Meta-Analysis on the Effectiveness of Graded Activity and Graded Exposure for Chronic Nonspecific Low Back Pain. Pain Med. 2016;17(1):172-88.	
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Braun 2020[77]
1. PICO		
***2. 'A priori' design**		No
3. Selection of study designs explained		
***4. Comprehensive literature search**		?
5. Duplicate study selection		
6. Duplicate data extraction		
***7. List of excluded studies with reasons**		No
8. Description of the included studies		
***9. Satisfactory RoB technique used**		?
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**		Yes
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**		Yes
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**		Yes
16. Conflict of interest reported		
Overall confidence in results of the review		Critically low

Data extraction table: systematic review		
Bibliographic reference	Luomajoki HA, Bonet Beltran MB, Careddu S, Bauer CM. Effectiveness of movement control exercise on patients with non-specific low back pain and movement control impairment: A systematic review and meta-analysis. Musculoskelet Sci Pract. 2018;36:1-11.	
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Braun 2020[77]
1. PICO		
***2. 'A priori' design**		?
3. Selection of study designs explained		
***4. Comprehensive literature search**		?
5. Duplicate study selection		
6. Duplicate data extraction		
***7. List of excluded studies with reasons**		Yes
8. Description of the included studies		
***9. Satisfactory RoB technique used**		?
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**		Yes
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**		Yes
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**		No
16. Conflict of interest reported		
Overall confidence in results of the review		Critically low

Data extraction table: systematic review		
Bibliographic reference	Luz Junior MAD, Almeida MO, Santos RS, Civile VT, Costa LOP. Effectiveness of Kinesio Taping in Patients With Chronic Nonspecific Low Back Pain: A Systematic Review With Meta-analysis. Spine. 2019;44(1):68-78.	
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Braun 2020[77]
1. PICO		
***2. 'A priori' design**		Yes
3. Selection of study designs explained		
***4. Comprehensive literature search**		?
5. Duplicate study selection		
6. Duplicate data extraction		
***7. List of excluded studies with reasons**		No
8. Description of the included studies		
***9. Satisfactory RoB technique used**		?
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**		Yes
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**		Yes
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**		No
16. Conflict of interest reported		
Overall confidence in results of the review		Critically low

Data extraction table: systematic review	
Bibliographic reference	Macedo LG, Saragiotto BT, Yamato TP, Costa LO, Menezes Costa LC, Ostelo RW, et al. Motor control exercise for acute non-specific low back pain. Cochrane Database Syst Rev. 2016;2:CD012085.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	Yes
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Low

Data extraction table: systematic review	
Bibliographic reference	Machado GC, Ferreira PH, Yoo RI, Harris IA, Pinheiro MB, Koes BW, et al. Surgical options for lumbar spinal stenosis. Cochrane Database Syst Rev. 2016;11:CD012421.
Source of funding	None
Meta-analysis?	Yes
Number of included studies	N=24 RCTs in n=39 papers
Study designs	RCTs
Search strategy	Review authors developed the search strategy based on the Back and Neck Review Group methods guidelines and a specialist was consulted to revise it. Electronic searches of the following databases were performed up to 16 June 2016: Cochrane Back and Neck Review Group Trials Register (OvidSP, 1991 to May 2016), Cochrane Central Register of Controlled Trials (CENTRAL; OvidSP, Issue 5, 2016), MEDLINE (OvidSP, 1946 to June Week 2 2016), Embase (Embase.com, 1947 to 16 June 2016), CINAHL (EBSCO, 1981 to 16 June 2016), AMED (OvidSP, 1985 to 16 June 2016), Web of Science (Thomson Reuters, 1900 to 16 June 2016), Latin American and Caribbean Health Sciences Literature (LILACS; 1967 to 16 June 2016). There were no restrictions on language or publication date. Authors also searched ClinicalTrials.gov, Australian New Zealand Clinical Trials Registry (ANZCTR), and World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP) for registered, ongoing or completed trials and contacted the main investigators of the relevant trials to identify any publication of the study. The keywords used for these searches included spinal stenosis, surgery and decompression.
Number of participants	N=2,352
Population	Adults with symptomatic degenerative lumbar spinal stenosis, despite its anatomical classification (central, foraminal or lateral) or diagnostic criteria (physical examination or radiographic imaging). There were no restrictions regarding intensity or duration of symptoms.
Intervention	Any surgical technique
Comparison	Another surgical technique (None of the included trials compared surgery with no treatment, placebo or sham surgery.)
Relevant outcome measures	Patient-centred outcomes of clinical relevance, as well as safety and perioperative surgical outcomes. The primary outcomes of this review comprised: pain intensity; physical function or disability status; quality of life; and recovery. Secondary outcomes were: perioperative blood loss; operation time; length of hospital stay; reoperation rate; and costs.
Outcomes	Five trials compared the effects of fusion in addition to decompression surgery. Our results showed no significant differences in pain relief at long-term (mean difference (MD) -0.29, 95% confidence interval (CI) -7.32 to 6.74). Similarly, we found no between-group differences in disability reduction in the long-term (MD 3.26, 95% CI -6.12 to 12.63). Participants who received decompression alone had significantly less perioperative blood loss (MD -0.52 L, 95% CI -0.70 L to -0.34 L) and required shorter operations (MD -107.94 minutes, 95% CI -161.65 minutes to -54.23 minutes) compared with those treated with decompression plus fusion, though we found no difference in the number of reoperations (risk ratio (RR) 1.25, 95% CI 0.81 to 1.92). Another three trials investigated the effects of interspinous process spacer devices compared with conventional bony decompression. These spacer devices resulted in similar reductions in pain (MD -0.55, 95% CI -8.08 to 6.99) and disability (MD 1.25, 95% CI -4.48 to 6.98). The spacer devices required longer operation time (MD 39.11 minutes, 95% CI 19.43 minutes to 58.78 minutes) and were associated with higher risk of reoperation (RR 3.95, 95% CI 2.12 to 7.37), but we found no difference in perioperative blood loss (MD 144.00 mL, 95% CI -209.74 mL to 497.74 mL). Two trials compared interspinous spacer devices with decompression plus fusion. Although we found no difference in pain relief (MD 5.35, 95% CI -1.18 to 11.88), the spacer devices revealed a small but significant effect in disability reduction (MD 5.72, 95% CI 1.28 to

	10.15). They were also superior to decompression plus fusion in terms of operation time (MD 78.91 minutes, 95% CI 30.16 minutes to 127.65 minutes) and perioperative blood loss (MD 238.90 mL, 95% CI 182.66 mL to 295.14 mL), however, there was no difference in rate of reoperation (RR 0.70, 95% CI 0.32 to 1.51). Overall there were no differences for the primary or secondary outcomes when different types of surgical decompression techniques were compared among each other.
Authors' conclusions	At present, decompression plus fusion and interspinous process spacers have not been shown to be superior to conventional decompression alone.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	High

Data extraction table: systematic review			
Bibliographic reference	Machado GC, Maher CG, Ferreira PH, Day RO, Pinheiro MB, Ferreira ML. Non-steroidal anti-inflammatory drugs for spinal pain: a systematic review and meta-analysis. Ann Rheum Dis. 2017;76(7):1269-78.		
Source of funding	GCM and MBP are supported by an Australian Postgraduate Award from the Department of Education and Training of Australia. CGM is supported by a Principal Research Fellowship from the National Health and Medical Research Council. MLF holds a Sydney Medical Foundation Fellowship, Sydney Medical School.		
Meta-analysis?	Yes		
Number of included studies	N=35		
Study designs	RCTs		
Search strategy	We searched MEDLINE, EMBASE, CINAHL, CENTRAL and LILACS from their inception to February 2016. The search strategy was constructed based on a combination of the following keywords and their variations: neck pain, back pain, lumbago, sciatica, anti-inflammatory, placebo and randomised controlled trial. There were no restrictions of language or publication period. Translations were obtained for non-English studies (two trials).		
Number of participants	N=6,065		
Population	Participants with neck or low back pain, with or without radicular pain		
Intervention	Any class, formulation or route of administration (topical, oral or injection) of NSAIDs		
Comparison	Matching placebo		
Relevant outcome measures	patient-relevant outcomes, such as pain intensity, disability status, quality-of-life or adverse events		
Outcomes	NSAIDs reduced pain and disability, but provided clinically unimportant effects over placebo. Six participants (95% CI 4 to 10) needed to be treated with NSAIDs, rather than placebo, for one additional participant to achieve clinically important pain reduction. When looking at different types of spinal pain, outcomes or time points, in only 3 of the 14 analyses were the pooled treatment effects marginally above our threshold for clinical importance. NSAIDs increased the risk of gastrointestinal reactions by 2.5 times (95% CI 1.2 to 5.2), although the median duration of included trials was 7 days.		
Authors' conclusions	NSAIDs are effective for spinal pain, but the magnitude of the difference in outcomes between the intervention and placebo groups is not clinically important. At present, there are no simple analgesics that provide clinically important effects for spinal pain over placebo. There is an urgent need to develop new drug therapies for this condition.		
Quality appraisal (AMSTAR 2: https://amstar.ca/)			Schreijenberg 2019[26]
1. PICO		Yes	
***2. 'A priori' design**		Yes	
3. Selection of study designs explained		Yes	
***4. Comprehensive literature search**		Partial	
5. Duplicate study selection		Yes	
6. Duplicate data extraction		Yes	
***7. List of excluded studies with reasons**		No	
8. Description of the included studies		Yes	
***9. Satisfactory RoB technique used**		Yes	
10. Sources of funding reported		Yes	
***11. Appropriate methods for statistical combination of results**		Yes	
12. Potential impact of RoB assessed		Yes	
***13. RoB accounted for in interpretation/discussion**		Yes	
14. Satisfactory explanation for heterogeneity		Yes	
***15. Adequate investigation of publication bias**		Yes	
16. Conflict of interest reported		Yes	Adequate: at least 8/16
Overall confidence in results of the review		High	

Data extraction table: systematic review	
Bibliographic reference	Manchikanti L, Knezevic NN, Sanapati MR, Boswell MV, Kaye AD, Hirsch JA. Effectiveness of percutaneous adhesiolysis in managing chronic central lumbar spinal stenosis: A systematic review and meta-analysis. Pain physician. 2019;22(6):E523-E50.
Source of funding	None
Meta-analysis?	Yes
Number of included studies	N=2 RCTs and 4 observational studies; 5 studies for single arm meta-analysis.
Study designs	Randomized controlled trials, Observational studies
Search strategy	Searches were performed from PubMed from 1966 www.ncbi.nlm.nih.gov/pubmed, Cochrane Library www.thecochranelibrary.com, US National Guideline Clearinghouse (NGC) www.guideline.gov/, clinical trials www.clinicaltrials.gov/, and Google Scholar with search period through June 2019. The search terminology was as follows: ((((((((((((((((chronic low back pain) OR nerve root compression) OR lumbosciatic pain) OR radicular pain) OR radiculitis) OR sciatica) OR spinal stenosis) AND ((((((((((epidural injection) OR epidural adhesiolysis) OR epidural neuroplasty) OR epidural lysis of adhesions) OR percutaneous adhesiolysis OR transforaminal injection) OR corticosteroid) OR methylprednisolone) OR bupivacaine OR lidocaine))) AND ((meta-analysis [pt] OR randomized controlled trial [pt] OR controlled clinical trial [pt] OR systematic review OR randomized controlled trials [mh] OR nonrandomized studies OR observational studies OR random allocation [mh] OR double-blind method [mh] OR single-blind method [mh] OR clinical trial [pt] OR clinical trials [mh] OR (“clinical trial” [tw]) OR ((singl* [tw] OR doubl* [tw] OR trebl* [tw] OR tripl* [tw]) AND (mask* [tw] OR blind* [tw])) OR (placebos [mh] OR placebo* [tw] OR random* [tw] OR research design [mh:noexp])))).
Number of participants	Overall not reported
Population	Chronic low back and lower extremity pain secondary to lumbar central spinal canal stenosis
Intervention	Percutaneous adhesiolysis administered utilizing caudal, lumbar interlaminar, or lumbar transforaminal approaches
Comparison	With or without a control group.
Relevant outcome measures	The primary outcome or hard endpoint was defined as the proportion of patients with 50% pain relief and improvement in functionality, whereas the secondary outcome measures or soft endpoints were pain relief and/or improvement in functionality. Short-term effectiveness was defined as improvement of 6 months or less, whereas long-term effectiveness was defined as more than 6 months.
Outcomes	Pain and functionality at 6 months: there were 4 studies (one compared two different types of percutaneous adhesiolysis) included in this single-arm meta-analysis. The results showed an improvement in the NRS pain scores for pain after percutaneous adhesiolysis at 6 months, on average 3.707 ($P < 0.001$), and an improvement in the ODI functionality scores after percutaneous adhesiolysis at 6 months, on average 14.854 (on 0-50 scale) ($P < 0.001$). Pain and functionality at 12 months: there were 3 studies included in this single-arm meta-analysis. The results showed an improvement in the NRS pain scores for back pain after percutaneous adhesiolysis at 12 months, on average 3.847 ($P < 0.001$), and an improvement in the ODI functionality scores after percutaneous adhesiolysis at 12 months, on average 15.394 (on 0-50 scale) ($P < 0.001$). Based on the single-arm meta-analysis, significant improvement in pain scores was observed at 3 months, 6 months, and 12 months. Similarly, improvement in functional status based on Oswestry disability scores was also observed at all 3 points of assessment. Average pain improvement was 3.8 at 3 months, 3.7 at 6 months, and 3.8 at 12 months. Similarly, average improvement in disability scores was on average 15 on a scale of 0-50 at 3, 6, and 12-month follow up. However, more importantly, the

	proportion of patients showing at least 50% improvement in pain and function was significantly higher in randomized and observational studies. Qualitative analysis showed effectiveness of percutaneous adhesiolysis and superiority over epidural injections. With qualitative analysis, there was significant evidence of effectiveness with both RCTs and 4 observational studies. With quantitative analysis, utilizing single-arm meta-analysis, significant improvement in pain and function with percutaneous adhesiolysis was identified. Consequently, based on the total of 6 available studies with 2 RCTs and 4 observational studies percutaneous adhesiolysis with targeted administration of local anesthetic and steroids with or without hypertonic sodium chloride solution and with or without balloon inflation showed significant improvement with Level II or moderate evidence.
Authors' conclusions	The results showed Level II evidence for short-term and long-term improvement in pain and function with application of percutaneous adhesiolysis in managing central lumbar spinal stenosis.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Partial
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Low

Data extraction table: systematic review	
Bibliographic reference	Marin TJ, Van Eerd D, Irvin E, Couban R, Koes BW, Malmivaara A, et al. Multidisciplinary biopsychosocial rehabilitation for subacute low back pain. Cochrane Database of Systematic Reviews. 2017(6).
Source of funding	NR
Study type	Systematic review
Number of included studies	N=9 (Anema 2007, Buitmann 2009, Campello 2012, Jensen 2011, Karjalainen 2003, Loisel 1997, Schiltenwolf 2006, Slater 2009, Whitfill 2010)
Study designs	RCTs.
Search strategy	We searched for relevant trials in any language by a computer-aided search of CENTRAL, MEDLINE, Embase, CINAHL, PsycINFO and two trials registers. Our search is current to 13 July 2016. We searched reference lists and contacted authors in the field for additional studies.
Number of participants	N=981
Population	Adult participants with nonspecific LBP with a mean duration for the current episode greater than six weeks and less than 12 weeks. Working age (between 18 and 65 years). Participants with or without radiating pain. Exclusion criteria: Studies that involved participants with LBP caused by specific pathologies (e.g. infections, neoplasms, metastases, fractures, osteoporosis, rheumatoid arthritis, radiculopathies); Studies that involved individuals with LBP during or immediately following pregnancy; Studies that recruited participants with postoperative back pain.
Intervention	A multidisciplinary biopsychosocial rehabilitation (MBR) program. This means that the intervention included a physical component (e.g. pharmacological, physical therapy) in combination with either a psychological, social, or occupational component (or any combination of these). We also required involvement of healthcare professionals from at least two different clinical backgrounds.
Comparison	Usual care (reflective of the usual management of these participants within the health care system in which the study was conducted), or other intervention (designed specifically for the RCT).
Relevant outcome measures	Primary outcomes: Pain, Back-specific disability/functional status, Work status (return-to-work, sick leave). Secondary outcomes: Generic health or quality of life (QoL), Healthcare service utilization, Global improvement, Psychological and cognitive function (depression, anxiety, fear avoidance, coping strategies), Adverse events.
Outcomes	In MBR compared to usual care for subacute LBP, individuals receiving MBR had less pain (four studies with 336 participants; SMD -0.46, 95% CI -0.70 to -0.21, moderate-quality of evidence due to risk of bias) and less disability (three studies with 240 participants; SMD -0.44, 95% CI -0.87 to -0.01, low-quality of evidence due to risk of bias and inconsistency), as well as increased likelihood of return-to-work (three studies with 170 participants; OR 3.19, 95% CI 1.46 to 6.98, very low-quality of evidence due to serious risk of bias and imprecision) and fewer sick leave days (two studies with 210 participants; SMD -0.38 95% CI -0.66 to -0.10, low-quality of evidence due to risk of bias and imprecision) at 12-month follow-up. The effect sizes for pain and disability were low in terms of clinical meaningfulness, whereas effects for work-related outcomes were in the moderate range. However, when comparing MBR to other treatments (i.e. brief intervention with features from a light mobilization program and a graded activity program, functional restoration, brief clinical intervention including education and advice on exercise, and psychological counselling), we found no differences between the groups in terms of pain (two studies with 336 participants; SMD -0.14, 95% CI - 0.36 to 0.07, low-quality evidence due to imprecision and risk of bias), functional disability (two studies with 345 participants; SMD -0.03, 95% CI -0.24 to 0.18, low-quality evidence due to imprecision and risk of bias), and time away from work (two studies with 158 participants; SMD -0.25 95% CI -0.98 to 0.47, very low-quality evidence due to serious imprecision, inconsistency and risk of bias).
Authors' conclusions	On average, people with subacute LBP who receive MBR will do better than if they receive usual care, but it is not clear whether they do better than people who receive

	some other type of treatment. However, the available research provides mainly low to very low-quality evidence, thus additional high-quality trials are needed before we can describe the value of MBP for clinical practice.

Quality appraisal (AMSTAR 2: https://amstar.ca/)		**Braun 2020[77]**
1. PICO		
***2. 'A priori' design**	Yes	Yes
3. Selection of study designs explained		
***4. Comprehensive literature search**	Yes	Yes
5. Duplicate study selection	Yes	
6. Duplicate data extraction	Yes	
***7. List of excluded studies with reasons**	Yes	Yes
8. Description of the included studies	Yes	
***9. Satisfactory RoB technique used**	Yes	Yes
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**	Yes	Yes
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**	Yes	Yes
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**	Yes	No
16. Conflict of interest reported	Yes	
Overall confidence in results of the review	High	Low

Data extraction table: systematic review		
Bibliographic reference	Mathieson S, Kasch R, Maher CG, Pinto RZ, McLachlan AJ, Koes BW, et al. Combination Drug Therapy for the Management of Low Back Pain and Sciatica: Systematic Review and Meta-Analysis. J Pain. 2019;20(1):1-15.	
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Braun 2020[77]
1. PICO		
***2. 'A priori' design**		Yes
3. Selection of study designs explained		
***4. Comprehensive literature search**		Yes
5. Duplicate study selection		
6. Duplicate data extraction		
***7. List of excluded studies with reasons**		No
8. Description of the included studies		
***9. Satisfactory RoB technique used**		Yes
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**		Yes
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**		Yes
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**		No
16. Conflict of interest reported		
Overall confidence in results of the review		Critically low

Data extraction table: systematic review	
Bibliographic reference	Nascimento PRCD, Costa LOP, Araujo AC, Poitras S, Bilodeau M. Effectiveness of interventions for non-specific low back pain in older adults. A systematic review and meta-analysis. Physiotherapy (United Kingdom). 2019;105(2):147-62.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	?
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Nicholl BI, Sandal LF, Stochkendahl MJ, McCallum M, Suresh N, Vasseljen O, et al. Digital Support Interventions for the Self-Management of Low Back Pain: A Systematic Review. J Med Internet Res. 2017;19(5):e179

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	?
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Noori SA, Rasheed A, Aiyer R, Jung B, Bansal N, Chang KV, et al. Therapeutic Ultrasound for Pain Management in Chronic Low Back Pain and Chronic Neck Pain: A Systematic Review. Pain Med. 2019;12:12.
Source of funding	None
Meta-analysis?	No
Number of included studies	N=6 (plus n=4 neck pain)
Study designs	RCTs
Search strategy	PubMed (1966–2018), CENTRAL (The Cochrane Library, 1970–2018), Scopus (1960–2018), and Web of Sciences (1965–2018).
Number of participants	Not reported overall, sample sizes ranging from 10 to 112 participants.
Population	Chronic non-specific LBP and neck pain.
Intervention	Therapeutic ultrasound: one-way energy delivery that utilizes a crystal sound head to transmit acoustic waves at 1 or 3MHz and at amplitude densities between 0.1 and 3W/cm2. In continuous delivery mode, there is nonstop delivery of ultrasonic waves.
Comparison	Standard therapy or no therapy
Relevant outcome measures	Visual Analog Scale (pain intensity), Numeric Pain Rating Scale, Oswestry Disability Index, Neck Disability Index, Neck Pain Disability Scale, Short-Form 36, Functional Rating Index, Pain Pressure Threshold.
Outcomes	Three studies in LBP reported that both therapeutic and sham (placebo) ultrasound provided significant improvement in pain intensity. In each of these studies, ultrasound was found to be more effective than placebo when using only one of several validated instruments to measure pain. Three of the four studies on neck pain demonstrated significant pain relief with ultrasound in combination with other treatment modalities. However, only one of these studies demonstrated that the use of ultrasound was the cause of the statistically significant improvement in pain intensity.
Authors' conclusions	Therapeutic ultrasound is frequently used in the treatment of LBP and neck pain and is often combined with other physiotherapeutic modalities. However, given the paucity of trials and conflicting results, we cannot recommend the use of monotherapeutic ultrasound for chronic LBP or neck pain. It does seem that ultrasound may be considered as part of a physical modality treatment plan that may be potentially helpful for short-term pain relief; however, it is undetermined which modality may be superior. In both pain syndromes, further trials are needed to define the true effect of low-intensity ultrasound therapy for axial back pain. No conclusive recommendations may be made for optimal settings or session duration.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	No
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	No
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	No
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	O'Brien KM, Hodder RK, Wiggers J, Williams A, Campbell E, Wolfenden L, et al. Effectiveness of telephone-based interventions for managing osteoarthritis and spinal pain: a systematic review and meta-analysis. Peerj. 2018;6:e5846.
Source of funding	No funding.
Meta-analysis?	Yes
Number of included trials	N=6 (n=2 acute back pain (Damush 2003, Iles 2011), n=4 chronic back pain (Buhrman 2004, Goode 2018, Rutledge 2018, Williams 2018))
Study designs	RCTs, cluster RCTs and non-randomised controlled trials that had a parallel comparison group.
Search strategy	Medline, Embase, AMED, Medline In-Process, PsycINFO, CINAHL, SportDiscus from inception to May 2018. We searched trial registries (ClinicalTrials.gov, the Australian and New Zealand Clinical Trials Registry and the World Health Organisation International Clinical Trials Registry Platform) in May 2018. We also conducted a manual search of the reference lists of all included studies. The corresponding authors of all included studies were contacted via email to request details of any other potentially eligible studies.
Number of participants	Acute back pain (n = 241), chronic back pain (n = 342)
Population	Osteoarthritis of the knee or hip, or spinal pain (back or neck pain). Studies that included patients with a serious pathology (e.g. cancer, infection, etc.) or included patients in the postoperative period were excluded. We excluded studies including other chronic pain conditions such as headache, rheumatoid arthritis, and neuropathic pain because they have a clearly different etiology and clinical course.
Intervention	Service delivery by any person (i.e. therapist, health professional or trained operator) by telephone or videoconferencing in which there was a direct person-to-person verbal exchange of information. The service could be used to provide any aspect of care (e.g. delivery of advice, education, behaviour modification treatment, ongoing support). We included studies that specifically aimed to test the effectiveness of a telephone-based or videoconferencing intervention. Complex interventions with one or more delivery component (e.g. face-to-face sessions or educational materials in addition to telephone or videoconferencing) were included if the telephone or videoconferencing component was the main method of intervention delivery, defined as at least 50% of the total number of intervention contacts conducted via telephone or videoconferencing.
Comparison	Other interventions, no treatment, usual care, wait-list control or attention control.
Relevant outcome measures	Primary: pain intensity or disability. Secondary: psychological symptoms, self-efficacy, behavioural outcomes related to treatment (weight loss, physical activity, healthcare or medication use, treatment adherence), health-related quality of life, recovery, subjective improvement in symptoms, fear avoidance, and adverse events.
Outcomes	Telephone-based interventions (with educational materials) vs. usual care Pain intensity: Positive intervention effects were found for spinal pain (n=2 studies, SMD -0.55, 95% CI [-0.92, -0.19]). Disability: Positive intervention effects were found for spinal pain (n=2 studies, SMD -0.64, 95% CI [-1.01, -0.27]). Telephone plus face-to-face interventions vs. usual care Pain intensity: no intervention effect was found for spinal pain (n=2 studies). Disability: no intervention effect was found for spinal pain (n=3 studies).
Authors' conclusions	We are moderately confident that telephone-based interventions reduce pain intensity and disability in patients with osteoarthritis and spinal pain compared to usual care, but telephone plus face-to-face interventions are no more effective than usual care or face-to-face interventions alone.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes

5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	High

Data extraction table: systematic review	
Bibliographic reference	Oliveira CB, Maher CG, Ferreira ML, Hancock MJ, Oliveira VC, McLachlan AJ, et al. Epidural corticosteroid injections for lumbosacral radicular pain. Cochrane Database Syst Rev. 2020(4).
Source of funding	Christopher Maher has a senior research fellowship by the National Health and Medical Research Council, Australia. Crystian Oliveira was supported by Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES-Finance Code 001), Brazil. No external funding.
Meta-analysis?	Yes
Number of included studies	N=25. Seventeen studies included participants with lumbosacral radicular pain with a diagnosis based on clinical assessment and 15 studies included participants with mixed duration of symptoms.
Study designs	RCTs
Search strategy	We searched the following databases without language limitations up to 25 September 2019: Cochrane Back and Neck group trial register, CENTRAL, MEDLINE, Embase, CINAHL, PsycINFO, International Pharmaceutical Abstracts, and two trial registers. We also performed citation tracking of included studies and relevant systematic reviews in the field.
Number of participants	N=2470
Population	Patients with lumbosacral radicular pain.
Intervention	Epidural corticosteroid injections of any corticosteroid drug. Included all three anatomical approaches (caudal, interlaminar, and transforaminal) to delivering corticosteroids into the epidural space.
Comparison	Placebo treatment as delivery of an inert substance (i.e. one with no pharmacologic activity), an innocuous substance (e.g. normal saline solution), or a pharmacologically active substance but not one considered to provide sustained benefit (e.g. local anaesthetic), either into the epidural space (i.e. to mimic epidural corticosteroid injection) or adjacent spinal tissue (i.e. subcutaneous, intramuscular, or interspinous tissue). We also included trials in which a local anaesthetic with a short duration of action was used as a placebo and injected together with corticosteroid in the intervention group
Relevant outcome measures	Leg pain intensity measured by a self-reported scale (e.g. visual analogue scale or numerical rating scale); and Disability measured by a self-reported questionnaire (e.g. Oswestry Disability Index or Roland–Morris Disability Questionnaire). *Secondary outcomes* • Overall pain intensity measured by a self-reported scale (e.g. visual analogue scale or numerical rating scale). • Back pain intensity measured by a self-reported scale (e.g.visual analogue scale or numerical rating scale). • Pain intensity measured by the proportion of patients with pain relief from baseline. • Disability measured by the proportion of patients with disability reduction from baseline. • Adverse events measured by the proportion of patients reporting any untoward medical occurrence after an epidural corticosteroid injection, which did not necessarily have a causal relationship with the epidural injection procedure or the substance administered.
Outcomes	Epidural corticosteroid injections were probably slightly more effective compared to placebo in reducing leg pain at short-term follow-up (mean difference (MD) −4.93, 95% confidence interval (CI) −8.77 to –1.09 on a 0 to 100 scale; 8 trials, n = 949; moderate-quality evidence (downgraded for risk of bias)). For disability, epidural corticosteroid injections were probably slightly more effective compared to placebo in reducing disability at short-term follow-up (MD −4.18, 95% CI −6.04 to −2.17, on a 0 to 100 scale; 12 trials, n = 1367; moderate-quality evidence (downgraded for risk of bias)). The treatment effects are small, however, and may not be considered clinically important by patients and clinicians (i.e. MD lower than 10%).

Authors' conclusions	This study found that epidural corticosteroid injections probably slightly reduced leg pain and disability at short-term follow-up in people with lumbosacral radicular pain. In addition, no minor or major adverse events were reported at short-term follow-up after epidural corticosteroid injections or placebo injection. Although the current review identified additional clinical trials, the available evidence still provides only limited support for the use of epidural corticosteroid injections in people with lumbosacral radicular pain as the treatment effects are small, mainly evident at short-term follow-up and may not be considered clinically important by patients and clinicians (i.e. mean difference lower than 10%). According to GRADE, the quality of the evidence ranged from very low to moderate, suggesting that further studies are likely to play an important role in clarifying the efficacy and tolerability of this treatment. We recommend that further trials should attend to methodological features such as appropriate allocation concealment and blinding of care providers to minimise the potential for biased estimates of treatment and harmful effects.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	High

Data extraction table: systematic review	
Bibliographic reference	Owen PJ, Miller CT, Mundell NL, Verswijveren SJ, Tagliaferri SD, Brisby H, et al. Which specific modes of exercise training are most effective for treating low back pain? Network meta-analysis. BJSM online. 2019;30:30.
Source of funding	Musculoskeletal Australia (formerly MOVE muscle, bone and joint health; CONTR2017/00399)
Meta-analysis?	Yes (network meta-analysis)
Number of included studies	N=89 for qualitative synthesis, 70 (pain), 63 (physical function), 16 (mental health) and 4 (trunk muscle strength) for NMA
Study designs	Parallel arm (individual-designed or cluster-designed) RCTs.
Search strategy	SPORTDiscus, EMBASE and CENTRAL was conducted for research published between journal inception to May 2019 using Medical Subject Headings (MeSH) for 'pain' and 'exercise' search terms. 'Pain' and 'Exercise' search terms were combined with 'AND' and search in 'All Fields' with the following limits: MEDLINE (All Adult: 19+ years; RCT; Human), CINAHL (Exclude MEDLINE records; Human, RCTs; Journal Article; All Adult), SPORTDiscus (Academic Journal), EMBASE (RCT; Not MEDLINE; Adult; Article) and CENTRAL (Trials). Additional searches included reviewing the reference lists of previously published systematic reviews identified via the Cochrane Database of Systematic Reviews (search terms: chronic back pain exercise; limits: none) and GoogleScholar (search terms: systematic review chronic back pain exercise; limits: previous 10 years).
Number of participants	N=5,578
Population	Adults (≥18 years) with non-specific (no known specific pathology) chronic (≥12 weeks) low back pain (localised below the costal margin and above the inferior gluteal folds, with or without leg pain).
Intervention	Prescription of exercise training alone, without the addition of other treatments (eg, massage, ultrasound or hot and cold therapy) for at least 4 weeks of duration.
Comparison	True control, therapist hands-on control and therapist hands-off control.
Relevant outcome measures	Subjective pain intensity (eg, visual analogue scale), subjective physical function (eg, Oswestry Disability Index), objective trunk muscle strength (eg, lumbar extension one-repetition maximum), objective trunk muscle endurance (eg, static lumbar extension hold time), subjective analgesic pharmacotherapy use (eg, prescription medication use) or subjective mental health (eg, 36-Item Short Form Health Survey).
Outcomes	The NMA consistency model revealed that the following exercise training modalities had the highest probability (surface under the cumulative ranking (SUCRA)) of being best when compared with true control: Pilates for pain (SUCRA=100%; pooled standardised mean difference (95% CI): −1.86 (–2.54 to –1.19)), resistance (SUCRA=80%; −1.14 (–1.71 to –0.56)) and stabilisation/motor control (SUCRA=80%; −1.13 (–1.53 to –0.74)) for physical function and resistance (SUCRA=80%; −1.26 (–2.10 to –0.41)) and aerobic (SUCRA=80%; −1.18 (–2.20 to –0.15)) for mental health. True control was most likely (SUCRA≤10%) to be the worst treatment for all outcomes, followed by therapist hands-off control for pain (SUCRA=10%; 0.09 (–0.71 to 0.89)) and physical function (SUCRA=20%; −0.31 (–0.94 to 0.32)) and therapist hands-on control for mental health (SUCRA=20%; −0.31 (–1.31 to 0.70)). Stretching and McKenzie exercise effect sizes did not differ to true control for pain or function (p>0.095; SUCRA<40%). NMA was not possible for trunk muscle endurance or analgesic medication. The quality of the synthesised evidence was low according to Grading of Recommendations Assessment, Development and Evaluation criteria.
Authors' conclusions	There is low quality evidence that Pilates, stabilisation/motor control, resistance training and aerobic exercise training are the most effective treatments, pending outcome of interest, for adults with NSCLBP. Exercise training may also be more effective than therapist hands-on treatment. Heterogeneity among studies and the fact that there are few studies with low risk of bias are both limitations.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes

3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Low

Data extraction table: systematic review	
Bibliographic reference	Parreira P, Heymans MW, van Tulder MW, Esmail R, Koes BW, Poquet N, et al. Back Schools for chronic non-specific low back pain. Cochrane Database of Systematic Reviews. 2017(8).
Source of funding	VU University Medical Center, Netherlands; The George Institute for Global Health, Sydney Medical School, The University of Sydney, Australia.
Meta-analysis?	Yes
Number of included studies	N=30 (Andrade 2008; Berwick 1989; Cecchi 2010a; Costantino 2014; Dalichau 1999; Devasahayam 2014; Donchin 1990; Donzelli 2006; Dufour 2010; Durmus 2014; Garcia 2013; Heymans 2006; Hurri 1989; Jaromi 2012; Keijsers 1989; Keijsers 1990; KlaberMoffett 1986; Lankhorst 1983; Lønn 1999; Meng 2009; Morone 2011; Morone 2012; Nentwig 1990; Paolucci 2012a; Paolucci 2012b; Penttinen 2002; Postacchini 1988; Ribeiro 2008; Sahin 2011; Tavafian 2007).
Study designs	RCTs and quasi-RCTs
Search strategy	We searched for trials in the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, Embase, CINAHL, two other databases and two trials registers to 15 November 2016. We also searched the reference lists of eligible papers and consulted experts in the field of LBP management to identify any potentially relevant studies we may have missed.
Number of participants	N= 4,105
Population	People with chronic (more than 12 weeks' duration) non-specific LBP, aged 18 to 70 years. Low back pain is defined as pain localised below the scapulae and above the cleft of the buttocks; non-specific indicates that no specific cause was detected, such as infection, neoplasm, metastasis, osteoporosis, fracture or inflammatory arthritis. We did not include trials enrolling participants with pregnancy-related LBP.
Intervention	Back School is a combination of exercises and education, where lessons are given to groups of patients, supervised by a physical therapist or medical specialist. According to the European guidelines, the combination of exercise programmes and education seems to be the most promising approach for the management of chronic non-specific LBP. Theoretical information could help patients understand their condition and learn how to modify their behaviour with regard to LBP. People with chronic non-specific LBP often have maladaptive thoughts, feelings, and beliefs, which have an important role in their experience of LBP. Exercise therapy is probably the most commonly used intervention for the treatment of people with chronic non-specific LBP.
Comparison	Usual care, waiting list, or other interventions (e.g. exercise therapy or manipulation)
Relevant outcome measures	Primary: Pain, disability. Secondary: work status (e.g. days of sick leave). Results are summarised for the short- (< 3 months), intermediate-(3 to 6 months), and long-term (> 6 months) follow ups.
Outcomes	Pain: Short-term follow up - very low-quality evidence that Back School is more effective than no treatment (mean difference (MD) -6.10, 95% confidence interval (CI) -10.18 to -2.01) . It is no more effective than passive physiotherapy (MD 1.96, 95% CI -9.51 to 13.43) or exercise (MD -2.06, 95% CI -14.58 to 10.45) or compared to medical care (MD -10.16, 95% CI -19.11 to -1.22). Intermediate- and Long-term – very low-quality evidence that there is no significant difference between Back School and no treatment at intermediate-term (MD -4.34, 95% CI -14.37 to 5.68) or long-term follow-up (MD -12.16, 95% CI -29.14 to 4.83). No more effective than passive physiotherapy intermediate-term (MD -16.89, 95% CI -66.56 to 32.79), or long-term follow-up (MD -12.86, 95% CI -61.22 to 35.50). There was low-quality evidence that Back School is no better than exercise at intermediate-term (MD -4.46, 95% CI -19.44 to 10.52) and long-term follow-up (MD 4.58, 95% CI -0.20 to 9.36). Very low-quality evidence that Back School reduces pain at intermediate-term (MD -9.65, 95% CI -22.46 to 3.15) or long-term follow-up (MD -5.71, 95% CI -20.27 to 8.84) compare to medical care. Disability:

	Short-term follow up - very low-quality evidence of a small difference between Back School and no treatment (MD -3.38, 95% CI -6.70 to -0.05) medical care (MD -1.19, 95% CI -7.02 to 4.64). No more effective than passive physiotherapy (MD 2.57, 95% CI -15.88 to 21.01); and exercise (MD -1.65, 95% CI -8.66 to 5.37) Intermediate- and Long-term - very low-quality evidence that Back School is no more effective than no treatment at intermediate-term (MD -5.92, 95% CI -12.08 to 0.23) and long-term follow-up (MD -7.36, 95% CI -22.05 to 7.34); and exercise at intermediate-term (MD 1.57, 95% CI -3.86 to 7.00), and long-term follow-up (MD 4.54, 95% CI -4.44 to 13.52). Very low evidence of a small difference between Back School and medical care at intermediate-term (MD -6.34, 95% CI -10.89 to -1.79) but no more effective at long-term (MD -0.40, 95% CI -7.33 to 6.53). Passive physiotherapy was no more effective at intermediate-term (MD 6.88, 95% CI -4.86 to 18.63) but at long-term there was very low-quality evidence that it is better than Back School (MD 9.60, 95% CI 3.65 to 15.54). Work status was only reported in three studies. Due to insufficient information, authors were unable to statistically pool the data.
Authors' conclusions	Due to the low- to very low-quality of the evidence for all treatment comparisons, outcomes, and follow-up periods investigated, it is uncertain if Back School is effective for chronic low back pain. Although the quality of the evidence was mostly very low, the results showed no difference or a trivial effect in favour of Back School. There are myriad potential variants on the Back School approach regarding the employment of different exercises and educational methods. While current evidence does not warrant their use, future variants on Back School may have different effects and will need to be studied in future RCTs and reviews.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	**Braun 2020[77]**	
1. PICO		Yes
***2. 'A priori' design**	Yes	Yes
3. Selection of study designs explained		Yes
***4. Comprehensive literature search**	Yes	Yes
5. Duplicate study selection		Yes
6. Duplicate data extraction		Yes
***7. List of excluded studies with reasons**	Yes	Yes
8. Description of the included studies		Yes
***9. Satisfactory RoB technique used**	Yes	Yes
10. Sources of funding reported		Yes
***11. Appropriate methods for statistical combination of results**	Yes	Yes
12. Potential impact of RoB assessed		Yes
***13. RoB accounted for in interpretation/discussion**	Yes	Yes
14. Satisfactory explanation for heterogeneity		Yes
***15. Adequate investigation of publication bias**	No	Yes
16. Conflict of interest reported		Yes
Overall	Low	High

Data extraction table: systematic review	
Bibliographic reference	Patti A, Bianco A, Paoli A, Messina G, Montalto MA, Bellafiore M, et al. Effects of Pilates exercise programs in people with chronic low back pain: a systematic review. Medicine (Baltimore). 2015;94(4):e383.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Almeida 2020[75]
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	No
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	No
***9. Satisfactory RoB technique used**	No
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	No
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Petzke F, Klose P, Welsch P, Sommer C, Hauser W. Opioids for chronic low back pain: An updated systematic review and meta-analysis of efficacy, tolerability and safety in randomized placebo-controlled studies of at least 4 weeks of double-blind duration. European Journal of Pain (United Kingdom). 2020;24(3):497-517.
Source of funding	Not reported
Meta-analysis?	Yes
Number of included studies	N=21
Study designs	RCTs
Search strategy	Update of previous review, conducted in 2015 – included 12 trials from the former review. We searched: Cochrane Central Register of Controlled Trials, MEDLINE, PsychInfo from October 2013 to 28 May 2019. We searched http://www.clinicaltrials.gov (website of the US National Institutes of Health) for completed trials to 12 April 2019. All authors searched bibliographies from retrieved relevant articles. Our search included all languages.
Number of participants	N=7,650
Population	Clinically diagnosed CLBP (nociceptive, neuropathic and mixed pain)
Intervention	Opioids: (a) Opioids given by oral, buccal and transdermal routes. (b) Opioids combined with abuse deterrent formulations (ADF), e.g. naloxone. (c) Tramadol, a centrally acting, synthetic opioid analgesic with two complementary mechanisms of action: binding of parent and M1 metabolite to μ-opioid receptors and inhibition of reuptake of norepinephrine and serotonin. (d). Tapentadol, a drug with two mechanisms of action: μ-receptor agonism and norepinephrine reuptake inhibition.
Comparison	Placebo
Relevant outcome measures	Primary outcomes: 1. Pain relief of 50% or greater (efficacy; dichotomous variable); 2. Patient global impression to be much or very much improved (efficacy; dichotomous variable); 3. Disability (efficacy; continuous variable); 4. Drop out rates to adverse events (tolerability; dichotomous variable); 5. Frequency of serious adverse events (safety; dichotomous variable); 6. Death (safety; dichotomous variable) Secondary outcomes: 1. Pain relief of 30% or greater (efficacy; dichotomous variable); 2. Pain intensity (efficacy; continuous variable); 3. Sleep problems (efficacy; continuous variable); 4. Drop out rates due to lack of efficacy (efficacy; dichotomous variable); 5. Withdrawal symptoms (safety; dichotomous variable); 6. Abuse/addiction (safety; dichotomous variable)
Outcomes	Studies with a parallel and cross-over design: Based on very low to low-quality evidence, opioids provided no clinically relevant pain relief of 50% or greater, but a clinically relevant reduction of disability compared to placebo. Enriched enrolment randomized withdrawal (EERW) design: Based on very low to low-quality evidence, opioids provided a clinically relevant pain relief of 50% or greater, but not a clinically relevant reduction of disability compared to placebo. There was no clinically relevant harm with regard to serious adverse events by opioids compared to placebo in studies with parallel/cross-over and EERW design. There was a relevant harm with regard to drop out rates due to adverse events in studies with parallel/cross-over, but not in studies with EERW design.
Authors' conclusions	Opioids may provide a safe and clinically relevant pain relief for 4–15 weeks in highly selected patients. Within the context of randomized controlled trials of 4–15 weeks, opioids provided a clinically relevant pain relief of 30% or greater and a clinically relevant reduction of disability compared to placebo in non-malignant chronic low back pain. Number needed to treat for an additional drop out due to side effects was 11 (95% confidence interval: 6–33). Assessment of abuse and addiction was incomplete. The frequency of serious adverse events including deaths did not differ from placebo.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes

***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	High

Data extraction table: systematic review	
Bibliographic reference	Poquet N, Lin CW, Heymans MW, van Tulder MW, Esmail R, Koes BW, et al. Back schools for acute and subacute non-specific low-back pain. Cochrane Database Syst Rev. 2016;4:CD008325.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	Yes
3. Selection of study designs explained	
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Low

Data extraction table: systematic review	
Bibliographic reference	Rasmussen-Barr E, Held U, Grooten WJ, Roelofs PD, Koes BW, van Tulder MW, et al. Nonsteroidal Anti-inflammatory Drugs for Sciatica: An Updated Cochrane Review. Spine. 2017;42(8):586-94.
Source of funding	No funds were received in support of this work.
Meta-analysis?	Yes
Number of included studies	N=10
Study designs	RCTs
Search strategy	Cochrane Central Register of Controlled Trials (CENTRAL, the Cochrane Library, Issue 5, 2015; includes the Cochrane Back and Neck [CBN] Review Group's Trials Register), MEDLINE, EMBASE, ClinicalTrials.gov, World Health Organization International Clinical Trials, Registry Platform (WHO ICTRP), and PubMed up until June 2015 for RCTs meeting the inclusion criteria. Additional trials were identified through examination of references from identified trials and systematic reviews.
Number of participants	N=1,651
Population	Aged 16 years or older with acute, subacute, and chronic (>12 weeks) sciatica. Sciatica was defined as pain radiating to one or both legs below the knee with some of the following signs; positive straight leg raising test, or Lasègue sign presenting with numbness, pins or needles in a dermatomal distribution; and muscle weakness or reflex changes or both in a myotome distribution.
Intervention	One or more types of NSAIDs.
Comparison	(1) placebo, (2) other NSAIDs, and (3) other pharmacological agents, alone or in combination (e.g., corticosteroids, muscle relaxants, antidepressants).
Relevant outcome measures	Primary outcomes: (1) change in pain intensity (e.g., visual analog scale [VAS] or numerical rating scale), (2) change in disability or functional status (e.g., Oswestry Disability Questionnaire or Roland Morris Disability Questionnaire, and (3) global measures (e.g., overall improvement). Secondary outcomes were reported adverse effects (pro- portions of participants experiencing adverse effects of NSAIDs) and the use of additional medication.
Outcomes	Three trials (n = 918) compared the effects of NSAIDs to those of placebo on pain reduction. The pooled mean difference showed comparable pain reduction (visual analogue scale, 0 to 100) in the NSAIDs and placebo groups (MD -4.56, 95% CI -11.11 to 1.99). Heterogeneity was high (I2 = 82%), and the quality of the evidence was very low. When we excluded one trial with a short follow-up of eight hours, the mean difference further decreased (MD -0.09, 95% CI -9.89 to 9.71). Three trials (n = 753) compared NSAIDs to placebo regarding global improvement. We found low-quality evidence that NSAIDs are more effective than placebo with a risk ratio of 1.14 (95% CI 1.03 to 1.27). One trial (n = 214) studied the effect of NSAIDs on disability, finding very low-quality evidence that NSAIDs are no more effective than placebo on disability. Four trials (n = 967) comparing NSAIDs to placebo reported adverse effects, with low-quality evidence that the risk for adverse effects is higher in the NSAID group than in the placebo group (RR 1.40, 95% CI 1.02 to 1.93). The adverse effects reported in this review are consistent with those previously reported in the literature.
Authors' conclusions	This updated systematic review including 10 trials evaluating the efficacy of NSAIDs versus placebo or other drugs in people with sciatica reports low- to very low-level evidence using the GRADE criteria. The efficacy of NSAIDs for pain reduction was not significant. NSAIDs showed a better global improvement compared to placebo. These findings must be interpreted with caution, as the level of evidence according to the GRADE classification was very low for the outcome pain reduction and low for global improvement due to small study samples, inconsistent results, imprecision, and a high risk of bias in the included trials. While the trials included in the analysis were not powered to detect potential rare side effects, we found an increased risk for side effects in the short-term NSAIDs use. As NSAIDs are frequently prescribed, the risk-benefit ratio of prescribing the drug needs to be considered.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	High

Data extraction table: systematic review	
Bibliographic reference	Richmond H, Hall AM, Copsey B, Hansen Z, Williamson E, Hoxey-Thomas N, et al. The Effectiveness of Cognitive Behavioural Treatment for Non-Specific Low Back Pain: A Systematic Review and Meta-Analysis. PLoS ONE. 2015;10(8):e0134192.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	?
3. Selection of study designs explained	
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Rihn JA, Radcliff K, Norvell DC, Eastlack R, Phillips FM, Berland D, et al. Comparative Effectiveness of Treatments for Chronic Low Back Pain: A Multiple Treatment Comparison Analysis. Clin Spine Surg. 2017;30(5):204-25.
Source of funding	Association for Collaborative Spine Research
Meta-analysis?	Yes
Number of included studies	N=12 RCTs: 5 total disk replacement (TDR) vs. fusion; 1 TDR vs. exercise and CBT; 5 fusion vs. exercise and CBT; 1 fusion vs physical therapy
Study designs	RCTs
Search strategy	MEDLINE and Cochrane, literature published 1990-Jan 2014. Reference lists of key articles and systematic reviews were also systematically checked.
Number of participants	Not reported overall
Population	Moderate to severe axial LBP >=6 months.
Intervention	1. Surgery. 2. Nonoperative interventions
Comparison	1. Another surgical or non-operative intervention. 2. Other nonoperative interventions.
Relevant outcome measures	Back-specific function and pain.
Outcomes	On the basis of mixed-treatment comparison, with respect to ODI change scores, the pooled mean difference favoring fusion over exercise and CBT was 2.0 points (95% CI, -1.2 to 4.8). The pooled mean difference favoring TDR over exercise and CBT was 6.4 points (95% CI, 3.2-9.3). The pooled mean differences favoring TDR over fusion was 4.4 points (95% CI, 2.37-6.63).
Authors' conclusions	All 4 treatments provided some benefit to patients with chronic LBP. According to the MTC analysis, TDR may be the most effective treatment and PT the least effective treatment for chronic LBP.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Harris 2018[98]
1. PICO	
***2. 'A priori' design**	
3. Selection of study designs explained	
***4. Comprehensive literature search**	
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	
8. Description of the included studies	
***9. Satisfactory RoB technique used**	
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Rothberg S, Friedman BW. Complementary therapies in addition to medication for patients with nonchronic, nonradicular low back pain: a systematic review. Am J Emerg Med. 2017;35(1):55-61.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Rubinstein SM, de Zoete A, van Middelkoop M, Assendelft WJJ, de Boer MR, van Tulder MW. Benefits and harms of spinal manipulative therapy for the treatment of chronic low back pain: systematic review and meta-analysis of randomised controlled trials. BMJ. 2019;364:l689.
Source of funding	None
Meta-analysis?	Yes
Number of included studies	N=47 RCTs
Study designs	RCTs
Search strategy	An electronic search of several databases (up to 4 May 2018): Cochrane Central Register of Controlled Trials (CENTRAL), Medline, Medline In-Process and Other Non-Indexed Citations, Embase, CINAHL, Physiotherapy Evidence Database (PEDro), Index to Chiropractic Literature, and PubMed. An experienced information specialist carried out the searches according to the recommendations of the Cochrane Handbook. In addition, we also screened the reference lists of all included studies and systematic reviews; searched trial registers, specifically, ClinicalTrials.gov and World Health Organization International Clinical Trials Registry Platform (ICTRP); and we sent our selection of studies to trial authors and specialists in SMT to identify any trials potentially missed.
Number of participants	9,211
Population	Adults (≥18 years) with chronic low back pain with or without referred pain.
Intervention	Spinal manipulation or mobilisation.
Comparison	Recommended therapies, non-recommended therapies, sham (placebo) SMT, and SMT as adjuvant therapy to any other therapy.
Relevant outcome measures	Main outcomes were pain and back specific functional status, examined as mean differences and standardised mean differences (SMD), respectively. Outcomes were examined at 1, 6, and 12 months.
Outcomes	Moderate quality evidence suggested that SMT has similar effects to other recommended therapies for short term pain relief (mean difference −3.17, 95% confidence interval −7.85 to 1.51) and a small, clinically better improvement in function (SMD −0.25, 95% confidence interval −0.41 to −0.09). High quality evidence suggested that compared with non-recommended therapies SMT results in small, not clinically better effects for short term pain relief (mean difference −7.48, −11.50 to −3.47) and small to moderate clinically better improvement in function (SMD −0.41, −0.67 to −0.15). In general, these results were similar for the intermediate and long term outcomes as were the effects of SMT as an adjuvant therapy. Evidence for sham SMT was low to very low quality; therefore these effects should be considered uncertain. Statistical heterogeneity could not be explained. About half of the studies examined adverse and serious adverse events, but in most of these it was unclear how and whether these events were registered systematically. Most of the observed adverse events were musculoskeletal related, transient in nature, and of mild to moderate severity. One study with a low risk of selection bias and powered to examine risk (n=183) found no increased risk of an adverse event (relative risk 1.24, 95% confidence interval 0.85 to 1.81) or duration of the event (1.13, 0.59 to 2.18) compared with sham SMT. In one study, the Data Safety Monitoring Board judged one serious adverse event to be possibly related to SMT.
Authors' conclusions	SMT produces similar effects to recommended therapies for chronic low back pain, whereas SMT seems to be better than non-recommended interventions for improvement in function in the short term. Clinicians should inform their patients of the potential risks of adverse events associated with SMT.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes

3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	High

Data extraction table: systematic review	
Bibliographic reference	Ruddock JK, Sallis H, Ness A, Perry RE. Spinal Manipulation Vs Sham Manipulation for Nonspecific Low Back Pain: A Systematic Review and Meta-analysis. J. 2016;15(3):165-83.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	Yes
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Low

Data extraction table: systematic review	
Bibliographic reference	Salathe CR, Melloh M, Crawford R, Scherrer S, Boos N, Elfering A. Treatment Efficacy, Clinical Utility, and Cost-Effectiveness of Multidisciplinary Biopsychosocial Rehabilitation Treatments for Persistent Low Back Pain: A Systematic Review. Global spine j. 2018;8(8):872-86.
Source of funding	No financial support
Meta-analysis?	No
Number of included studies	N=13 (Borys 2015, Brömme 2015, Busch 2011, Caby 2016, Hafenbrack 2013, Henchoz 2010b, Henchoz 2010a/2010c, Merrick 2013, Moradi 2012, Rantonen 2011, Roche-Leboucher 2011, Steiner 2013, van Hooff 2010/2012).
Study designs	RCTs (n=4), prospective studies (n=6), cost analyses (n=2), retrospective studies (n=1).
Search strategy	English and German publications. Web of Science, Cochrane Library, PubMed Central, EMBASE and PsycINFO (January 2010 to July 2017). The search string entered was (efficacy OR effectiveness OR efficiency OR therapeutic effects OR utility OR cost effectiveness) AND (multidisciplinary treatment OR interdisciplinary treatment OR multidisciplinary rehabilitation OR functional restoration OR cognitive-behavioral pain management program OR functional centered rehabilitation) AND (low back pain OR non-specific low back pain OR persistent low back pain OR persistent non-specific low back pain). This search was supplemented with a manual check of references in articles included in recent reviews and work by authors known to publish in this area. The cutoff date for the retrieval of articles from libraries was July 31, 2017.
Number of participants	N=2002 MBR, n=947 control
Population	Persistent (ie, of at least 12 weeks' duration) LBP/nonspecific lower back pain (NSLBP) without structural origin
Intervention	Cognitive behavioral therapy (CBT)-based multidisciplinary biopsychosocial rehabilitation (MBR) interventions of any design, provided they comprised at least 25 hours of treatment per week and involved at least 3 health professions. MBR is an integrated intervention that involves at least 2 of the following: physical, psychological, social, and work-related factors. For the included studies, the number of hours of therapy per week ranged from 25 to 50 and the total for the intervention from 97.5 to 150.
Comparison	NR
Relevant outcome measures	Pain intensity, disability, health-related quality of life, work ability/sick leave
Outcomes	Pain Intensity: Eight studies examined changes in pain intensity over the 12 months following MBR. Comparisons of pre- and posttreatment scores revealed moderate to large ESs or P values in pain reduction (ES -0.6 to -0.74; P = .003 to P < .001). In studies that assessed patients over a longer period, the reduction in pain intensity persisted for at least 24 months (P < .01). Disability: The 8 studies reporting disability used 7 different instruments, rendering direct comparisons difficult. Nevertheless, all comparisons between pre- and post-treatment scores revealed moderate to large ESs or P values for reduction in functional disability (ES 0.4 to 0.8; P < .01 to P < .001). Reduction in pain-related disability persisted for 24 months in the studies that examined a longer time frame (P < .05 to P < .001). One study which included non-sick-listed employees, reported neither short- nor long-term changes in disability. Health-Related Quality of Life. Four different instruments were used to assess HRQoL, which probably contributed to the conflicting results. Three studies found no long-term increase in the HRQoL after MBR: one found a short-term reduction in one HRQoL variable and the other two did not detect any change in HRQoL. The other 4 studies reported moderate to large increases in HRQoL that persisted for at least 12 months (ES 0.5 to 0.8; P < .05 to P < .001). Cost-Effectiveness. Three of the 12 studies examined economic parameters of MBR and all demonstrated that indirect costs substantially exceed direct costs and that MBR produced a substantial reduction in direct and indirect costs.

Authors' conclusions	MBR is an effective treatment for nonspecific LBP, but there is room for improvement in cost-effectiveness and impact on sick leave, where the evidence was less compelling.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	No
***2. 'A priori' design**	No
3. Selection of study designs explained	No
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	No
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	No
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Saragiotto BT, Maher CG, Yamato TP, Costa LOP, Menezes Costa LC, Ostelo R, et al. Motor control exercise for chronic non-specific low-back pain. Cochrane Database of Systematic Reviews. 2016(1).
Source of funding	None
Meta-analysis?	Yes
Number of included studies	N=29 (Akbari 2008, Alp 2014, Cairns 2006, Costa 2009, Critchley 2007, Ferreira 2007, Franca 2010, Goldby 2006, Hemmati 2011, Hosseinifar 2013, Inani 2013, Javadian 2012, Kachanathu 2012, Koumantakis 2005, Kumar 2009, Kumar 2010, Lomond 2015, Macedo 2012, Miller 2005, Moon 2013, Puntumetakul 2013, Rabin 2014, Rasmussen-Barr 2003, Rasmussen-Barr 2009, Rhee 2012, Shaughnessy 2004, Stankovic 2012, Tsauo 2009, Unsgaard-Tondel 2010).
Search strategy	CENTRAL, MEDLINE, EMBASE, five other databases and two trials registers from their inception up to April 2015. We also performed citation tracking and searched the reference lists of reviews and eligible trials.
Study designs	RCTs
Number of participants	N=2,431 (ranged from 20-323)
Population	Chronic (> 12 weeks) non-specific LBP (with or without leg pain) or recurrent LBP. We excluded studies that included individuals with specific conditions such as disc herniation, spinal stenosis, cancer etc.
Intervention	Motor Control Exercise (MCE): We considered trials to have evaluated MCE if the exercise treatment was described as motor control or specific stabilisation exercise, and/or the trial described exercise aiming to activate, train or restore the function of specific muscles of the spine, such as multifidus and transversus abdominis. We considered specific stabilization exercises and exercises aiming to activate, train, or restore the stabilisation or co-ordination of specific deep muscles because these principles integrate the MCE intervention. As reports of trials do not always take into consideration the principles of motor learning, the intervention is often described as specific stabilization exercises, instead of MCE. Articles were not included if generalized (whole body) stability exercises without consideration of specific muscle activity were performed. We excluded trials evaluating Pilates.
Comparison	Placebo, no treatment, another active treatment, or when MCE was added as a supplement to other interventions.
Relevant outcome measures	Primary outcomes were pain intensity and disability and the secondary outcomes were function, quality of life, global impression of recovery, return to work, adverse events and recurrence.
Outcomes	There is low to high quality evidence that MCE is not clinically more effective than other exercises for all follow-up periods and outcomes tested. When compared with minimal intervention, there is low to moderate quality evidence that MCE is effective for improving pain at short, intermediate and long-term follow-up with medium effect sizes (long-term, MD -12.97; 95% CI -18.51 to -7.42). There was also a clinically important difference for the outcomes function and global impression of recovery compared with minimal intervention. There is moderate to high quality evidence that there is no clinically important difference between MCE and manual therapy for all follow-up periods and outcomes tested. Finally, there is very low to low quality evidence that MCE is clinically more effective than exercise and electrophysical agents (EPA) for pain, disability, global impression of recovery and quality of life with medium to large effect sizes (pain at short term, MD - 30.18; 95% CI -35.32 to -25.05). Minor or no adverse events were reported in the included trials.
Authors' conclusions	There is very low to moderate quality evidence that MCE has a clinically important effect compared with a minimal intervention for chronic low back pain. There is very low to low quality evidence that MCE has a clinically important effect compared with exercise plus EPA. There is moderate to high quality evidence that MCE provides similar outcomes to manual therapies and low to moderate quality evidence that it provides similar outcomes to other forms of exercises. Given the evidence that MCE is not superior to other forms of exercise, the choice of exercise for chronic LBP should

	probably depend on patient or therapist preferences, therapist training, costs and safety.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Almeida 2020[75]	Braun 2020[77]
1. PICO	Yes	
***2. 'A priori' design**	No	Yes
3. Selection of study designs explained	No	
***4. Comprehensive literature search**	Yes	?
5. Duplicate study selection	Yes	
6. Duplicate data extraction	Yes	
***7. List of excluded studies with reasons**	Yes	Yes
8. Description of the included studies	Yes	
***9. Satisfactory RoB technique used**	Yes	Yes
10. Sources of funding reported	Yes	
***11. Appropriate methods for statistical combination of results**	Yes	Yes
12. Potential impact of RoB assessed	Yes	
***13. RoB accounted for in interpretation/discussion**	Yes	Yes
14. Satisfactory explanation for heterogeneity	Yes	
***15. Adequate investigation of publication bias**	Yes	Yes
16. Conflict of interest reported	Yes	
Overall confidence in results of the review	Low	High

Data extraction table: systematic review	
Bibliographic reference	Saragiotto BT, Machado GC, Ferreira ML, Pinheiro MB, Abdel Shaheed C, Maher CG. Paracetamol for low back pain. Cochrane Database Syst Rev. 2016(6):CD012230.
Source of funding	None
Meta-analysis?	Yes
Number of included studies	N=2
Study designs	RCTs
Search strategy	We performed a computerised electronic search to identify relevant articles in the following databases from their inception to 7 August 2015 without language restrictions: Cochrane Central Register of Controlled Trials, MEDLINE, MEDLINE In-Process & Other Non-Indexed Citations, EMBASE, CINAHL, AMED, Web of Science, LILACS, IPA. We also searched the reference lists of eligible papers and the following trial registry websites: World Health Organization (WHO) International Clinical Trials Registry Platform (ICTRP) and ClinicalTrials.gov.
Number of participants	N=1,785
Population	Non-specific low back pain
Intervention	Paracetamol
Comparison	Placebo
Relevant outcome measures	The primary outcomes were pain and disability. We also investigated quality of life, function, adverse effects, global impression of recovery, sleep quality, patient adherence, and use of rescue medication as secondary outcomes.
Outcomes	For acute LBP, there is high-quality evidence for no difference between paracetamol (4 g per day) and placebo at 1 week (immediate term), 2 weeks, 4 weeks, and 12 weeks (short term) for the primary outcomes. There is high-quality evidence that paracetamol has no effect on quality of life, function, global impression of recovery, and sleep quality for all included time periods. There were also no significant differences between paracetamol and placebo for adverse events, patient adherence, or use of rescue medication. No trials were identified evaluating patients with subacute or chronic LBP.
Authors' conclusions	We found that paracetamol does not produce better outcomes than placebo for people with acute LBP.

Quality appraisal (AMSTAR 2: https://amstar.ca/)		Braun 2020[77]	Schreijenberg 2019[26]
1. PICO	Yes		
***2. 'A priori' design**	Yes	Yes	
3. Selection of study designs explained	Yes		
***4. Comprehensive literature search**	Yes	Yes	
5. Duplicate study selection	Yes		
6. Duplicate data extraction	Yes		
***7. List of excluded studies with reasons**	Yes	Yes	
8. Description of the included studies	Yes		
***9. Satisfactory RoB technique used**	Yes	Yes	
10. Sources of funding reported	Yes		
***11. Appropriate methods for statistical combination of results**	Yes	Yes	
12. Potential impact of RoB assessed	Yes		
***13. RoB accounted for in interpretation/discussion**	Yes	Yes	
14. Satisfactory explanation for heterogeneity	Yes		
***15. Adequate investigation of publication bias**	Yes	No	
16. Conflict of interest reported	Yes		Adequate: at least 8/16
Overall confidence in results of the review	High	Low	

Data extraction table: systematic review	
Bibliographic reference	Searle A, Spink M, Ho A, Chuter V. Exercise interventions for the treatment of chronic low back pain: a systematic review and meta-analysis of randomised controlled trials. Clin Rehabil. 2015;29(12):1155-67.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Almeida 2020[75]
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	No
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	No
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Partial
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	No
***13. RoB accounted for in interpretation/discussion**	No
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Shanthanna H, Gilron I, Rajarathinam M, AlAmri R, Kamath S, Thabane L, et al. Benefits and safety of gabapentinoids in chronic low back pain: A systematic review and meta-analysis of randomized controlled trials. PLoS Med. 2017;14(8):e1002369.
Source of funding	The article processing charges for the article were supported through funds from a Canadian Institute of Health Research (CIHR) Randomized Controlled Trials Mentoring Program grant, awarded to Dr. Shanthanna in 2014.
Meta-analysis?	Yes
Number of included studies	N=8
Study designs	RCTs
Search strategy	We searched the electronic databases of EMBASE, MEDLINE, and the Cochrane Central Registry of Controlled Trials (CENTRAL), from their inception until January 26th, 2016. WHO clinical trial registry, and https://clinicaltrials.gov/ were also searched to look for any registered studies, fulfilling our eligibility criteria, and crosschecked for their resulting publications. To be comprehensive, bibliographies of relevant reviews and selected studies were examined. Since performing the original search, we also repeated our search on December 20th, 2016 to ensure that we have not missed any recent publications. We included terms referring to study population of low back pain, and terms referring to study interventions such as GB, PG, and anticonvulsants.
Number of participants	Not reported overall
Population	Predominant CLBP of 3 months or more, with or without leg pain, in adult patients.
Intervention	Gabapentinoids
Comparison	Placebo, other types of analgesic medication, PG as an adjuvant.
Relevant outcome measures	Pain relief and safety (adverse effects) as our primary outcomes and others as secondary outcomes: physical and emotional functioning, participant ratings of global improvement and satisfaction with treatment, and participant disposition.
Outcomes	Based on the interventions and comparators, studies were analyzed in 3 different groups. GB compared with placebo (3 studies, n = 185) showed minimal improvement of pain (MD = 0.22 units, 95% CI [−0.5 to 0.07] I2 = 0%; GRADE: very low). Three studies compared PG with other types of analgesic medication (n = 332) and showed greater improvement in the other analgesic group (MD = 0.42 units, 95% CI [0.20 to 0.64] I2 = 0; GRADE: very low). Studies using PG as an adjuvant (n = 423) were not pooled due to heterogeneity, but the largest of them showed no benefit of adding PG to tapentadol. There were no deaths or hospitalizations reported. Compared with placebo, the following adverse events were more commonly reported with GB: dizziness- (RR = 1.99, 95% CI [1.17 to 3.37], I2 = 49); fatigue (RR = 1.85, 95% CI [1.12 to 3.05], I2 = 0); difficulties with mentation (RR = 3.34, 95% CI [1.54 to 7.25], I2 = 0); and visual disturbances (RR = 5.72, 95% CI [1.94 to 16.91], I2 = 0). The number needed to harm with 95% CI for dizziness, fatigue, difficulties with mentation, and visual disturbances were 7 (4 to 30), 8 (4 to 44), 6 (4 to 15), and 6 (4 to 13) respectively. The GRADE evidence quality was noted to be very low for dizziness and fatigue, low for difficulties with mentation, and moderate for visual disturbances. Functional and emotional improvements were reported by few studies and showed no significant improvements.
Authors' conclusions	Existing evidence on the use of gabapentinoids in CLBP is limited and demonstrates significant risk of adverse effects without any demonstrated benefit. Given the lack of efficacy, risks, and costs associated, the use of gabapentinoids for CLBP merits caution. There is need for large high-quality trials to more definitively inform this issue.

Quality appraisal (AMSTAR 2: https://amstar.ca/)		Schreijenberg 2019[26]
1. PICO	Yes	
***2. 'A priori' design**	Yes	
3. Selection of study designs explained	Yes	Adequate: at least 8/16
***4. Comprehensive literature search**	Partial	

5. Duplicate study selection	Yes	
6. Duplicate data extraction	Yes	
***7. List of excluded studies with reasons**	No	
8. Description of the included studies	Yes	
***9. Satisfactory RoB technique used**	Yes	
10. Sources of funding reported	Yes	
***11. Appropriate methods for statistical combination of results**	Yes	
12. Potential impact of RoB assessed	Yes	
***13. RoB accounted for in interpretation/discussion**	Yes	
14. Satisfactory explanation for heterogeneity	Yes	
***15. Adequate investigation of publication bias**	Yes	
16. Conflict of interest reported	Yes	
Overall confidence in results of the review	Low	

Data extraction table: systematic review	
Bibliographic reference	Shi Z, Zhou H, Lu L, Pan B, Wei Z, Yao X, et al. Aquatic Exercises in the Treatment of Low Back Pain: A Systematic Review of the Literature and Meta-Analysis of Eight Studies. Am J Phys Med Rehabil. 2018;97(2):116-22.
Source of funding	"Financial disclosure statements have been obtained"
Meta-analysis?	Yes
Number of included studies	N=8
Study designs	RCTs
Search strategy	PubMed, the Cochrane Library, Embase, and Cumulative Index to Nursing and Allied Health were searched in November 2016 for studies using the following combination of terms: "low back pain," "lumbago," "lower back pain,", "low back ache," "low backache," "recurrent low back pain," "postural low back pain," "mechanical low back pain," "low back pain," "posterior compartment," in combination with "aquatic exercise," "aquatic therapy," and "hydrotherapy," and only RCTs were included. Bibliographies of potentially eligible studies were also reviewed to identify the additional studies.
Number of participants	N=331
Population	Adults with back pain between the lower ribs and above the gluteal folds, with or without leg pain.
Intervention	Aquatic exercise.
Comparison	General exercise or no exercise.
Relevant outcome measures	Visual analog scale (VAS), Short-Form 12 Health Survey (SF-12) or Short-Form 36 Health Survey (SF-36).
Outcomes	Results showed a relief of pain (standardized mean difference = −0.65, 95% confidence interval = −1.16 to −0.14) and physical function (standardized mean difference = 0.63, 95% confidence interval = 0.17 to 1.09) after aquatic exercise. However, there was no significant effectiveness with regard to general mental health in aquatic group (standardized mean difference = 0.46; 95% confidence interval = −0.22 to 1.15).
Authors' conclusions	Aquatic exercise can statistically significantly reduce pain and increase physical function in patients with low back pain. Further high-quality investigations on a larger scale are required to confirm the results.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Partial
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	No
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Sitthipornvorakul E, Klinsophon T, Sihawong R, Janwantanakul P. The effects of walking intervention in patients with chronic low back pain: A meta-analysis of randomized controlled trials. Musculoskelet Sci Pract. 2018;34:38-46.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Steffens D, Hancock MJ, Pereira LS, Kent PM, Latimer J, Maher CG. Do MRI findings identify patients with low back pain or sciatica who respond better to particular interventions? A systematic review. Eur Spine J. 2016;25(4):1170-87.
Source of funding	NR
Meta-analysis?	No
Number of included studies	N=8
Study designs	Included studies needed to be an RCT which had used methods capable of identifying whether patients with a specific MRI finding had a different treatment effect than those without the MRI finding or with a different MRI finding. Studies were required to have included and reported a patient's results separately for either (1) sample with and without a particular MRI finding (i.e. disc herniation) or (2) people with a different type or severity of MRI finding (i.e. mild vs. severe disc degeneration).
Search strategy	A sensitive search was performed of MEDLINE, EMBASE and The Cochrane Central Register of Controlled Trials to identify potential studies from the earliest records up to 20th of June, 2015. We used a search strategy based on the recommendations of the Cochrane Back Review Group for randomised controlled trials (RCTs) and LBP, combined with Medical Subject Headings and keywords related to 'MRI' and 'effect modification/subgroups'. After piloting the search strategy, we decided to use two different searches and then combine the results. Search 1 included terms from each of the following domains: (1) RCTs, (2) LBP/sciatica and (3) MRI. Search 2 included terms from each of the following domains: (1) RCTs, (2) LBP/sciatica and (3) effect modification/sub- group. Searches 1 and 2 were merged to generate the final search strategy. Reference and citation tracking of relevant articles were performed. A final list of the included studies was sent to two experts in the field who reviewed the list for possible omissions.
Number of participants	Not reported overall.
Population	Current LBP or sciatica, who were not diagnosed with serious disease (e.g. cancer, spinal infection, spinal fracture, inflammatory arthritis or cauda equina syndrome) as the source of LBP.
Intervention	Any type of intervention for LBP, including conservative, surgical, or placebo
Comparison	Any type of intervention, placebo or no treatment control
Relevant outcome measures	Reported for either pain (e.g. measured by the visual analogue scale, numerical rating scale) or disability (e.g. measured by the Roland Morris Disability Scale, Oswestry Disability Index). In studies that included participants with a primary complaint of LBP, self-reported LBP was considered the primary outcome while in trials of sciatica self-reported leg pain was considered the primary outcome
Outcomes	Eight published trials met the inclusion criteria. The methodological quality of trials was inconsistent. Substantial variability in MRI findings, treatments and outcomes across the eight trials prevented pooling of data. Patients with Modic type 1 when compared with patients with Modic type 2 had greater improvements in function when treated by Diprospan (steroid) injection, compared with saline. Patients with central disc herniation when compared with patients without central disc herniation had greater improvements in pain when treated by surgery, compared with rehabilitation.
Authors' conclusions	Although individual trials suggested that some MRI findings might be effect modifiers for specific interventions, none of these interactions were investigated in more than a single trial. High quality, adequately powered trials investigating MRI findings as effect modifiers are essential to determine the clinical importance of MRI findings in LBP and sciatica.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes

5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	High

Data extraction table: systematic review	
Bibliographic reference	Suman A, Armijo-Olivo S, Deshpande S, Marietta-Vasquez J, Dennett L, Miciak M, et al. A systematic review of the effectiveness of mass media campaigns for the management of low back pain. Disabil Rehabil. 2020:1-29.
Source of funding	No funding was received for this systematic review. RB is supported by an Australian National Health and Medical Research Council (NHMRC) Senior Principal Research Fellowship.
Meta-analysis?	No
Number of included studies	N=18
Study designs	Randomized controlled trials (RCTs), controlled trials (CTs), interrupted time series studies, before and after studies, or any other quasi-experimental or observational design
Search strategy	An extensive literature search was conducted by a health sciences librarian (LD) and included Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations and Daily 1946 to December 16, 2019, OVID EMBASE (1974-Dec 17, 2019), Wiley Cochrane Central Register of Controlled Trials (CENTRAL) (1991- Dec 17, 2019), SCOPUS (Dec 17, 2019) and EBSCOHost CINAHL Plus with Full Text (1937-Dec 17, 2019). The search combined the 3 concepts of 1) LBP; 2) campaigns or educational interventions; and 3) media, technologies, or formats used to deliver the information. An extensive list of key words and subject headings were used for each concept in a broad search, but only articles evaluating LBP mass media campaigns were deemed relevant for this study. No date or language limits were used in the search but only studies including the adult population were included. Reference lists of included studies were manually searched, publications of key authors in the area were searched, experts in the area were consulted about relevant papers, and a forward citation search was performed to identify any additional potentially relevant studies.
Number of participants	Not reported overall
Population	General public with LBP, health care providers
Intervention	Mass media campaigns were defined as campaigns utilizing any channel of communication, such as television, radio, newspapers, billboards, posters, leaflets, booklets, and websites or social media intended to reach large numbers of people and that are not necessarily dependent on person-to-person contact.
Comparison	NR
Relevant outcome measures	Primary outcome: General Public LBP Beliefs. Secondary outcomes: Health Care Provider Beliefs, Disability behaviours, Health utilization behaviours, LBP-related clinical outcomes.
Outcomes	All studies evaluating LBP beliefs in the general public detected positive effects. Health care provider beliefs also consistently improved. Results for behavioural outcomes (disability behaviour and health utilization) were mixed and appeared dependent on campaign characteristics and local context.
Authors' conclusions	Mass media campaigns for LBP appear effective for improving beliefs of the general public and health care providers.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis

***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Low

Data extraction table: systematic review	
Bibliographic reference	Tegner H, Frederiksen P, Esbensen BA, Juhl C. Neurophysiological Pain Education for Patients With Chronic Low Back Pain: A Systematic Review and Meta-Analysis. Clin J Pain. 2018;34(8):778-86

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Traeger AC, Hubscher M, Henschke N, Moseley GL, Lee H, McAuley JH. Effect of Primary Care-Based Education on Reassurance in Patients With Acute Low Back Pain: Systematic Review and Meta-analysis. JAMA Internal Medicine. 2015;175(5):733-43.
Source of funding	National Health and Medical Research Council PhD Scholarships. National Health and Medical Research Council research fellowship NHMRC ID 1061279. National Health and Medical Research Council project grant ID 1047827.
Meta-analysis?	Yes
Number of included trials	N=14 (Bucker 2010, Burton 1999, Cherkin 1996, Deyo 1987, Hagen 2000, Hay 2005, Hill 2011, Jellema 2005, Karjalainen 2003, Leonhardt 2008, Pengel 2007, Roberts 2002, Roland 1989, Storheim 2003)
Study designs	Randomized and nonrandomized clinical trials.
Search strategy	Medline, EMBASE, Cochrane Central Register for Controlled Trials, and PsychINFO databases were searched to June 2014. Studies were identified using the following key words or their variations: reassurance, education, psychoeducation, advice, information, consultation, and counselling. The search strategies of the Cochrane Back Review Group were then used to identify clinical trials on LBP.
Number of participants	N=4,872
Population	Adults with acute (less than 6-weeks' duration) or subacute (6 to 12–weeks' duration) LBP.
Intervention	Interventions took place in primary care, consisted of individual patient education (including advice and information) delivered by a primary care practitioner (eg, a general practitioner, physiotherapist, nurse). Patient education could be written or verbal information of any duration and was considered to be "…any set of planned condition-specific educational activities in a one-to-one situation, designed to improve patients' health behaviors and/or health status in regard to the low back pain problem."
Comparison	Any
Relevant outcome measures	Reassurance in the short and long term and health care utilization at 12 months.
Outcomes	There is moderate- to high-quality evidence that patient education increases reassurance more than usual care/control education in the short term (standardized mean difference [SMD], −0.21; 95%CI, −0.35 to −0.06) and long term (SMD, −0.15; 95%CI, −0.27 to −0.03). Interventions delivered by physicians were significantly more reassuring than those delivered by other primary care practitioners (eg, physiotherapist or nurse). There is moderate-quality evidence that patient education reduces LBP-related primary care visits more than usual care/control education (SMD, −0.14; 95%CI, −0.28 to −0.00 at a 12-month follow-up). The number needed to treat to prevent 1 LBP-related visit to primary care was 17.
Authors' conclusions	There is moderate- to high-quality evidence that patient education in primary care can provide long-term reassurance for patients with acute or subacute LBP.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Yes
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes

14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall	Critically low

Data extraction table: systematic review	
Bibliographic reference	Vadala G, Russo F, De Salvatore S, Cortina G, Albo E, Papalia R, et al. Physical Activity for the Treatment of Chronic Low Back Pain in Elderly Patients: A Systematic Review. J. 2020;9(4):05.
Source of funding	This research received no external funding.
Meta-analysis?	No
Number of included studies	N=12 7 RCT, 3 non-NRCT, 1 pre and post intervention study, and 1 case series.
Study designs	Randomized clinical trials (RCT) and non-randomized controlled studies (NRCT) designs such as observational studies (OS), pre-post interventional studies (PPIS), and case-series studies (CS).
Search strategy	From inception to March 2019: Medline, Scopus, CINAHL, EMBASE, and CENTRAL. For the search strategy we decided to use the following keywords: “low back pain” OR “chronic low back pain” AND “physical activity” OR “physical therapy” AND “elderly” OR “old aged” OR “older age” AND “Meziere” AND “Souchard” AND “global postural rehabilitation” “Feldenkrais” AND “McKenzie” AND “back school program” AND “Tai-Chi” AND “Pilates” AND “water therapy” OR “hydrotherapy” OR “balneotherapy” OR “hydrokinesis.” We used the keywords isolated or combined. We searched for more studies among the reference lists of the selected papers and systematic reviews.
Number of participants	Not reported overall
Population	Elderly patients (mean age > 65 years) suffering by CLBP (at least > 3 months).
Intervention	Physical activity (cardiovascular or aerobic) or exercise programs that included loaded (against gravity or resistance) as a component.
Comparison	NR
Relevant outcome measures	At least one pain assessment or one disability assessment. The disability outcome needed to be evaluated by one or more of the following scales: 36-Item Short Form Health Survey (SF-36) Version 1.0 and 2.0 (SF-36); Roland Morris Disability Questionnaire (RMDQ); Oswestry Disability Index (ODI); and Back function (FFBH-R). The pain outcome had to be evaluated by one or more of the following scales: Numerical pain rating scale (NRS); Global Rating Change (GRC); Patient Pain Questionnaire (PPQ); and Visual rating scale (VRS).
Outcomes	Two RCTs studies presented data on pain at the end of the treatment. At the end of the treatment, they both reported a reduction of pain in the group treated by PA One reported a better NRS in the intervention group compared to the control group at the end of the treatment (MD −1.73, 95% C.I. −3.11 to −0.35, p = 0.01). The other reported a difference from 5.3 to 2.1 points in VRS from the beginning to the end of the treatment (no full data were reported concerning to control group results). Otherwise, the authors reported an improvement in pain between the intervention and the control group, but this was not statistically significant (p > 0.05). Five RCT studies presented data on disability at the end of the treatment. At the end of the treatment, all studies reported an overall improvement in disability.
Authors’ conclusions	In general, post-treatment data showed a trend in the improvement for disability and pain. However, considering the low quality of evidence of the studies, the high risk of bias, the languages limitations, the lack of significant results of some studies, and the lack of literature on this argument, further studies are necessary to improve the evidences on the topic.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. ‘A priori’ design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	No
***7. List of excluded studies with reasons**	No

8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	van Erp RMA, Huijnen IPJ, Jakobs MLG, Kleijnen J, Smeets R. Effectiveness of primary care interventions using a biopsychosocial approach in chronic low back pain: a systematic review. Pain Practice. 2018;05:05.
Source of funding	Adelante, Centre of Expertise in Rehabilitation and Audiology Hoensbroek, The Netherlands; the Province of Limburg and CZ Foundation.
Meta-analysis?	No
Number of included studies	N=7 (McDonough 2013, Lamb 2010, Johnson 2007, Wälti 2015, Vibe Fersum 2013, Macedo 2012, van der Roer 2008)
Search strategy	English, Dutch and German languages. MEDLINE (Ovid), MEDLINE In-Process Citations & Daily Update (Ovid), PubMed (NLM) (Internet) http://www.ncbi.nlm.nih.gov/pubmed, Embase (Ovid), PsycINFO (Ovid), Cumulative Index to Nursing and Allied Health Literature (CINAHL; EBSCO), Cochrane Database of Systematic Reviews (CDSR; Cochrane Library: Wiley), Cochrane Central Register of Controlled Trials (CENTRAL; Cochrane Library: Wiley), Database of Abstracts of Reviews of Effects DARE; Cochrane Library: Wiley), Health Technology Assessment (HTA) database Cochrane Library: Wiley), PEDro (Internet) pedro.org.au
Study designs	RCTs. 7 studies, including 1 feasibility RCT and 1 pilot RCT, leaving 5 full-scale RCTs
Number of participants	N=1,426
Population	Studies with adult participants (≥ 18 years) experiencing nonspecific CLBP were included. Nonspecific CLBP was defined as pain between the 12th rib and gluteal region, with or without radiation towards 1 or both legs, present for at least 12 weeks.
Intervention	The BPS interventions in all selected studies contained cognitive-behavioral principles. However, the applied approach varied. Two studies used operant conditioning and graded activity principles, and another study used the 5 A's model of health behavior advice (ask/assess, advice, agree, assist, arrange). These 3 BPS interventions focused on specific exercise programs to improve activity levels, and cognitive behavioral approaches were used additionally to encourage active behavior. Another study used neurophysiological education about pain, disability, and perceptions in addition to sensory and motor retraining. The remaining studies used cognitive-behavioral therapy (CBT) or cognitive-functional therapy. Although the latter 2 BPS interventions did include exercises, the main focus was on targeting beliefs and behavior (eg, to reduce fear avoidance and catastrophizing, and to improve coping style). By doing so, they aimed to improve the level of functional activities. Four studies reported providing a booklet with education about LBP and coping strategies such as The Back Book, Explain Pain, or a general booklet on self-management strategies. All interventions were of low intensity (≤ 16 hours) except of one trial with 35 hours of contact time. Physiotherapists mostly participated in short training program with a duration ranging from 2 days to a maximum of 4 days.
Comparison	Three studies compared a BPS intervention with education and advice. Four studies compared a BPS intervention with physical activity therapy. Physical activity therapy included usual or guideline physiotherapy, motor control therapy, and manual therapy plus exercise.
Relevant outcome measures	Primary outcomes: functional disability, pain, and work status. Secondary outcomes: generic functional status or well-being, overall improvement or satisfaction, emotional functioning and cognitions (depression, anxiety, catastrophizing, fear avoidance), and adverse events (AEs). Outcomes categorized as short (>= 3 months), medium (> 3 - 12 months), and long term (> 12 months).
Outcomes	This systematic review provided moderate-quality evidence (3 trials; 991 participants) that a BPS intervention is more effective than education and advice in improving functional disability and pain at short, medium, and long term. For work status, no differences in effect were visible between the interventions. When a BPS intervention is compared to physical activity therapy, there is low-quality evidence (4 trials; 435 participants) that no differences in improving functional

	disability, pain, and work status exist between interventions at short, medium, and long term.
Authors' conclusions	BPS interventions seem more effective than education/advice and were found to be as effective as physical activity interventions in patients with CLBP. BPS interventions with a clear focus on psychosocial factors (understanding pain, unhelpful thoughts, coping styles, and goal setting) seem most promising. Sufficient delivery of BPS elements is expected when physiotherapists participate in training programs with extensive support prior and during delivery (manual, supervision, and informative resources).

Quality appraisal (AMSTAR 2: https://amstar.ca/)	**Braun 2020[77]**
1. PICO	
***2. 'A priori' design**	?
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	
Overall	Low

Data extraction table: systematic review	
Bibliographic reference	van der Gaag WH, Roelofs P, Enthoven WTM, van Tulder MW, Koes BW. Non-steroidal anti-inflammatory drugs for acute low back pain. Cochrane Database Syst Rev. 2020(4).
Source of funding	Internal sources: In-kind support: Department of General Practice, Erasmus Medical Center, Rotterdam, Netherlands. In-kind support: Research Centre Innovations in Care, Rotterdam University of Applied Sciences, Rotterdam, Netherlands. In-kind support: Department of Health Sciences, Community and Occupational Medicine, University Medical Center Groningen, University of Groningen, Groningen, Netherlands. External sources: No sources of support supplied.
Meta-analysis?	Yes
Number of included studies	N=32 RCTs
Study designs	RCTs
Search strategy	No language restrictions, to 7 January 2020: Cochrane CENTRAL, includes the Back and Neck Group Trials Register; CRS Web, MEDLINE In-Process, MEDLINE Daily, MEDLINE, Embase, PubMed, ClinicalTrials.gov, ICTRP. We screened the reference lists of all included trials, as well as (systematic) reviews on NSAIDs for acute LBP. We also reassessed the studies on acute low back pain included in the previous version of this review.
Number of participants	N=5356
Population	Aged 18 years or older, treated for acute non-specific low back pain (LBP).
Intervention	One or more types of non-steroidal anti-inflammatory drugs (NSAID).
Comparison	NSAIDs versus placebo (the main comparison), Selective COX-2 inhibitors versus non-selective NSAIDs, NSAIDs versus paracetamol, NSAIDs versus other drug treatment, NSAIDs versus non-drug treatment.
Relevant outcome measures	1) pain intensity (e.g. Visual Analogue Scale (VAS) or Numerical Rating Scale (NRS)) 2) back pain-specific functional status (e.g. Roland Morris Disability Questionnaire (RMDQ), Oswestry Disability Index (ODI)) 3) global measure (e.g. overall improvement, proportion of participants recovered) 4) adverse events (proportion of participants experiencing adverse events) 5) return to work (e.g. return to work status, number of days off work)
Outcomes	There is moderate quality evidence that NSAIDs are slightly more effective in short-term (≤ 3 weeks) reduction of pain intensity (visual analogue scale (VAS), 0 to 100) than placebo (mean difference (MD) -7.29 (95% confidence interval (CI) -10.98 to -3.61; 4 RCTs, N = 815). There is high quality evidence that NSAIDs are slightly more effective for short-term improvement in disability (Roland Morris Disability Questionnaire (RMDQ), 0 to 24) than placebo (MD -2.02, 95% CI -2.89 to -1.15; 2 RCTs, N = 471). The magnitude of these effects is small and probably not clinically relevant. There is low quality evidence that NSAIDs are slightly more effective for short-term global improvement than placebo (risk ratio (RR) 1.40, 95% CI 1.12 to 1.75; 5 RCTs, N = 1201), but there was substantial heterogeneity (I2 52%) between studies. There is very low quality evidence of no clear difference in the proportion of participants experiencing adverse events when using NSAIDs compared to placebo (RR 0.86, 95% CI 0.63 to 1.18; 6 RCTs, N = 1394). There is very low quality evidence of no clear difference between the proportion of participants who could return to work after seven days between those who used NSAIDs and those who used placebo (RR 1.48, 95% CI 0.98 to 2.23; 1 RCT, N = 266). There is low quality evidence of no clear difference in short-term reduction of pain intensity between those who took selective COX-2 inhibitor NSAIDs compared to non-selective NSAIDs (mean change from baseline -2.60, 95% CI -9.23 to 4.03; 2 RCTs, N = 437). There is moderate quality evidence of conflicting results for short-term disability improvement between groups (2 RCTs, N = 437). Low quality evidence from one trial (N = 333) reported no clear difference between groups in the proportion of participants experiencing global improvement. There is very low quality evidence of no clear

	difference in the proportion of participants experiencing adverse events between those who took COX-2 inhibitors and non-selective NSAIDs (RR 0.97, 95% CI 0.63 to 1.50; 2 RCTs, N = 444). No data were reported for return to work.
Authors' conclusions	This updated Cochrane Review included 32 trials to evaluate the efficacy of NSAIDs in people with acute LBP. The quality of the evidence ranged from high to very low, thus further research is (very) likely to have an important impact on our confidence in the estimates of effect, and may change the estimates. NSAIDs seemed slightly more effective than placebo for short-term pain reduction (moderate certainty), disability (high certainty), and global improvement (low certainty), but the magnitude of the effects is small and probably not clinically relevant. There was no clear difference in short-term pain reduction (low certainty) when comparing selective COX-2 inhibitors to non-selective NSAIDs. We found very low evidence of no clear difference in the proportion of participants experiencing adverse events in both the comparison of NSAIDs versus placebo and selective COX-2 inhibitors versus non-selective NSAIDs. We were unable to draw conclusions about adverse events and the safety of NSAIDs for longer-term use, since we only included RCTs with a primary focus on short-term use of NSAIDs and a short follow-up. These are not optimal for answering questions about longer-term or rare adverse events.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	Yes
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	High

Data extraction table: systematic review		
Bibliographic reference	Vanti C, Andreatta S, Borghi S, Guccione AA, Pillastrini P, Bertozzi L. The effectiveness of walking versus exercise on pain and function in chronic low back pain: a systematic review and meta-analysis of randomized trials. Disabil Rehabil. 2019;41(6):622-32.	
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Braun 2020[77]
1. PICO		
***2. 'A priori' design**		No
3. Selection of study designs explained		
***4. Comprehensive literature search**		?
5. Duplicate study selection		
6. Duplicate data extraction		
***7. List of excluded studies with reasons**		No
8. Description of the included studies		
***9. Satisfactory RoB technique used**		?
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**		Yes
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**		Yes
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**		Yes
16. Conflict of interest reported		
Overall confidence in results of the review		Critically low

Data extraction table: systematic review	
Bibliographic reference	Verhagen AP, Downie A, Maher CG, Koes BW. Most red flags for malignancy in low back pain guidelines lack empirical support: a systematic review. Pain. 2017;158(10):1860-8.
Source of funding	Stichting Stoffels-Hornsta
Meta-analysis?	No
Number of included studies	N=33 (2 systematic reviews in 5 articles, 2 narrative reviews, 7 prospective cohorts in 8 articles, 10 retrospective, 8 case reports).
Study designs	Systematic and narrative reviews, diagnostic accuracy studies, cohorts, case–control studies, and case series.
Search strategy	MEDLINE, CINAHL [key words: low back pain, red flags, and serious pathology]) inception-Jul 27, 2016. Also searched for references in the guidelines and relevant articles found, and reference checking and “snowballing” of landmark articles.
Number of participants	Not reported overall
Population	People with LBP.
Intervention	Red flags for malignancies (signs or symptoms collected in the clinical assessment signalling underlying serious pathology that requires attention)
Comparison	NR
Relevant outcome measures	Sensitivity or specificity data on the diagnostic accuracy of red flags.
Outcomes	We identified 13 red flags endorsed in a total of 16 guidelines and 2 extra red flags not endorsed in any guideline. We included 33 publications varying from systematic reviews to case reports. The origin of many red flags was unclear or was sourced from case reports. The incidence of malignancy in patients presenting with LBP in primary care varied between 0% and 0.7%. Seven studies provided diagnostic accuracy data on red flags. We found 5 red flags with accuracy data from 2 or more studies, with 2 (“history of malignancy” and “strong clinical suspicion”) considered informative. In conclusion, the origin and diagnostic accuracy of many red flags endorsed in guidelines are unclear. A “history of malignancy” and “strong clinical suspicion” are the only red flags with empirical evidence of acceptably high diagnostic accuracy.
Authors’ conclusions	For the majority of red flags for malignancy included in clinical guidelines, the origin is unclear and there is strikingly little or no evidence available regarding their diagnostic accuracy. Two red flags were evaluated in 2 diagnostic studies at low RoB and had acceptably high LR1 to guide decision making: “history of malignancy” and “strong clinical suspicion”. At present, these are the only red flags that have an empirical basis for inclusion in clinical guidelines.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	No
***2. ‘A priori’ design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes / No
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Wang YT, Qi Y, Tang FY, Li FM, Li QH, Xu CP, et al. The effect of cupping therapy for low back pain: A meta-analysis based on existing randomized controlled trials. J Back Musculoskeletal Rehabil. 2017;30(6):1187-95

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Wang L, Guo Q, Lu X, Ni B. Surgical versus nonsurgical treatment of chronic low back pain: A meta-analysis based on current evidence. J Back Musculoskeletal Rehabil. 2016;29(3):393-401.
Source of funding	Not reported
Meta-analysis?	Yes
Number of included studies	N=6
Study designs	RCTs
Search strategy	Relevant randomized controlled trials (RCTs) from January 1970 to December 2013 were identified by searching the MEDLINE and Embase databases. The reference lists of the retrieved articles were also searched. Keywords and medical subject headings related to the conditions and potential treatments were identified prior to initiating the search. The search was limited to studies published in English. Studies selected for review were RCTs published in peer-reviewed journals as full articles and excluded grey literature and conference proceedings. The search strings are shown in Fig. 1.
Number of participants	N=904
Population	Adult patients undergoing CLBP with a minimum follow-up of 1 year
Intervention	Lumbar surgery of any type: One study focused on surgery with disc prosthesis versus rehabilitation. Five studies reported on lumbar fusion versus nonsurgical treatment.
Comparison	Not reported
Relevant outcome measures	A patient-centered, disease-specific functional outcome. At least one of the following outcomes had to be reported: Oswestry Disability Index (ODI), Visual Analogue Scale (VAS), General Function Score (GFS), emotional distress, Fear-Avoidance Beliefs Questionnaire, evaluation of work status, complications, and assessment of risk of bias.
Outcomes	Pooled data revealed that, compared with surgical treatment, nonsurgical treatment was associated with better Oswestry Disability Index scores (WMD, 3.71; CI, 0.44–6.97; P = 0.03). Both groups had similar Visual Analogue Scale and Emotional Distress Scale scores as well as General Function Scores.
Authors' conclusions	For chronic low back pain, nonsurgical treatment was shown to be effective, feasible, and safe during the follow-up period.
Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	No
***2. 'A priori' design**	No
3. Selection of study designs explained	No
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Partial
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review		
Bibliographic reference	Wang X, Wanyan P, Tian JH, Hu L. Meta-analysis of randomized trials comparing fusion surgery to non-surgical treatment for discogenic chronic low back pain. J Back Musculoskeletal Rehabil. 2015;28(4):621-7.	
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Harris 2018[98]
1. PICO		
***2. 'A priori' design**		
3. Selection of study designs explained		
***4. Comprehensive literature search**		
5. Duplicate study selection		
6. Duplicate data extraction		
***7. List of excluded studies with reasons**		
8. Description of the included studies		
***9. Satisfactory RoB technique used**		
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**		
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**		
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**		
16. Conflict of interest reported		
Overall confidence in results of the review		Low

Data extraction table: systematic review	
Bibliographic reference	Wewege MA, Booth J, Parmenter BJ. Aerobic vs. resistance exercise for chronic non-specific low back pain: A systematic review and meta-analysis. J Back Musculoskeletal Rehabil. 2018;31(5):889-99.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	?
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Wieland LS, Skoetz N, Pilkington K, Vempati R, D'Adamo CR, Berman BM. Yoga treatment for chronic non-specific low back pain. Cochrane Database Syst Rev. 2017;1:CD010671.
Source of funding	NIH National Center for Complementary and Integrative Medicine, R24 AT001293, USA.
Meta-analysis?	Yes
Number of included studies	N=12
Study designs	RCTs
Search strategy	Inception to 11 March 2016 without restrictions to language or publication status: Cochrane CENTRAL, which includes the Cochrane Back and Neck group (CBN) trials register, MEDLINE, MEDLINE In-Process, Embase, CINAHL, PsycINFO, Allied and Complementary Medicine Database, CBN Trials Register, Cochrane Complementary Medicine Field Trials Specialized Register, IndMED, PubMed, US National Institutes of Health ClinicalTrials.gov, World Health Organization (WHO) International Clinical Trials Registry Platform. The searches were previously run in 2013 and 2014. In 2014, the ClinicalTrials.gov, WHO ICTRP, and a supplementary search of the CBN Specialized Register in the CRS were added to the search strategy. In 2016, the PubMed search was revised to capture studies not in MEDLINE using the strategy recommended by Duffy 2014. We screened the reference lists of included studies and contacted experts in the field (e.g. authors of included studies) for information on additional trials, including unpublished or ongoing studies.
Number of participants	N=1,080
Population	Adults (aged 18 years or greater) with cur- rent chronic non-specific low back pain
Intervention	Yoga
Comparison	No treatment or a waiting list, a minimal intervention (e.g. booklets, lectures, or other educational interventions), or usual care (i.e. yoga compared to non-exercise controls); another active intervention (e.g. yoga versus drugs), for which different types of active interventions were considered separately (e.g. yoga versus drugs, yoga versus manipulation) (i.e. yoga compared to exercise controls); yoga plus any intervention versus that intervention alone, for which different types of cointervention were considered separately (e.g. yoga plus drugs versus drugs alone) (i.e. yoga as an add-on intervention to an exercise intervention).
Relevant outcome measures	Primary outcomes: Back-specific functional status (e.g. as measured by the Roland-Morris Disability Questionnaire); Pain (e.g. as measured by the visual analogue scale (VAS) for pain). Secondary outcomes: Clinical improvement, Measures of mental or physical quality of life (e.g. as measured on the 36-item Short Form (SF-36)), Measures of work disability, Adverse events.
Outcomes	For yoga compared to non-exercise controls (9 trials; 810 participants), there was low-certainty evidence that yoga produced small to moderate improvements in back-related function at three to four months (standardized mean difference (SMD) -0.40, 95% confidence interval (CI) -0.66 to -0.14; corresponding to a change in the Roland-Morris Disability Questionnaire of mean difference (MD) -2.18, 95% -3.60 to -0.76), moderate-certainty evidence for small to moderate improvements at six months (SMD -0.44, 95% CI -0.66 to - 0.22; corresponding to a change in the Roland-Morris Disability Questionnaire of MD -2.15, 95% -3.23 to -1.08), and low-certainty evidence for small improvements at 12 months (SMD -0.26, 95% CI -0.46 to -0.05; corresponding to a change in the Roland-Morris Disability Questionnaire of MD -1.36, 95% -2.41 to -0.26). On a 0-100 scale there was very low- to moderate-certainty evidence that yoga was slightly better for pain at three to four months (MD -4.55, 95% CI -7.04 to -2.06), six months (MD -7.81, 95% CI -13.37 to -2.25), and 12 months (MD -5.40, 95% CI -14.50 to -3.70), however we pre-defined clinically significant changes in pain as 15 points or greater and this threshold was not met. Based on information from

	six trials, there was moderate-certainty evidence that the risk of adverse events, primarily increased back pain, was higher in yoga than in non-exercise controls (risk difference (RD) 5%, 95% CI 2% to 8%). For yoga compared to non-yoga exercise controls (4 trials; 394 participants), there was very-low-certainty evidence for little or no difference in back-related function at three months (SMD -0.22, 95% CI -0.65 to 0.20; corresponding to a change in the Roland-Morris Disability Questionnaire of MD -0.99, 95% -2.87 to 0.90) and six months (SMD -0.20, 95% CI -0.59 to 0.19; corresponding to a change in the Roland-Morris Disability Questionnaire of MD -0.90, 95% -2.61 to 0.81), and no information on back-related function after six months. There was very low-certainty evidence for lower pain on a 0-100 scale at seven months (MD -20.40, 95% CI -25.48 to -15.32), and no information on pain at three months or after seven months. Based on information from three trials, there was low-certainty evidence for no difference in the risk of adverse events between yoga and non-yoga exercise controls (RD 1%, 95% CI -4% to 6%). For yoga added to exercise compared to exercise alone (1 trial; 24 participants), there was very-low-certainty evidence for little or no difference at 10 weeks in back-related function (SMD -0.60, 95% CI -1.42 to 0.22; corresponding to a change in the Oswestry Disability Index of MD -17.05, 95% -22.96 to 11.14) or pain on a 0-100 scale (MD -3.20, 95% CI -13.76 to 7.36). There was no information on outcomes at other time points. There was no information on adverse events. Studies provided limited evidence on risk of clinical improvement, measures of quality of life, and depression. There was no evidence on work-related disability.
Authors' conclusions	There is low- to moderate-certainty evidence that yoga compared to non-exercise controls results in small to moderate improvements in back-related function at three and six months. Yoga may also be slightly more effective for pain at three and six months, however the effect size did not meet predefined levels of minimum clinical importance. It is uncertain whether there is any difference between yoga and other exercise for back-related function or pain, or whether yoga added to exercise is more effective than exercise alone. Yoga is associated with more adverse events than non-exercise controls, but may have the same risk of adverse events as other back-focused exercise. Yoga is not associated with serious adverse events. There is a need for additional high-quality research to improve confidence in estimates of effect, to evaluate long-term outcomes, and to provide additional information on comparisons between yoga and other exercise for chronic non-specific low back pain.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Almeida 2020[75]	Braun 2020[77]
1. PICO	Yes	
***2. 'A priori' design**	Yes	Yes
3. Selection of study designs explained	No	
***4. Comprehensive literature search**	Yes	Yes
5. Duplicate study selection	Yes	
6. Duplicate data extraction	Yes	
***7. List of excluded studies with reasons**	Yes	Yes
8. Description of the included studies	Yes	
***9. Satisfactory RoB technique used**	Yes	Yes
10. Sources of funding reported	Yes	
***11. Appropriate methods for statistical combination of results**	Yes	Yes
12. Potential impact of RoB assessed	Yes	
***13. RoB accounted for in interpretation/discussion**	Yes	Yes
14. Satisfactory explanation for heterogeneity	Yes	
***15. Adequate investigation of publication bias**	Yes	No
16. Conflict of interest reported	Yes	
Overall confidence in results of the review	High	Low

Data extraction table: systematic review	
Bibliographic reference	Wood L, Hendrick PA. A systematic review and meta-analysis of pain neuroscience education for chronic low back pain: Short-and long-term outcomes of pain and disability. Eur J Pain. 2019;23(2):234-49

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review	
Bibliographic reference	Wu LC, Weng PW, Chen CH, Huang YY, Tsuang YH, Chiang CJ. Literature Review and Meta-Analysis of Transcutaneous Electrical Nerve Stimulation in Treating Chronic Back Pain. Reg Anesth Pain Med. 2018;43(4):425-33.
Source of funding	This research did not receive any funding from agencies in the public, commercial, or not-for-profit sectors.
Meta-analysis?	Yes
Number of included studies	N=12
Study designs	RCTs
Search strategy	Cochrane, Google Scholar, and ClinicalTrials.gov databases through June 30, 2014, using the following search terms: nerve stimulation therapy (electroacupuncture, percutaneous electrical nerve stimulation, and percutaneous neuromodulation therapy), transcutaneous electrical nerve stimulation, back pain, and chronic pain. The reference lists of the relevant studies were hand searched to identify other studies that met the inclusion criteria.
Number of participants	N=700
Population	Patients were 18 years or older, being treated for CBP.
Intervention	TENS
Comparison	Either a negative control (ie, sham control, placebo, or medication only) or an active control (ie, other types of NSTs).
Relevant outcome measures	Degree of pain or disability.
Outcomes	The efficacy of TENS was similar to that of control treatment for providing pain relief (standardized difference in means [SDM] = −0.20; 95% confidence interval [CI], −0.58 to 0.18; P = 0.293). Other types of NSTs were more effective than TENS in providing pain relief (SDM = 0.86; 95% CI, 0.15–1.57; P = 0.017). Transcutaneous electrical nerve stimulation was more effective than control treatment in improving functional disability only in patients with follow-up of less than 6 weeks (SDM = −1.24; 95% CI, −1.83 to −0.65; P < 0.001). There was no difference in functional disability outcomes between TENS and other NSTs.
Authors' conclusions	These results suggest that TENS does not improve symptoms of lower back pain, but may offer short-term improvement of functional disability.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Xiang Y, He JY, Tian HH, Cao BY, Li R. Evidence of efficacy of acupuncture in the management of low back pain: a systematic review and meta-analysis of randomised placebo- or sham-controlled trials. Acupunct Med. 2020;38(1):15-24.
Source of funding	This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
Meta-analysis?	Yes
Number of included studies	N=14, n=9 in meta-analysis
Study designs	RCTs
Search strategy	Cochrane CENTRAL; PubMed and MEDLINE; and Embase on 31 December 2016. Keywords, free words and MeSH terms including 'acupuncture' OR 'acupuncture therapy' OR 'acupuncture points' AND 'low back pain' OR 'lower back pain' OR 'backache' OR 'lumbago' were used. We searched the reference lists of all included studies and other SRs for additional RCTs.
Number of participants	N=2,110
Population	Adults (>18 years) with both (sub)acute (defined as pain duration <12 weeks) and chronic (>12 weeks) NSLBP.
Intervention	Studies in which needles were inserted at traditional acupuncture points.
Comparison	Sham or placebo acupuncture.
Relevant outcome measures	1. Pain intensity (eg, visual analogue scale (VAS)) 2. Functional status (eg, Roland Morris Disability Questionnaire(RMDQ)).
Outcomes	Immediately after acupuncture treatment we found statistically significant differences in pain reduction between acupuncture and sham or placebo therapy (standardised mean difference (SMD) −0.40, 95% CI −0.54 to −0.25; I2 7%; 753 participants; 9 studies), but there were no differences in function (weighted mean difference (WMD) −1.05, 95% CI −3.61 to 1.52; I2 79%; 462 participants; 4 studies). At follow-up, there were significant differences in pain reduction (SMD −0.46, 95% CI −0.82 to −0.09; I2 67%), but not in function (WMD −0.98, 95%CI −3.36 to 1.40; I2 87%). We conducted subgroup analyses both immediately after treatment and at follow-up.
Authors' conclusions	There is moderate evidence of efficacy for acupuncture in terms of pain reduction immediately after treatment for NSLBP ((sub)acute and chronic) when compared to sham or placebo acupuncture.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	Yes
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Low

Data extraction table: systematic review				
Bibliographic reference	Yamato TP, Maher CG, Saragiotto BT, Hancock MJ, Ostelo RW, Cabral CM, et al. Pilates for low back pain. Cochrane Database Syst Rev. 2015(7):CD010265.			
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Almeida 2020[75]	Braun 2020[77]	Lorenc 2018[78] (AMSTAR)
1. PICO		Yes		
***2. 'A priori' design**		Yes	Yes	
3. Selection of study designs explained		No		
***4. Comprehensive literature search**		Yes	?	
5. Duplicate study selection		Yes		
6. Duplicate data extraction		Yes		
***7. List of excluded studies with reasons**		Yes	Yes	
8. Description of the included studies		Yes		
***9. Satisfactory RoB technique used**		Yes	Yes	
10. Sources of funding reported		Yes		
***11. Appropriate methods for statistical combination of results**		Yes	Yes	
12. Potential impact of RoB assessed		Yes		
***13. RoB accounted for in interpretation/discussion**		Yes	Yes	
14. Satisfactory explanation for heterogeneity		Yes		
***15. Adequate investigation of publication bias**		Yes	No	
16. Conflict of interest reported		Yes		
Overall confidence in results of the review		High	Low	High

Data extraction table: systematic review	
Bibliographic reference	Yang LH, Duan PB, Hou QM, Du SZ, Sun JF, Mei SJ, et al. Efficacy of Auricular Acupressure for Chronic Low Back Pain: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Evid Based Complement Alternat Med. 2017;2017:6383649.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	Braun 2020[77]
1. PICO	
***2. 'A priori' design**	No
3. Selection of study designs explained	
***4. Comprehensive literature search**	?
5. Duplicate study selection	
6. Duplicate data extraction	
***7. List of excluded studies with reasons**	No
8. Description of the included studies	
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	
***15. Adequate investigation of publication bias**	No
16. Conflict of interest reported	
Overall confidence in results of the review	Critically low

Data extraction table: systematic review		
Bibliographic reference	Yeganeh M, Baradaran HR, Qorbani M, Moradi Y, Dastgiri S. The effectiveness of acupuncture, acupressure and chiropractic interventions on treatment of chronic nonspecific low back pain in Iran: A systematic review and meta-analysis. Complement Ther Clin Pract. 2017;27:11-8.	
Quality appraisal (AMSTAR 2: https://amstar.ca/)		Braun 2020[77]
1. PICO		
***2. 'A priori' design**		No
3. Selection of study designs explained		
***4. Comprehensive literature search**		?
5. Duplicate study selection		
6. Duplicate data extraction		
***7. List of excluded studies with reasons**		No
8. Description of the included studies		
***9. Satisfactory RoB technique used**		Yes
10. Sources of funding reported		
***11. Appropriate methods for statistical combination of results**		Yes
12. Potential impact of RoB assessed		
***13. RoB accounted for in interpretation/discussion**		Yes
14. Satisfactory explanation for heterogeneity		
***15. Adequate investigation of publication bias**		No
16. Conflict of interest reported		
Overall confidence in results of the review		Critically low

Data extraction table: systematic review	
Bibliographic reference	Zahari Z, Ishak A, Justine M. The effectiveness of patient education in improving pain, disability and quality of life among older people with low back pain: A systematic review. Journal of Back and Musculoskeletal Rehabilitation. 2020;33(2):245-54.
Source of funding	Institute of Research Management and Innovation, Universiti Teknologi MARA through the LESTARI grant (No. 600-IRMI/DANA 5/3/LESTARI (0102/2016).
Meta-analysis?	No
Number of included studies	N=5
Study designs	RCTs and quasi-experimental designs
Search strategy	EBSCO MEDLINE, EBSCO CINAHL, Science Direct, PubMed, and PEDro, 2006 to 2016. The search strategies were limited to 10 years latest articles to obtain latest articles regarding patient education treatment given to older people with LBP. The keywords “patient education”, “low back pain”, “elderly”, “older adults”, “older persons” and “older people” in each databases were used during literature search process. Boolean operator of “OR” or “AND” were used to expand or limit the searching scope. The literature search was limited to human subjects, full text and English articles only.
Number of participants	Not reported overall
Population	Elderly, older adults, older people, older people or age > 60 years old with LBP
Intervention	Patient education
Comparison	Not reported
Relevant outcome measures	Pain, disability and quality of life
Outcomes	Findings suggest that patient education for older people may differ in terms of its contents such as health education, self-management, video education, and postural education. Patient education improved pain and had positive effects on disability and quality of life among older people with LBP.
Authors’ conclusions	In conclusion, this study revealed that patient education had beneficial effects in improving pain, disability and quality of life among older people with LBP. However, an education program alone might not be the best approach in order to holistically treat older people with LBP. Patient education alone might be insufficient and needs to be combined with other interventions such as pain management and exercises to provide better improvement of outcomes for older people. Therefore, it is highly recommended to use patient education in treating older people with LBP, in order to reduce the prevalence of LBP in this population and improve their health and function.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. ‘A priori’ design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	No
6. Duplicate data extraction	No
***7. List of excluded studies with reasons**	Yes
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	No meta-analysis
12. Potential impact of RoB assessed	No meta-analysis
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	No
***15. Adequate investigation of publication bias**	No meta-analysis
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Data extraction table: systematic review	
Bibliographic reference	Zhang Q, Jiang S, Young L, Li F. The Effectiveness of Group-Based Physiotherapy-Led Behavioral Psychological Interventions on Adults With Chronic Low Back Pain: A Systematic Review and Meta-Analysis. Am J Phys Med Rehabil. 2019;98(3):215-25.
Source of funding	This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
Meta-analysis?	No
Number of included studies	N=13
Study designs	RCTs
Search strategy	We searched the following databases from their inception to February 2018, with no language restrictions, to gather relevant RCTs: PubMed, Web of Science, Cochrane Library, EMBASE, Ovid Medline, PsycINFO, Physiotherapy Evidence Database, Chinese Biomedical Literature Database, China National Knowledge Infrastructure, and Google Scholar. The search consisted of a combination of free text words and MeSH terms using Boolean operators. The following combination of key words and opera- tors was used: ("Back Pain" OR "Low Back Pain" OR "Lumbar near Pain" OR "Dorsalgia" OR "backache" OR "Back disorder") AND ["Chronic Disease *" OR "Chronic Disease" OR "Chronic Pain" OR "Musculoskeletal Pain"] AND ["Exercise" OR "Movement Techniques" OR "Exercise Therapy" OR "Physical Fitness" OR "Physical Endurance" OR "Rehabilitation" OR "Rehab*" OR "exercise*" OR "groups"] OR ["Self Care" OR "Patient Education" OR "Disease Management" OR "Cognitive Therapy" OR "Behavior Therapy" OR "Adaptation" OR "Psychological" OR "physical" OR "motion" OR "fitness" OR "therap*"] AND ["controlled clinical trial" OR "randomized controlled trial" OR "trial" OR "randomly" OR "randomized"]. The databases were searched for relevant systematic reviews and meta-analyses. Titles, abstracts, key words, and reference lists were scanned to refine the search terms. If the abstracts met the inclusion criteria, the full-text article was downloaded. In addition, the reference lists of all included studies were screened to identify potentially studies that had not been identified by previous search methods.
Number of participants	Not reported overall. Sample sizes ranged from 52 to 348 patients.
Population	Adult participants with a clinical diagnosis of nonspecific CLBP (We defined pain duration as >3 mos).
Intervention	Group-Based Physiotherapy-Led Behavioral Psychological Interventions (GPBPIs). (1) We defined GPBPIs as involving a physiotherapy component and one or both of a behavioral or a psychological component. (2) Delivered in a group format. (3) Delivered by physiotherapist. (4) Delivery method (such as face-to-face methods or remote delivery—i.e., online or phone) was not restricted. • Education sessions, back exercise school, and exercise therapy were defined as a psychological and/or behavioral component if it used specific techniques and rehabilitation approaches to change both cognition and behavior. In cases where treatments were the main focus of the intervention, the cognitive and psychological aspects (such as relaxation, thoughts, fear, stress, and beliefs) was deemed to be the psychological components. If an intervention consisted of a wide range of components, educational leaflets or treatment sessions consisting of a large psychological component, without physical aspects such as exercise, it was deemed inadequate to be defined as GPBPIs.
Comparison	No treatment (inc. usual care, wait list), active therapy.
Relevant outcome measures	The primary outcome was pain. If more than one outcome scale was used to assess pain, VAS was prioritized, rather than NRS or other measurements.
Outcomes	In reviewing the short- (<6 mos), intermediate- (≥6 and <12 mos), and longer-term (≥12 mos) effects of GPBPIs, long-term follow-up evaluations showed large and significant effect sizes (standardized mean difference = −0.25, 95% confidence interval

	= −0.39 to −0.11, I2 = 38%, P < 0.01). Sub- group analysis indicated that patients from GPBPIs group had the greater short-, intermediate-, and long-term pain reduction than patients on waiting listing or usual care group. Compared with other active treatments, GPBPIs showed a small but significant long-term pain reduction in patients with chronic low back pain (standardized mean difference = −0.18, 95% confidence interval = −0.35 to −0.01, I2 = 32%, P = 0.04).
Authors' conclusions	In general, GPBPIs may be an acceptable intervention to relieve pain intensity.

Quality appraisal (AMSTAR 2: https://amstar.ca/)	
1. PICO	Yes
***2. 'A priori' design**	No
3. Selection of study designs explained	Yes
***4. Comprehensive literature search**	Partial
5. Duplicate study selection	Yes
6. Duplicate data extraction	Yes
***7. List of excluded studies with reasons**	No
8. Description of the included studies	Yes
***9. Satisfactory RoB technique used**	Yes
10. Sources of funding reported	No
***11. Appropriate methods for statistical combination of results**	Yes
12. Potential impact of RoB assessed	Yes
***13. RoB accounted for in interpretation/discussion**	Yes
14. Satisfactory explanation for heterogeneity	Yes
***15. Adequate investigation of publication bias**	Yes
16. Conflict of interest reported	Yes
Overall confidence in results of the review	Critically Low

Appendix E: Patient-reported outcome measures

Table E1: Patient-reported outcome measures selected as potential core outcome measurement instruments to measure physical functioning, pain intensity and health-related quality of life in clinical trials in non-specific low back pain (Chiarotto 2018, p.484)[114]

PROM	Name abbreviation	Reference(s) original development	Characteristics				Recommended by other initiatives aimed at fostering standardization for LBP or chronic pain
			Number of items	Response options	Total score range	Recall period	
			Physical functioning				
Oswestry Disability Index version 1.0	ODI 1.0	Fairbank 1980[38]	10	0-5 rating scale	0-100	Undefined	Original core set for LBP clinical research[30]
Oswestry Disability Index version 2.1a	ODI 2.1a	Fairbank 1980,[38] Meade 1986,[81] Baker 1989[5]	10	0-5 rating scale	0-100	Undefined	Original core set for LBP clinical research; ICHOM standard set for LBP[24, 30]
Chiropractic version Low Back Pain Disability Questionnaire	CLBPDQ	Fairbank 1980,[38] Hudson-Cook 1989[59]	10	0-5 rating scale	0-100	Undefined	
Modified version Low Back Pain Disability Questionnaire	MLBPDQ	Fairbank 1980,[38] Fritz 2001[42]	10	0-5 rating scale	0-100	Today	
24-item Roland Morris Disability Questionnaire	RMDQ-24	Roland 1983[94]	24	0-1 yes/no	0-24	Today	Original core set for LBP clinical research[30]
23-item Roland Morris Disability Questionnaire	RMDQ-23	Roland 1983,[94] Patrick 1995[89]	23	0-1 yes/no	0-23	Today	Original core set for LBP clinical research[30]
18-item Roland Morris Disability Questionnaire	RMDQ-18	Roland 1983,[94] Stratford 1997[102]	18	0-1 yes/no	0-18	Today	
Pain Interference subscale of Brief Pain Inventory	BPI-PI	Daut 1983,[28] Cleeland 1994,[23] Cleeland 2009[22]	7	0-10 numeric scale	0-10	Last 24 h	IMMPACT for chronic pain clinical trials[34]
Pain Interference items of Multidimensional Pain Inventory	MPI-PI	Kerns 1985[71]	9	0-6 rating scale	0-6	Undefined	IMMPACT for chronic pain clinical trials[34]
Physical Functioning subscale of 36-item Short Form Health Survey	SF36-PF	Stewart 1992,[101] Ware 1992[108]	10	1-3 rating scale	0-100	Now	
Disability Index of Low Back Pain Rating Scale	LBPRS-DI	Manniche 1994[80]	15	0-2 rating scale	0-30	Undefined	
Quebec Back Pain Disability Scale	QBPDS	Kopec 1996[75]	20	0-5 rating scale	0-80	Today	
4-item Patient-Reported Outcomes Measurement Information System Physical Function short form	PROMIS-PF-4	Cella 2007,[14] DeWalt 2007,[29] Bruce 2009,[10] Fries 2009,[40] Cella 2010,[13] Rose 2014,[95] PROMIS scientific standards[1]	4	1-5 rating scale	4-20	Undefined	NIH Task Force for research standards in chronic LBP[31]
6-item Patient-Reported Outcomes Measurement Information System Physical Function short form	PROMIS-PF-6	Cella 2007,[14] DeWalt 2007,[29] Bruce 2009,[10] Fries 2009,[40] Cella 2010,[13] Rose 2014,[95] PROMIS scientific standards[1]	6	1-5 rating scale	6-30	Undefined	
8-item Patient-Reported Outcomes Measurement Information System Physical Function short form	PROMIS-PF-8	Cella 2007,[14] DeWalt 2007,[29] Bruce 2009,[10] Fries 2009,[40] Cella 2010,[13] Rose 2014,[95] PROMIS scientific standards[1]	8	1-5 rating scale	8-40	Undefined	
10-item Patient-Reported Outcomes Measurement	PROMIS-PF-10	Cella 2007,[14] DeWalt 2007,[29] Bruce 2009,[10] Fries 2009,[40] Cella 2010,[13]	10	1-5 rating scale	10-50	Undefined	

PROM	Name abbreviation	Reference(s) original development	Characteristics				Recommended by other initiatives aimed at fostering standardization for LBP or chronic pain
			Number of items	Response options	Total score range	Recall period	
Information System Physical Function short form		Rose 2014,[92] PROMIS scientific standards[1]					
20-item Patient-Reported Outcomes Measurement Information System Physical Function short form	PROMIS-PF-20	Cella 2007,[14] DeWalt 2007,[29] Bruce 2009,[10] Fries 2009,[40] Cella 2010,[13] Rose 2014,[95] PROMIS scientific standards[1]	20	1-5 rating scale	20-99	Undefined	
			Pain intensity				
Visual Analogue Scale	VAS	Huskisson 1974[64]	1	0-100 scale	0-100	Varying	
Numeric Rating Scale	NRS	Downie 1978[33]	1	0-10 numeric scale	0-10	Varying	Original core set for LBP clinical research; ICHOM standard set for LBP; NIH Task Force for research standards in chronic LBP; IMMPACT for chronic pain clinical trials[24, 30, 31, 34]
Pain Severity subscale of Brief Pain Inventory	BPI-PS	Daut 1983,[29] Cleeland 1991,[23] Cleeland 2009[22]	4	0-10 numeric scale	0-10	Varying	
			Health-related quality of life				
36-Item Short Form Health Survey	SF36	Ware 1992[108]	36	Varying	0-100*	Varying	Original core set for LBP clinical research[30]
12-item Short Form Health Survey	SF12	Ware 1996[107]	12	Varying	0-100†	Varying	Original core set for LBP clinical research[30]
EuroQol Five Dimensions questionnaire	EQ-5D	EuroQol Group 1990,[36] Brooks 1996[9]	5 (items); 1 (visual analogue scale)	1-3 rating scale (items); 0-100 visual analogue scale	0-1‡ (items); 0-100 (visual analogue scale)	Today	Original core set for LBP clinical research[30]
Nottingham Health Profile	NHP	Hunt 1981[62]	45	0-1 yes/no	0-100§	At the moment	
10-item Patient-Reported Outcomes Measurement Information System Global Health short form	PROMIS-GH-10	Cella 2007,[14] DeWalt 2007,[29] Hays 2009,[54] Cella 2010,[13] PROMIS scientific standards[1]	9 (items); 1 (numeric scale)	1-5 rating scale (items); 0-10 (numeric scale)	4-20†	Undefined	

* This is the total score range for each of the 8 subscales of SF36.
† This is the total score for physical component and mental component summary scores.
‡ This is a utility score.
§ This is the total score range for the 6 domains measured by NHP part 1 (38 items); the rating for each individual item is provided for part 2 (7 items).
ICHOM, International Consortium for Health Outcomes Measurement; LBP, low back pain; PROM, patient-reported outcome measure.