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REVIEW ARTICLE

A Systematic Review of Clinical Practice Guidelines for Persons With Non-specific Low Back Pain With and Without Radiculopathy: Identification of Best Evidence for Rehabilitation to Develop the WHO's Package of Interventions for Rehabilitation

Fabio Zaina, MD,[a] Pierre Côté, PhD,[b,c] Carolina Cancelliere, PhD,[b,c] Francesca Di Felice, MD,[a] Sabrina Donzelli, MD,[a] Alexandra Rauch, MPH,[d] Leslie Verville, MHSc,[b,c] Stefano Negrini, MD, PhD,[e,f] Margareta Nordin, Dr Med Sci[g]

From the [a]ISICO (Italian Scientific Spine Institute), Milan, Italy; [b]Faculty of Health Sciences, Ontario Tech University, Oshawa, Ontario, Canada; [c]Institute for Disability and Rehabilitation Research, Ontario Tech University, Oshawa, Ontario, Canada; [d]Sensory Functions, Disability and Rehabilitation Unit, Department for Noncommunicable Diseases, World Health Organization, Geneva, Switzerland; [e]Department of Biomedical, Surgical and Dental Sciences, University "La Statale", Milan, Italy; [f]IRCCS Istituto Ortopedico Galeazzi, Milan, Italy; and [g]Departments of Orthopedic Surgery and Environmental Medicine, NYU Grossman School of Medicine, Occupational and Industrial Orthopedic Center (OIOC), NYU Hospital for Joint Diseases, NYU Langone Health, New York University, New York, NY.

Abstract

Objective: To Identify evidence-based rehabilitation interventions for persons with non-specific low back pain (LBP) with and without radiculopathy and to develop recommendations from high-quality clinical practice guidelines (CPGs) to inform the World Health Organization's (WHO) Package of Interventions for Rehabilitation (PIR).

Data Source: We searched MEDLINE, EMBASE, CINAHL, PsycINFO, National Health Services Economic Evaluation Database, Health Technology Assessment Database, PEDro, the Trip Database, the Index to Chiropractic Literature and the gray literature.

Study Selection: Eligible guidelines were (1) published between 2009 and 2019 in English, French, Italian, or Swedish; (2) included adults or children with non-specific LBP with or without radiculopathy; and (3) assessed the benefits of rehabilitation interventions on functioning. Pairs of independent reviewers assessed the quality of the CPGs using AGREE II.

Data Synthesis: We identified 4 high-quality CPGs. Recommended interventions included (1) education about recovery expectations, self-management strategies, and maintenance of usual activities; (2) multimodal approaches incorporating education, exercise, and spinal manipulation; (3) nonsteroidal anti-inflammatory drugs combined with education in the acute stage; and (4) intensive interdisciplinary rehabilitation that includes exercise and cognitive/behavioral interventions for persistent pain. We did not identify high-quality CPGs for people younger than 16 years of age.

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Conclusion: We developed evidence-based recommendations from high-quality CPGs to inform the WHO PIR for people with LBP with and without radiculopathy. These recommendations emphasize the potential benefits of education, exercise, manual therapy, and cognitive/behavioral interventions.

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The World Health Organization (WHO) aims to achieve universal health coverage to ensure that "all people receive quality health services that meet their needs without being exposed to financial hardship in paying for the services".[1] Importantly, universal health coverage includes rehabilitation services. Therefore, the WHO Rehabilitation 2030 call for action[2] committed to developing a Package of Interventions for Rehabilitation (PIR) to support ministries of health in integrating rehabilitation services into health systems.[3]

Low back pain (LBP) is the most prevalent musculoskeletal condition in the population,[4] with an estimated global prevalence of 568 million people[5] It refers to pain located between the lower rib margins and the buttock creases and sometimes can be associated with radiculopathy).[6] Radiculopathy refers to inflammation, injury, or compression of the spinal nerve roots that can present as pain, weakness, or numbness in a myotomal or dermatomal distribution.[7] Lumbar radiculopathy may be caused by spinal stenosis (narrowing of the spinal canal) or lumbar disk herniation (localized displacement of disk material beyond the normal margins of the intervertebral disk space).[7]

In most cases, no identifiable pathology is identified as the cause of LBP and most people are diagnosed as suffering from non-specific LBP. Nevertheless, LBP is commonly associated with physical and psychological symptoms, and it is known to negatively affect people's quality of life and functioning.[8] The global age-standardized point prevalence of LBP is 7.5% (95% CI: 6.8%-8.3%), ranging from 3.9% in East Asia and 5.6% in Central Latin America to 13.2% in high-income Asia Pacific and 13.5% in Southern Latin America.[9] Globally, the prevalence is higher in women than men.[9] Less is known about the epidemiology of low back pain and radiculopathy, but evidence from general population studies suggests that the annual incidence of hospitalization is less than 8 per 10,000 and that the annual prevalence of radiculopathy is 2.2%.[10] The incidence of radiculopathy is associated with age; it is rare before the age of 20, peaks in the fifth decade and declines thereafter.[7] The available evidence suggests that risk factors for radiculopathy related to lumbar spine disk include acute injuries, heavy lifting, twisting, bending, driving, smoking, pregnancy, diabetes, body mass index, hypertension, hypercholesterolemia, and family history.[10-20]

In the past 3 decades, the focus of clinical interventions for the management of LBP has shifted from treating pain to targeting functioning by improving activities and participation, thus emphasizing the role of rehabilitation. The reason for this shift is that no pain-focused clinical intervention has been shown to significantly reduce the burden of low back pain in the population.[21]

Our objective was to systematically review clinical practice guidelines (CPGs) for the management of persons with low back pain with or without radiculopathy and synthesize recommendations from high quality to inform the development of a WHO PIR.

List of abbreviations:

CPG	**clinical practice guideline**
LBP	**low back pain**
NICE	**National Institute for Health and Clinical Excellence**
NSAID	**nonsteroidal anti-inflammatory drug**
PIR	**Package of Interventions for Rehabilitation**
WHO	**World Health Organization**

Methods

Our review was developed in compliance with the methodology for the development of PIR.[3] We report our systematic review according to the PRISMA statement.[22] The protocol was registered on Open Science Framework (registration DOI 10.17605/OSF.IO/S83U7).

The development of the PIR followed a stepwise approach. First, the WHO prioritized a series of health conditions that require a PIR. Second, the WHO Rehabilitation Program and Cochrane Rehabilitation WHO's guideline review committee developed the methods to identify evidence-based rehabilitation interventions for the prioritized health conditions. To meet this goal, The Be4rehab initiative conducted a series of systematic reviews of CPGs for the prioritized health conditions. Finally, clinical and research experts reviewed all available evidence and selected the final set of interventions through a formal consensus process. All information underwent a review process before developing the final version of the PIR.

Population

We considered CPGs targeting adults (≥18 years of age) and pediatric populations (<18 years of age) with acute, subacute, or chronic non-specific LBP with or without radiculopathy. Guidelines about the management of LBP with or without radiculopathy attributed to any major structural or systemic pathology (fracture, infection, tumor, osteoporosis, inflammatory arthritis, vascular claudication, and cauda equine syndrome) were excluded.

Interventions

We included pharmacologic and non-pharmacologic interventions used for the rehabilitation of LBP. We defined rehabilitation according to the WHO definition: "*a set of interventions that assist individuals who experience, or are likely to experience, disability to achieve and maintain optimal functioning when interacting with their environments*".[23] Eligible rehabilitation interventions aimed to improve functioning (eg, reducing pain, increasing muscle strength or joint mobility, improving ability to perform daily activities including work ability), or the individual's environment (eg, installation of assistive devices).

We considered rehabilitation interventions provided by various health care providers including but not limited to general practitioners, physiotherapists, chiropractors, osteopaths, and occupational therapists. Examples of interventions for rehabilitation include but are not limited to preventive, restorative, or compensatory approaches; pharmacologic interventions; provision of assistive devices, environmental modification, and self-management approaches. In addition, any intervention including 1 or more rehabilitation modality (multimodal care) was considered. Surgical interventions were excluded.

Outcomes

The outcomes of interest included functioning, impairments (eg, pain severity), and treatment complications. Eligible guidelines included interventions that aimed to improve functioning by (1) reducing impairments (eg, pain severity), (2) promoting and restoring functioning, or (3) providing compensatory strategies to achieve and maintain optimal levels of functioning in every area of a person's life.

Search strategy

Data sources and searches

Our search strategy included CPGs (guidelines, practice guidelines, or clinical guidelines) published in English, Italian, French, and Swedish published from January 1st, 2009, to March 17th, 2019. In compliance with the PIR methods, we searched CPGs published in English. However, we also searched for guidelines published in French, Italian, and Swedish because the languages are spoken by the co-authors. The search ended in 2019 to comply with the WHO project timelines.[3]

We searched MEDLINE, EMBASE, CINAHL, PsycINFO, National Health Services Economic Evaluation Database, Health Technology Assessment Database, PEDro, the Trip Database, and the Index to Chiropractic Literature and the gray literature using the following: Canadian Medical Association CPG Infobase, International Guidelines Network, American College of Physicians Clinical Guidelines and Recommendations, the Australian government's National Health and Medical Research Council, Health Services/Technology Assessment Texts, Institute for Clinical Systems Improvement, National Institute for Health and Clinical Excellence (NICE) Guidance, NICE Pathways, New Zealand Guidelines Group, Scottish Intercollegiate Guidelines Network, WHO guidelines approved by the Guidelines Review Committee, Italian Society of Physiatrists, and Italian Society of Orthopedics and Traumatology. Google Scholar was systematically searched using the advanced option, using the same search terms and filters used for the other databases. For reasons of feasibility, the Google search of the gray literature was only performed for the first 250 results.[24]

The search strategy was first developed in MEDLINE and subsequently adapted to the other databases.[3] The search terms included subject headings specific to each database (eg, MeSH for MEDLINE) and free text words relevant to LBP and rehabilitation. Databases containing the results of the searches were created using EndNote X8. The search strategies are reported in Appendix 1.

Inclusion and exclusion criteria

We considered only original CPGs reporting on interventions for the rehabilitation of persons with LBP with or without radiculopathy. CPGs were excluded if they (1) were a summary or copy of previous CPGs; (2) were developed solely based on consensus opinion, did not conduct a systematic literature search or critical appraisal of studies used to derive recommendations; (3) presented a conflict of interest (financial or non-financial); and (4) did not provide information on the strength of the recommendation. Specific exclusion criteria are discussed in the "Quality Assessment" paragraph.

Screening

Eligible CPGs were screened through a 2-phase process. In phase 1, 2 reviewers independently screened titles and abstracts to determine eligibility. Studies were classified as possibly relevant or irrelevant. In phase 2, the reviewers independently reviewed manuscripts of the possibly relevant guidelines to make a final determination of eligibility. Reviewers resolved any disagreements through discussion. We involved a third reviewer if a consensus could not be reached.

According to the WHO methodology,[3] to include in the subsequent work to produce the WHO PIR only the best information and reduce the variability among different teams' interpretation of the current evidence, we selected a maximum of 5 CPGs (5 for adults and 5 for children or youth) based on the following criteria: (1) methodological quality; (2) publication date; (3) interprofessional; and (4) comprehensiveness. The selection of the final 5 CPGs was informed by (1) a higher AGREE II score; (2) most recent or most recently updated; (3) relevant to different rehabilitation professions; and (4) more comprehensiveness in terms of number of functioning domains addressed. A standardized form was used for data extraction, which comprises information on the CPGs; reference to their recommendations, interventions, and related outcomes; content and strength of the recommendations; and quality of evidence related to the recommendations.

We arbitrarily decided to include a maximum of 5 CPGs because we assumed that they would include all relevant interventions. The final selection of guidelines was approved by all members of the research team.

Quality assessment

Two independent reviewers critically appraised the risk of bias of eligible CPGs using the Appraisal of Guidelines for Research and Evaluation (AGREE) II tool.[25] The AGREE II tool includes 23 items grouped into 6 domains: (1) scope and purpose; (2) stakeholder involvement; (3) rigor of development; (4) clarity of presentation; (5) applicability; and (6) editorial independence (Table 1). All items were rated, however, 9 items (items 4, 7, 8, 10, 12, 13, 15, 22, and 23) were prioritized to assess the quality of guidelines.[3] These items were selected based on consensus from the research team.[3] CPGs were deemed to be of low quality/high risk of bias and therefore, excluded if (1) the average sum score of the 2 reviewers in any of items 4, 7, 8, 10, 12, 13, 15, 22, 23 was less than 45 (AGREE/9) and (2) the average score of the 2 reviewers in any of items 7, 8, 12, and 22 was lower than 3 (AGREE/4).[3]

Table 1 The AGREE II tool

Domain	Item
1. Scope and Purpose	1. The overall objective(s) of the guideline is (are) specifically described. 2. The health question(s) covered by the guideline is (are) specifically described. 3. The population (patients, public, etc) to whom the guideline is meant to apply is specifically described.
2. Stakeholder Involvement	4. The guideline development group includes individuals from all relevant professional groups. 5. The views and preferences of the target population (patients, public, etc) have been sought. 6. The target users of the guideline are clearly defined.
3. Rigor of Development	7. Systematic methods were used to search for evidence. 8. The criteria for selecting the evidence are clearly described. 9. The strengths and limitations of the body of evidence are clearly described. 10. The methods for formulating the recommendations are clearly described. 11. The health benefits, side effects, and risks have been considered in formulating the recommendations. 12. There is an explicit link between the recommendations and the supporting evidence. 13. The guideline has been externally reviewed by experts prior to its publication. 14. A procedure for updating the guideline is provided.
4. Clarity of Presentation	15. The recommendations are specific and unambiguous. 16. The different options for management of the condition or health issue are clearly presented. 17. Key recommendations are easily identifiable.
5. Applicability	18. The guideline describes facilitators and barriers to its application. 19. The guideline provides advice and/or tools on how the recommendations can be put into practice. 20. The potential resource implications of applying the recommendations have been considered. 21. The guideline presents monitoring and/or auditing criteria.
6. Editorial Independence	22. The views of the funding body have not influenced the content of the guideline. 23. Competing interests of guideline development group members have been recorded and addressed.

Data extraction

The lead author extracted data into standardized tables. A second reviewer independently checked the extracted data for accuracy and completeness. Extracted data included the recommendation (eg, type/modality, dosage, target group), the strength of the recommendation, and the quality of the evidence used to inform the recommendation.

Data synthesis and analysis

A narrative synthesis of the selected CPGs was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement.[26] We stratified the recommendations from the CPGs according to the target population, the type (Service: recommendations on organizational issues, eg, professions required, rehabilitation management; Assessment: information on eg, type of clinical examinations, specific tests, standardized assessment procedures; Interventions: any intervention that is delivered to a patient (eg, therapeutic procedures,

pharmacologic treatment, provision of assistive products, etc) and by continuum of care (acute, subacute, chronic, acute and chronic, acute and subacute, and not specified).

According to the protocol, we classified the recommendations into WHO topics of interest (service, assessment, and intervention).[3] The topics from the first CPG were compared independently by 2 authors and integrated with those coming from the other one. If needed, agreement by discussion was reached involving a third author. The process was repeated for all the CPG until a final agreement on the topic of interest was reached.

There were no deviations from the published protocol. Quality assurance of the data extraction and methodological support for this study was provided by Cochrane Rehabilitation.

Results

Study selection

Our search yielded 3049 articles. We removed 236 duplicates and screened 2813 articles (Fig 1). Of those, 12 CPGs were eligible for critical appraisal and 4 CPGs[7,27-29] fulfilled the quality criteria and were included in our synthesis. Two high-quality CPGs were from the USA, 1 from Canada and 1 from the UK. One high-quality CPG provided recommendations on the conservative treatment of LBP and radiculopathy in patients ≥16 years of age,[7] one focused on manual therapy and other rehabilitation treatments for adults and young adults (≥16 years) with LBP,[28] one included interventional therapies and interdisciplinary rehabilitation for adults with LBP,[29] and the last included pharmacologic, educational, and rehabilitation treatments for adults with acute and chronic LBP.[30]

We excluded 8 CPGs for the following reasons: 7 because there were no clear statements about possible conflicts of interest,[31-37] 8 because AGREE/4 was <3,[31-38] 5 because AGREE/9 was ≤45.[31-33,35,37] All excluded CPGs failed to demonstrate editorial independence and also had limitations with the description of the search methodology.[31-38] Overall, we did not find CPGs that informed the management of pediatric patients with LBP. The average AGREE II scores from reviewed CPGs were 47% (SD 17) while that of the high-quality CPGs 71% (SD 8) (Table 2).

Most recommendations focused on clinical interventions, and a few recommendations addressed assessment (Table 3). A summary of the strength of the recommendations and quality of evidence

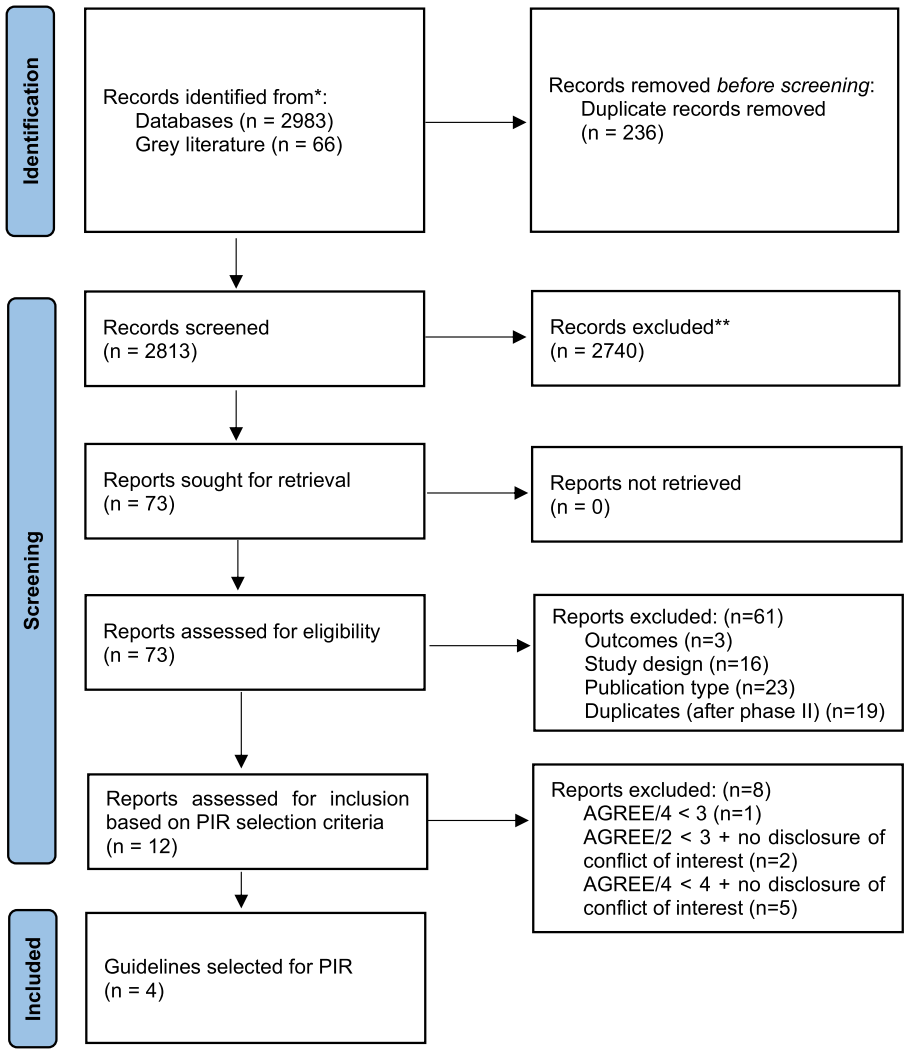

Fig 1 Results of the screening process (flow diagram).

Table 2 Guidelines found and selected, and their respect of the criteria used to reach the final choice

Guideline	AGREE Ratings						Multiprofessional Team (Y/N)	Topic	Publication Date
	Total	*Average of Key Items*							
		7	*8*	*12*	*22*	*4,7,8,10, 12,13,15,22,23*			
Included									
Spinal manipulative therapy and other conservative treatments for low back pain: a guideline from the Canadian Chiropractic Guideline Initiative[18]	122	4.5	4.5	6.5	7	45	N	Spinal manipulative therapy and other conservative treatments for low back pain	2018
Low back pain and sciatica in over 16 s: assessment and management[9]	133	6.5	7	7	5	60	Y	Treatment for patients with LBP and/or sciatica	2016
Interventional therapies, surgery, and interdisciplinary rehabilitation for low back pain[19]	103	4	5.5	6.5	7	46.5	Y	Treatment of LBP patients	2009
Adult acute and subacute low back pain[20]	122	4	5.5	6	6		Y	Treatment of acute and subacute LBP patients	2018
Excluded									
Clinical practice guidelines of using acupuncture for low back pain[27]	58	2.5	1	3	3.5	23.5	N	Acupuncture for low back pain	2016
Evidence-based guideline on prevention and management of low back pain in working population in primary care[21]	61	6	4	1.5	1	27.5	N	Prevention and management of low back pain in working population in primary care	2012
Noninvasive treatments for acute, subacute, and chronic low back pain: a clinical practice guideline from the American College of Physicians[22]	101.5	6.5	6.5	5	1	44.5	N	Noninvasive treatments for acute, subacute, and chronic low back pain	2017
Low back pain: clinical practice guidelines linked to the International Classification of Functioning, Disability, and Health from the Orthopedic Section of the American Physical Therapy Association[23]	81	5	2	5	1.5	34.5	Y	Noninvasive treatments for acute, subacute, and chronic low back pain	2012
Management of chronic pain. A national clinical guideline[24]	122	6	2.5	6	1	47	Y	Treatment of LBP patients	2013
Ottawa Panel evidence-based clinical practice guidelines on therapeutic massage for low back pain[25]	78.5	4	6.5	3	2	29.5	Y	Therapeutic massage for low back pain	2012

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Table 2 (*Continued*)

Guideline	AGREE Ratings						Multiprofessional Team (Y/N)	Topic	Publication Date
		Average of Key Items							
	Total	*7*	*8*	*12*	*22*	*4,7,8,10, 12,13,15,22,23*			
Clinical Guideline for the diagnosis and treatment of lumbar disk herniation with radiculopathy[26]	99	7	4	7	2	45.5	Y	Diagnosis and treatment of lumbar disk herniation with radiculopathy	2012
Low back pain: early management of persistent non-specific low back pain Full guideline[28]	121.5	6	6	6	1.5	45	Y	Treatment of chronic LBP	2009

Table 3 Number of recommendations per type of recommendation per each guideline

Guideline	Number of Recommendations on		
	Service	Assessment	Intervention
Spinal manipulative therapy and other conservative treatments for low back pain: a guideline from the Canadian Chiropractic Guideline Initiative[18]	0 (%)	0 (%)	100 (%)
Low back pain and sciatica in over 16s: assessment and management[9]	0 (%)	11 (%)	89 (%)
Interventional therapies, surgery, and interdisciplinary rehabilitation for low back pain[19]	0 (%)	25 (%)	75 (%)
Adult acute and subacute low back pain[20]	0 (%)	15 (%)	85 (%)

Table 4 Strength of recommendation and quality of the evidence of the selected guidelines. Since the reference scales adopted by each guideline are not directly comparable, we propose here the recommendations according to 2 resuming 3-point Likert scales

Guideline	Body of Evidence			Strength of Recommendation		
	*RCTs, Systematic Reviews or, Meta-analyses**	*Clinical Studies*	*Expert Opinion*	*Strong*	*Intermediate*	*Weak*
Spinal manipulative therapy and other conservative treatments for low back pain: a guideline from the Canadian Chiropractic Guideline Initiative[18]	33.3%	33.3%	33.3%	0%	0%	100%
Low back pain and sciatica in over 16 s: assessment and management[9]	4%	48%	48%	75%	25%	0%
Interventional therapies, surgery, and interdisciplinary rehabilitation for low back pain[19]	25%	75%	0%	50%	0%	50%
Adult acute and subacute low back pain[20]	10 (%)	45 (%)	45 (%)	46 (%)	0 (%)	54 (%)

* At least 1 RCT or 1 systematic review is required to classify in this column.

Table 5 Number of identified recommendations per topic (functioning domain?) and recommendation type (service, assessment, interventions)

Topics	Selected Guidelines			
	Spinal Manipulative Therapy and Other Conservative Treatments for Low Back Pain: A Guideline From the Canadian Chiropractic Guideline Initiative. Bussières et al	Low Back Pain and Sciatica in Over 16 s: Assessment and Management. Ward et al	Interventional Therapies, Surgery, and Interdisciplinary Rehabilitation for Low Back Pain. Chou et al	Adult Acute and Subacute Low Back Pain. Thorson et al
Service recommendations				
	-	-	-	-
Assessment recommendations				
Discography			In patients with chronic nonradicular low back pain, provocative discography is not recommended as a procedure for diagnosing discogenic low back pain. There is insufficient evidence to evaluate validity or utility of diagnostic selective nerve root block, intra-articular facet joint block, medial branch block, or sacroiliac joint block as diagnostic procedures for low back pain with or without radiculopathy.	
Intervention recommendations				
Education		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.		All patients should receive appropriate education on the treatment and recovery expectations for acute and subacute low back pain.
Exercise		Consider a group exercise program (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.		Clinicians should advise patients with acute and subacute low back pain to stay active and continue activities of daily living within the limits permitted by their symptoms.

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Belts and corsets		Do not offer belts or corsets for managing low back pain with or without sciatica.	
Foot orthotics		Do not offer foot orthotics for managing low back pain with or without sciatica.	
Rocker sole shoes		Do not offer rocker sole shoes for managing low back pain with or without sciatica.	
Spinal traction		Do not offer traction for managing low back pain with or without sciatica.	
Manual therapy: spinal manipulation, mobilization or soft tissue techniques such as massage	For patients with chronic (>3 months) LBP, we suggest SMT over minimal intervention to decrease pain and disability in the short term (very low evidence, conditional recommendation).	Consider manual therapy (spinal manipulation, mobilization 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.	Spinal manipulation should be considered in early intervention for acute and subacute low back pain.
Manual therapy: spinal manipulation, mobilization or soft tissue techniques such as massage	For patients with chronic (>3 months) LBP, we recommend SMT or other treatments for short-term reduction in pain and disability (high quality of evidence, conditional recommendation).		
Manual therapy: spinal manipulation, mobilization or soft tissue techniques such as massage	For patients with chronic (>3 months) back-related leg pain, we suggest SMT plus home exercise and advice to reduce back pain and disability (low quality of evidence, conditional recommendation).		
Acupuncture		Do not offer acupuncture for managing low back pain with or without sciatica.	Acupuncture should be considered for subacute low back pain.
Ultrasound		Do not offer ultrasound for managing low back pain with or without sciatica	
PENS		Do not offer percutaneous electrical nerve simulation (PENS) for managing low back pain with or without sciatica	
TENS		Do not offer transcutaneous electrical nerve simulation (TENS) for managing low back pain with or without sciatica	
Interferential therapy		Do not offer interferential therapy for managing low back pain with or without sciatica	
- Behavioral therapies - Cognitive therapies		Consider psychological therapies using a cognitive behavioral approach for	

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-Cognitive Behavioral approaches - Mindfulness -I26 Acceptance and commitment therapy (ACT)	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, mobilization or soft tissue techniques such as massage).	
NSAIDs	Consider oral 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	Non-steroidal anti-inflammatory medication may be used for short-term relief in patients with acute and subacute low back pain. Patient should be counseled on potential side effects
NSAIDs	When prescribing oral NSAIDs for low back pain, think about appropriate clinical assessment, ongoing monitoring of risk factors, and the use of gastroprotective treatment.	
NSAIDs	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.	In general, opioids are not recommended for acute and subacute low back pain. If non-opioid options have been tried and the clinician feels that a trial of opioids are necessary, the first opioid prescription for acute pain should be the lowest possible effective strength of a short-acting opioid, not to exceed 100 MME total. Patients should be instructed that 3 days or less will often be sufficient.
Opioids	Do not offer opioids for managing chronic low back pain	
Opioids	Do not routinely offer opioids for managing acute low back pain	
Paracetamol	Do not offer paracetamol alone for managing low back pain.	Acetaminophen may be used as an option for pain relief in patients with acute and subacute low back pain. Patients should be counseled on potential side effects.
Antidepressant/ anticonvulsivants	Do not offer selective serotonin reuptake inhibitors, serotonin-norepinephrine	

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		reuptake inhibitors, or tricyclic antidepressants for managing low back pain		
Antidepressant/ anticonvulsivants		Do not offer anticonvulsants for managing low back pain.		
Combined physical and psychological program, incorporating a cognitive behavioral approach	For patients with chronic (>3 months) LBP, we suggest multimodal therapy with or without SMT to decrease pain and disability (moderate quality of evidence, conditional recommendation).	Consider a combined physical and psychological program, incorporating a cognitive behavioral 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.	In patients with nonradicular low back pain who do not respond to usual, noninterdisciplinary interventions, it is recommended that clinicians consider intensive interdisciplinary rehabilitation with a cognitive/ behavioral emphasis (strong recommendation, high-quality evidence). Chronic back pain is a complex condition that involves biologic, psychological, and environmental factors. For patients with persistent and disabling back pain despite recommended noninterdisciplinary therapies, clinicians should counsel patients about interdisciplinary rehabilitation (defined as an integrated intervention with rehabilitation plus a psychological and/or social/occupational component) as a treatment option.	
Interventions/ multidisciplinary programs with a specified return to work focus (or including ergonomic interventions): (1) Uni-disciplinary programs including combined concepts (2) Multidisciplinary biopsychosocial programs		Promote and facilitate return to work or normal activities of daily living for people with low back pain with or without sciatica		
Spinal injection		Do not offer spinal injections for managing low back pain.	In patients with persistent radiculopathy due to herniated lumbar disk, it is recommended that clinicians discuss risks and benefits of epidural steroid injection as an	Epidural steroid injections may be used as an adjunct treatment for acute and subacute low back pain with a radicular component to assist with pain relief.

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		option (weak recommendation, moderate-quality evidence). It is recommended that shared decision-making regarding epidural steroid injection include a specific discussion about inconsistent evidence showing moderate short-term benefits, and lack of long-term benefits. There is insufficient evidence to adequately evaluate benefits and harms of epidural steroid injection for spinal stenosis.	
Spinal injection	Consider epidural injections of local anesthetic and steroid in people with acute and severe sciatica.	In patients with persistent nonradicular low back pain, facet joint corticosteroid injection, prolotherapy, and intradiscal corticosteroid injection are not recommended. There is insufficient evidence to adequately evaluate benefits of local injections, botulinum toxin injection, epidural steroid injection, intradiscal electrothermal therapy (IDET), therapeutic medial branch block, radiofrequency denervation, sacroiliac joint steroid injection, or intrathecal therapy with opioids or other medications for nonradicular low back pain.	
Spinal injection	Do not use epidural injections for neurogenic claudication in people who have central spinal canal stenosis.		
Heat			Heat may be used for pain relief for acute/subacute low back pain.
Cold			Cold therapy may be used for pain relief
Muscle relaxants			Muscle relaxants may be used as a short-term option (<1 week) in the treatment of acute low back pain. Possible side effects should be considered.

given in each CPG is reported in Table 4. The recommendations from all the included CPGs are summarized in Table 5.

Education

Two CPGs emphasized the importance to provide appropriate education regarding management and recovery expectations for acute, subacute, and chronic LBP with and without radiculopathy.[7,27] Specifically, patients should receive advice and information, tailored to their needs and abilities, to help them self-manage their LBP with or without radiculopathy, throughout care. This should also include encouragement to continue with normal activities.[7]

Exercise

The main rehabilitation approaches focused on exercises (various types) in combination with other interventions such as spinal manipulation,[35] reassurance, and education.[7]

Physical modalities

Several recommendations did not support using commonly used physical modalities such as ultrasound, PENS, TENS, and interferential therapy. The evidence suggests that ultrasound and interferential therapy were not effective, while conflicting evidence was found about the effectiveness of TENS for pain and function.[7]

Acupuncture

Acupuncture is recommended for subacute LBP[27] but not for chronic LBP with or without radiculopathy.[7]

Drugs

One guideline recommended that nonsteroidal anti-inflammatory drugs (NSAIDs) may be used primarily in the acute phase, possibly together with education and encouragement to maintain the usual activity,[7] and eventually in subacute and chronic cases for short-term pain relief at the lowest possible dosage and combined use of gastroprotective treatment.[7,27]

Paracetamol is not recommended alone in LBP (whatever the duration) by 1 CPG while another CPG set no limitation but information about side effects.[27]

Opioids should not be used routinely but could be recommended for a short treatment for acute LBP in case NSAIDs are contraindicated.[7,27]

Antidepressants are not recommended for the management of LBP.[7]

Interdisciplinary rehabilitation approach

For complex cases of persistent pain, it is recommended that clinicians consider intensive interdisciplinary rehabilitation that includes exercise with a cognitive/behavioral approach to reduce fear of movement, catastrophizing, and anxiety.[7,29]

Spinal injections

Steroidal epidural injections were only recommended for short-term benefits in patients with LBP and radiculopathy,[7,27] but their side effects must be discussed with patients.[29]

Discussion

We identified several CPGs to inform the management of LBP, but their methodological quality varies. According to our systematic search and quality evaluation, most of the retrieved CPGs did not fulfil the minimum quality criteria defined by the WHO to be included in the present review. All excluded CPGs failed to demonstrate editorial independence, while others also had limitations with the description of the search methodology.[31-38] Overall, we did not find CPGs that informed the management of pediatric patients with LBP.

Several recommendations from high-quality CPGs were consistent across guidelines. Specifically, high-quality guidelines recommended rehabilitation and education for patients with LBP. Furthermore, CPGs were consistent with their recommendations against the use of passive modalities such as ultrasound, PENS, TENS, and interferential therapy.[7] Overall, we found that the quality of evidence for pharmacologic therapies is poor. CPGs suggest that pharmacologic therapies have a very limited role in LBP patients, and should be used, when necessary, only together with other modalities.

The CPGs included in our review recommend multimodal approaches that combine exercise, manipulation, and education from cognitive behavioral approaches for chronic low back patients. The overall evidence suggests that an approach primarily focused only on pain management is not effective, while a rehabilitation approach based on multimodal care may be effective for chronic back pain >3 months.

A limitation common to many CPGs is that recommendations are often vague and do not provide practical advice for implementation in clinical practice. For example, it is recommended that clinicians should provide advice to continue usual activities (which includes resumption of work); however, no CPG describes the ingredients and mode of delivery of this intervention.[7,29] Moreover, recommendations provide few details on how to address environmental or occupational barriers to optimize function. Finally, no details are provided about the effect of co-morbid conditions (such as depression) and how these co-morbidities should be co-managed to improve functioning.[39]

The examined literature's primary flaw is how frequently CPG recommendations rely on weak evidence or expert opinion (Table 4). Because providers and patients cannot be blinded, it might be challenging to perform high-quality RCTs in the field of rehabilitation, which results in recommendations being made based on weak data. Given the issues with blinding, we need to close the gaps and find better ways to carry out rehabilitation intervention trials. Also, interventions for rehabilitation require an individualized approach more than standardization and this creates specific research challenges. Finally, reporting is another issue for interventions to be replicated and compared across studies.

The CPGs examined in this analysis do not provide recommendations for appropriate sites for rehabilitation, supervision requirements, scheduling, or length of interventions. A description of the providers and their particular training is also missing, as well as information regarding the procedures, activities, and/or processes used in the intervention, including any enabling or support activities.

The search strategy for our review ended in March 2019 to comply with the WHO PIR methodology. Future updates will likely include more recent CPGs and our recommendations should be updated accordingly.[40]

Our systematic review of CPG's agrees, in part, with a previous systematic review of CPGs for the management of low back

pain.[41] In their review, Wong et al reported that all patients with acute or chronic LBP should be treated with education, reassurance, and instruction on self-management options. Moreover, they reported that patients with acute LBP should be encouraged to return to activity and may benefit from paracetamol, NSAIDs, or spinal manipulation. The recommendation that paracetamol should be used to manage acute LBP differs from our conclusion. This is due to the recent reporting in a placebo-controlled randomized controlled trial that paracetamol is ineffective for the management of acute LBP.[42] Our recommendations also differ from Wong et al for the management of persistent LBP. While Wong et al recommended that the management of chronic LBP may include exercise, paracetamol or NSAIDs, manual therapy, acupuncture, and multimodal rehabilitation (combined physical and psychological treatment), we recommended multimodal approaches that combine exercise, manipulation, and education from cognitive behavioral approaches. The differences in recommendations may be attributable, in part, to the fact that the literature search covered by Wong et al ended in 2014.

Study limitations

Our systematic review has limitations. First, our search of the literature needed on March 17, 2019. Therefore, it is possible that recently published high-quality CPGs were not included in our review. Second, our literature search was not reviewed by a second librarian using the PRESS checklist. we selected 5 CPGs and it is possible that including a larger number of guidelines may have affected our recommendations. Finally, we used an arbitrary cut point based on the AGREE II quality scores to differentiate between low vs high risk of bias CPGs. It is possible that using a different approach based on the effect of specific biases may have led to different recommendations.

Strengths

First, we used the WHO definition of rehabilitation to identify eligible interventions. Second, we searched articles in 4 languages in 9 databases. Third, we searched the gray literature. Finally, we used the AGREE tool to critically appraise the quality of CPGs.

Conclusion

Our review summarizes recommendations from high-quality CPGs for the rehabilitation of adults with LBP with or without radiculopathy. Overall, the recommendations highlight the benefits of education, exercise, and multimodal care that includes manual therapies. However, the use of most passive modalities is not recommended. Implementation strategies are needed to implement the recommendations and evaluation of these strategies to see if there's an improvement in patients' outcomes and costs. The identified interventions from the high-quality CPGs were used as the basis for selecting relevant interventions included in the PIR for LBP.

Keywords

Education; Quality of life; Rehabilitation; Sciatica

Corresponding author

Stefano Negrini, Department of Biomedical, Surgical and Dental Sciences, University "La Statale", Milan, Italy. *E-mail address:* stefano.negrini@unimi.it.

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